

CREWS CARIBBEAN – Project Document for Additional Financing

1	Project Title	Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean Additional financing for the Caribbean region		
2	Project Reference	CREWS/RProj/03/Regional Project Caribbean/rev		
3	Geographic coverage	Caribbean Community (CARICOM) Member States		
4	Timeframe	1 Feb. 2022 - 31 Dec. 2022		
5	Total cost of CREWS contribution	US\$ 5.5 million + US\$ 1 million Total US\$ 6.5 million		
6	Implementing Partner	The World Bank/GFDRR		
		a. Allocation Requested for Execution by Government	0	
		b. Allocation Requested for Execution by Partner	2,575,000	
		c. Fees of Implementing Partner:	300,000	
		d. Co-financing provided by Partner(s)		
		d. Total requested	2,875,000	
7	Additional Implementing Partners	WMO		
		a. Allocation Requested for Execution by Partner	2,000,000	
		b. Fees of Additional Implementing Partner:	300,000	
		c. Total requested:	2,300,000	
8	Additional Implementing Partners	UNDRR	Original	Additional
		a. Allocation Requested for Execution by Partner	287,611	884,956
		b. Fees of Additional Implementing Partner:	37,389	115,044
		c. Total requested:	325,000	1,000,000
9	Total requested	US\$ 5.5 million (approved by SC 6) US\$ 1.0 million (additional financing request)		
	Co-financing provided by Partner(s)	US\$ 1.5 million (from the contribution by Canada to WMO)		
10	Total Project Amount	US\$ 8.0 million (including co-financing provided by Partners)		
11	Main objective	To further strengthen and streamline regional and national systems and capacity related to weather forecasting, hydrological services, multi-hazard impact-based warnings and service delivery for enhanced decision-making, in particular the response capacity of individuals, institutions and communities.		
12	Initial state of play - project rationale			
	a. Vulnerability, exposure to risks, disasters impacts (on people and economy)	The Caribbean region is highly exposed to natural hazards, in particular, hydrometeorological hazards such as hurricanes and tropical storms, floods, landslides and storm surge, have caused significant damage in the region. Amongst the most damaging hydrometeorological events were Hurricane		

	<p>Ivan's passage over Grenada which resulted in 2004 in damage and losses of about 200% of GDP, Hurricane Tomas (2010) which caused impacts representing more than 40% of Saint Lucia's GDP and Hurricane Matthew (2016) which gave rise to about 22% of GDP loss in Haiti. Tropical storm Erika hit Dominica in 2015 resulting in 11 deaths, about 7,229 persons impacted by the event and estimated damages and losses of about 90% of GDP. Most recently, Hurricane Irma devastated Barbuda resulting in the subsequent full evacuation of the island and Hurricane Maria devastated Dominica which resulted in damage and losses of over 220% of GDP. According to WMO (2011)^[1], between 1980 and 2007 nearly 98% of the disasters, 99% of casualties and 99% of the economic losses in this region were related to hydrometeorological and climate related phenomena. Climate change is expected to further exacerbate hazard levels while unplanned urban expansion and inadequate construction practices are continuously increasing vulnerability.</p> <p>The capacity of National Meteorological and Hydrological Services (NMHS) as well as Disaster Risk Management (DRM) offices in the region is highly varied - in some, especially small, countries the NMHS consists of only few people with limited technical training, while others, especially larger countries or foreign territories have far higher levels of capacity, training and technology. Sharing, collaboration and coordination mechanisms are in place. Shared amongst a large number of islands is the agreement on the importance of strengthening hydromet services and EWS in the Caribbean. During the "Caribbean Early Warning System Workshop", which took place in 2016, the need for strengthening capacity and coordination around EWS using a multi-hazards approach, was acknowledged. Furthermore, its relevance has also been expressed by Caribbean countries through the (Intended) Nationally Determined Contributions (I-NDCs) in which 9 out of 16 countries refer specifically to EWS and another 6 countries emphasize the need to address the risk of extreme climate events^[2].</p> <p>Regional agencies, particularly the Caribbean Institute on Meteorology and Hydrology (CIMH) and the Caribbean Disaster Emergency Management Agency (CDEMA), have the mandate to harmonize efforts and support national level hydrometeorological services and EWS. In the past, support from multi-lateral and bi-lateral agencies, at times, has not taken this heterogeneity into account, resulting in scattered efforts across the region with resources not being used optimally.</p> <p>For instance, under the umbrella of the Caribbean Meteorological Organization (CMO) stronger national meteorological services made commitment to provide support to their less capable neighbours. However, such commitment is not always supported by resources. For example, Antigua and Barbuda Meteorological Service (ABMS) – providing forecasts to Anguilla, British Virgin Islands, Montserrat, St. Kitts and Nevis - indicated that ABMS staff do not have access to <i>in situ</i> near real-time data and due to lack of resources, infrequently visit these countries, which makes targeted community level forecasting and situational awareness difficult.</p> <p>Since the initial design of the project, the Caribbean remains exposed to a variety of hazards intensified by climate change. Even though, CARICOM</p>
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^[1] WMO (2011) Strengthening of Risk Assessment and Multi-Hazard Early Warning Systems for Meteorological, Hydrological and Climate Hazards in the Caribbean

^[2] WMO (2017) Stocktaking – Climate Risk and Early Warning Systems – Caribbean Region

		<p>Caribbean countries were not heavily affected by the 2020 and 2021 hurricane seasons, their exposure to this particular climate related phenomena is still considerable; and the potential impacts on Caribbean SIDS could be even more devastating than those caused in the continental Caribbean as it was the case of Honduras, Nicaragua and Colombia with Hurricanes Iota and Eta. In addition, the Caribbean region and especially its economic activity have been hit by external shocks, notably a global recession and a collapse in international trade. The health crisis caused by the COVID-19 pandemic has also produced the worst economic and social upheaval in recent decades around the world and in the economies of the Caribbean region. According to the Economic Commission for Latin America and the Caribbean (ECLAC) projections, as a result of the pandemic the economies of the Caribbean will contract by 6.2%. This is expected to result in higher unemployment, as well as, greater poverty and inequality, two major and historical drivers of vulnerability in the region.</p>
	<p>b. Status of the EWS, DRM agencies and NMHSs, actors / players present</p>	<p>The Caribbean Institute on Meteorology and Hydrology (CIMH) is a regional research institution specializing in meteorological, hydrological and climate research under the umbrella of the Caribbean Community (CARICOM) with the following additional roles: (i) designated WMO Regional Training Center as well as Regional Climate Centre for the Caribbean (ii) WMO Regional Instrument Centre (RIC), (iii) WMO recognized Centre of Excellence specializing in the Training in Satellite Meteorology, (iv) the WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) Centre for the Pan American region and (v) host of the Caribbean Centre for Climate and Environmental Simulations). While CIMH has a very strong relationship with NMHSs in the region, strong expertise including staff with strong forecasting skills and expertise in capacity building in the region, it does not have an operational mandate in the region.</p> <p>The Caribbean Disaster Emergency Management Agency (CDEMA) is the regional inter-governmental agency for disaster management in the CARICOM with the mandate to facilitate, drive and coordinate Comprehensive Disaster Management (CDM) in all Participating States. One of the Regional Outcomes is related to strengthening EWS which is aligned to the seventh global target of the Sendai Framework for Disaster Risk Reduction calling for a substantial increase of multi-hazard EWS. The Sendai Framework further refers to EWS to a critical element for disaster risk reduction.</p> <p>Many national agencies (NMHSs and DRM agencies) have limited capacity on their own to provide services given limited financial and human resources as well as technical capacity. Most NMHSs do not have a strongly user-oriented culture, partly because they do not have the legal mandate, making it challenging to define their roles, responsibilities and interactions with other agencies. The level of current annual budgets for these agencies often does not allow them to adequately maintain or invest further in their systems including observation and early warning platforms. Therefore, when new technologies become available, it is not always easy for these agencies to immediately benefit from them. The number of technical/professional staff of these agencies is limited and they need further training to adapt new technologies and develop new services. It is recognized that the introduction and subsequent expansion of structured and scheduled continuing professional development courses offered by CIMH to staff of NMHSs in the Caribbean represents a positive step in bringing new knowledge and know-how to staff in NMHSs but it is also recognized that the level of participation in these courses needs to increase.</p> <p>National Hydrological Services are particularly weak and have been paid little attention across the region. Many countries lack a dedicated agency for</p>

	<p>hydrological services with the ministry responsible for water and sanitation being the only body working on this topic and, in many cases, their focus is singularly on the quality and quantity of water for municipal and industrial purposes and does not include matters of flood mitigation and forecasting. This leaves voids in the mandate for providing hydrological services, especially since needs for such services have become greater in recent years with greater demands for water resources and increased inter-annual variability of precipitation. Flood/flash flood and landslide warning as well as hazard mapping and ground water monitoring have become more important for decision making in many countries as the residential areas further expand to high risk zones increasing exposure of people and assets.</p> <p>National and regional level operations and capacity building around EWS are scattered and being carried out through collaboration with different development partners, regional organizations and agencies from peer countries without a coordinated and integrated approach. In order to harmonize efforts, under CDEMA's leadership, a Regional Early Warning Systems Consortium has been founded beginning of 2017, which shall serve as a strategic and advisory body for the advancement and strengthened coordination of EWS within the Caribbean Region. Being chaired by CDEMA, the EWS Consortium consists of a number of regional and national agencies as well as scientific bodies and international organizations in observer role.</p>
c. Projects and programs dealing with EWS and hydromet under implementation or preparation	<p>In the following, an overview of some key activities is provided - please refer to the Stocktaking exercise prepared for the CREWS Steering Committee for information on further projects:</p> <p>The following outlines some key projects that have strengthened EWS in the region in the past and started a paradigm shift:</p> <ul style="list-style-type: none"> (i) the Enhancing Resilience to reduce vulnerability in the Caribbean (ERC) Project strengthened the early warning network, significantly enhanced the computational capacity of CIMH to develop high resolution numerical weather products for region and provided a regional early warning platform that supports impacts based forecasting, (ii) the Programme for Building Regional Climate Capacity in the Caribbean (BRCCC) which further strengthens the regional early warning network, significantly advanced climate early warning systems in the region and further enhanced the regional computational platform for the region, (iii) the Advanced Flood Forecasting Pilot Project that advanced watershed level flood forecasting in the Caribbean, and (iv) the Caribbean Water Initiative (CariWin) under which the Caribbean Drought and Precipitation Monitoring Network was established. <p>The Climate Change Adaptation Program (CCAP) – funded by USAID and implemented by CCCCC with support from CIMH – aims at promoting the use of climate data and information for the use in decision-making; support innovative adaptation approaches which demonstrate proof of concept necessary to secure additional financing; and foster climate financing to support scale up and replication of sustainable adaptation initiatives.</p> <p>The Strengthening Integrated Early Warning Systems for More Effective Disaster Risk Reduction in the Caribbean Through Knowledge and Tool Transfer project led by CDEMA with support from UNDP, IFRC and DIPECHO helped in the adaptation of the multi-hazard early warning system (MEWS) checklist, previously developed by UNISDR and WMO.</p>

	<p>Disaster Vulnerability Reduction Projects in Saint Lucia, Grenada and Dominica (World Bank and CIF ¹ financed) which have a small component on strengthening hydromet services and partially EWS. Dedicated hydromet projects in Haiti and Jamaica (WB and CIF funded) provide more in-depth support to strengthening hydromet and EWS services through a larger financial scope.</p> <p>The Severe Weather Forecasting Demonstration Project in the Caribbean, financed by Canada and implemented by WMO aims at empowering participating national meteorological and hydrological services to maintain effective multi-hazard early warning systems with greater accuracy, more advance notice and in a manner, that is more responsive to the needs of users, including disaster management and civil protection agencies, the media and the general public</p> <p>The Regional Weather Radar System Project – funded by the EU – established a radar mosaic between a large number of Caribbean radars. Activities mentioned in the proposal at hand will build on the achievements of this project.</p> <p>In addition, there have been a number of national projects, which are complementary to the regional projects listed above.</p>
d. Positioning of CREWS support: complementarity and synergies with the existing programs	<p>While a large number of initiatives are already ongoing, both at the national and regional levels, complementing and strengthening of these activities with additional regional support shows, based on a diagnostic of the situation and conversations with regional and national agencies, the largest potential for success. Strengthening the regional cascading system, e.g. for weather forecasting, can in a complementary way strengthen regional, sub-regional and national capacities in order to reach optimal levels of efficiency in service provision. Furthermore, the level of efficiency of scattered support provided by donors and partners through a regional strategy and coordination mechanisms can be significantly enhanced. The regional strategy for EWS will ensure linkages to the CDM Strategy, Sendai Framework for DRR and the Global Framework for Climate Services (GFCS) and shall be guided by regional and national policies.</p> <p>Complementarity with existing project</p> <p>This additional funding is an integral part of and key to the success of the existing project in order to strengthen the multi-stakeholder response capabilities of institutions and communities. Over the course of project implementation, it was identified through formal and informal consultations with a wide variety of projects partners (NEMOs, IPs, regional entities such as CDEMA) and stakeholders (gender bureaus, CARICHAM, ARISE, etc.) and other relevant institutions in the region such as UN Resident Coordinators, that there was a need to further invest in reinforcing several aspects of the project. These aspects included strengthening connections with disaster management entities and other key stakeholders and enhancing the consistency with and complementarity of the regional CREWS Caribbean Roadmap and identified Strategic Initiatives with national and regional DRR plans, strategies and stakeholder priorities. These aspects are key for the development of impact-based forecasting, a pivotal and transformative element of the regional MHEWS Roadmap.</p>

¹ Climate Investment Fund (CIF) through the Pilot Program for Climate Resilience (PPCR)

The systemic nature of complex risk, including climate change, requires methods that transcend the traditional compartmentalized, sectorized and departmentalized approaches to disaster risk reduction. To avoid advancing fragmented responses to systemic problems, disaster risk reduction needs to be a truly multisectoral, multi-stakeholder effort. Structures to govern risk must be agile and adaptive, and recognizant of systems' interactions and reverberations if they are to deal with their complexity and develop the tools needed for risk-informed decision-making that allows human societies to live with uncertainty. This is something highly relevant for the approaching climate risk early warning systems, and MHEWS.

International agreements such as the Sendai Framework for Disaster Risk Reduction 2015–2030, the 2030 Agenda for Sustainable Development and the Paris Agreement have all recognized the importance of developing and operationalizing multi-hazard early warning systems that integrate the specificities of single and cluster hazards early warning systems in a holistic, systematic and coordinated manner to promote synergies and maximize efficiency. While much progress has been made in recent years towards the advancement of knowledge and practice related to early warning systems worldwide, the lack of multi-disciplinary and transboundary cooperation among and across communities of scientists, decision-makers and practitioners continues to be a key challenge for the successful establishment and operation of these systems.

Global researchers and practitioners of EWS have highlighted that one of the most important factors influencing the effectiveness of early warning (EW) systems is the human factor. That is, how those who are at risk from hazards perceive that risk, and how this in turn influences their response to warnings. Therefore, it is an urgent need to consider how, by taking such factors into account, EW systems might be made more effective.

This additional funding will enable UNDRR to strengthen the gains achieved in the project so far and improve the sustainability of the project. It is designed based on the requests of different regional and national partners, in order to strengthen the response capabilities of institutions and communities. The original project, as planned in 2018, had a very modest role and resource allocation (circa 5% of the budget) for UNDRR and this additional project will enable more comprehensive implementation of the current project.

The current responsibility structure covers large focus areas of EWS with very limited resources which are, at this stage of implementation, insufficient to truly make an impact. For example, funding has been allocated for 2 regional workshops for the definition of roles and responsibilities, however there are no provisions for additional actions directed at enhancing joint ways of working for effective EWS, specifically considering the capacity strengthening needs stemming from the definition of those roles. In addition to ensuring integrating the perspectives of vulnerable groups into the strategy documents, the gender and inclusion approach also requires further engagement and capacity strengthening to truly work, which is not currently feasible. Moreover, further support is essential to ensure the full alignment of the Caribbean CREWS Multi-Hazard Early Warning System (MHEWS) strategies with the National DRR Strategies (*Target e* of the Sendai Framework) as well as with the regional Comprehensive Disaster Management (CDM) Strategy. Similarly, there is an urgent need to secure that these strategies are in line with the efforts to “substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030”, including linking the proposed strategies with other current and

future EWS strategies in the region (e.g. Tsunami EWS strategy, Pandemics EWS, etc.).

The engagement of the private sector had not been included in the original project proposal. However, its strategic importance was recognized during the Component 1 EWS diagnostic phase. The World Bank has taken up the needed tasks in the Strategy elaboration, in which the private sector role is recommended to be strengthened in the Caribbean EWS, making a case for its bigger role in the Project. There is a significant added value UNDRR can bring to the implementation of the Regional EWS Strategy recommendations in the area of private sector engagement, by leveraging on UNDRR's role as the focal point of the Private Sector Alliance for Disaster Resilience Societies (ARISE) and its historical cooperation with the network of Caribbean Chambers of Commerce CARICHAM –representing 18 Chambers of Commerce and 60,000 companies in the Caribbean region. In addition to this, UNDRR is currently involved in a series of platforms and groups with the private sector specifically on issues related to MHEWS (e.g. Varysian network, Weather Enterprise platform, etc.).

The CREWS Caribbean project has many actors and interest groups, yet it currently lacks a visibility and communication plan. Without a plan to engage stakeholders in creating awareness, a large project may be in risk of failing to connect with and build a collective understanding among the different stakeholders. The project would also benefit from support to diverse stakeholders in the collection and sharing of learning and good practices. This would serve several complementary purposes, firstly to engage stakeholders in identifying challenges and the lessons that can be drawn from practical experience, secondly to engage stakeholders in exploring diverse media and participatory methods for inclusively communicating learning and insight to different segments of the population, and thirdly in order to engage stakeholders in connecting the different EWS steps with practical examples of the different elements of MHEWS to build a shared understanding of how they can drive transformative action. It is envisaged that the various stakeholder groups will integrate MHEWS and IBS considerations in their current and future plans and strategies such as DRR strategies, PPP work plans and work plans of various vulnerable stakeholder groups. As a mechanism to monitor stakeholder engagement, UNDRR will inspect the reports provide by countries through the Sendai Framework Monitoring notably on which relates to DRR strategies and plans (Target E), as well as, on the access to MHEWS (Target G). Similarly, PPP work plans will be monitor through the ARISE² network.

The outcomes of the latest activity organized by WMO, in the framework of this project, the working sessions on Impact-Based Financing (IBF) and risk scenario planning, confirmed once again the need to expand the objectives of this project in order to secure that: 1) the linkages between impact-based forecasting and risk scenario planning, and the current operational landscape in the Caribbean, are identified; and, 2) key actors are identified and involved in every single process of this project, with a particular focus on the role of women and the private sector.

Additionally, based on the experience of implementing EWS activities through the CREWS Initiative, there is a need to further explore how countries can better assess and monitor the effectiveness of their national EWS. UNDRR will conduct an analysis of the existing data gathered by the two pilot countries to report against the global MHEWS indicators (bottom-up approach). This will be undertaken in close alignment and complementarity with the CREWS global

² ARISE is the UNDRR vehicle for building public-private disaster resilience collaboration.

		<p>project on measuring the effectiveness of MHEWS which aims to provide recommendations and expert advice to the CREWS Implementing Partners on how countries currently measure the effectiveness of their early warning systems and how such practices can be extended to LDCs and SIDS (top-down approach). In addition, the analysis of this data will support the gathering and use of IBF data (and proxy data) that will build the development of IB matrices and impact tables.</p> <p>The studies, consultations and lessons-learned through the project will be shared with all key project stakeholders to contribute to improving the original project outcomes, including the meteorological services developed in Components 2 and 3 of the project. The project will seek to engender a continuous learning feedback loop. The mechanism to share results with the different stakeholders will be in different levels: 1) through meetings of the REWS consortium; 2) National Platforms for DRR meetings; and, 3) Meetings in the framework of the Mid-Term Review of Sendai Framework implementation.</p> <p>For more detailed information about links between the problems identified by global and regional researchers and practitioners, implementing partners and project steering committee members, with the CREWS' strategic objectives, and the new proposed outcomes and outputs, please refer to Annex 5.</p>
13	Project design	
	<p>a. Project Outputs (<i>Bold italic items represent activities with contribution of CREWS financing</i>)</p>	<p>Component 1) Development of regional strategy to strengthen and streamline early warning and hydromet services (estimated cost US\$ 2,000,000)</p> <p>Specific activities could include:</p> <ul style="list-style-type: none"> (a) Evaluation of national and regional capacities as well as services currently provided vs. user needs (DRM, climate change adaptation, operational climate services provision to climate sensitive sectors, tourism, agriculture, transport, water resources, marine) and institutional capacities of NMSs, NHSs, telecom and DRM agencies. With this information, a gap analysis will be carried out which will form the basis for the next activity; (b) Development of a strategy for strengthening governance, institutional alignment and coordination including conceptualization of a regional "cascade" for better distribution and clear understanding of roles and responsibilities between regional, sub-regional and national levels, more efficient use of resources and more effective leverage. This step will be based on the findings from step (a) and build on/strengthen existing but often informal or not fully functional institutional arrangements between the regional, sub-regional and national level; (c) Develop an appropriate approach to risk informed decision making regarding EWS at the regional and national levels considering existing data, methodology to collate and share and identifying gaps in risk assessments at the regional and national level. (d) Integration of gender aspects and other vulnerable groups (children, elderly and the disabled) in the regional strategy for early warning systems. (e) Evaluation of the status and available gaps in the existing Doppler radar network, develop pre-feasibility study for strengthening the regional network to ensure its sustainable operation, at least for the hurricane season. Improve utilization of Doppler radar information and other remote sensing data for "now-casting" of extreme meteorological and hydrological events; (f) Evaluate the resiliency of basic NMHSs and DRM infrastructure including regional communication and observation networks, forecasting centres, shelters and other facilities, and development of recommendations for making them more resilient.

	<p>(g) Review potential opportunities to build partnerships between public and private sector to improve delivery of hydromet services and functioning of the EWS;</p> <p>(h) Evaluate opportunities and develop recommendations for broader use of social science to improve formulation the warnings and information on severe weather to make them more actionable;</p> <p>(i) Assessment of socio-economic benefits of better hydromet services and EWS on national and regional level and advocacy at high levels for better regional and national support in order to ensure the sustainability of investments and activities. Strengthening hydromet and early warning services requires adequate funding and this assessment of costs versus benefits shall support the communication of the required budgets in a transparent way as well as convey the benefits of such investments; and</p> <p>(j) Identification of priority investment needs and development of investment proposals for leveraging further funding from different sources including the WB.</p> <p>Component 2) Institutional Strengthening and streamlining of early warning and hydromet services (estimated cost US\$ 2,100,000)</p> <p>Capacity building and training activities will be focusing on comprehensive strengthening and operationalizing of a cascading forecasting system that will feed into comprehensive and coordinated early warning systems in the region. In the context of the integral cascading approach particular activities will cover the following key aspects (to be refined on basis of the findings under Component 1):</p> <p>(a) Institutional strengthening at regional and national level to support a clear definition of roles and responsibilities of CIMH, CDEMA and national NMSs, NHSs, DRM agencies and other relevant stakeholders within the context of national and regional weather, climate and hydrological services and early warning systems;</p> <p>(b) Strengthening of meteorological and hydrological observation, data management and weather, climate and flood forecasting;</p> <p>(c) Strengthening and streamlining regional cascading framework through regional initiatives such as the Severe Weather Forecasting Demonstration Project, Global Flash Flood Guidance System, Caribbean Climate Outlook Forum, and Caribbean Early Warning Information Systems Across Climate Time Scales Consortium Meetings;</p> <p>(d) Expand and enhance Multi-Hazard Early Warning Systems, risk assessments and Impact-Based Forecasting with the objective for better informing the exposed communities. Installation and putting in operation low cost-high priority observation and ICT infrastructure should be considered to support this activity.</p> <p>(e) Support broader use of social/communication science to improve formulation of information and warnings to make them more actionable, taking into account gender specific communication aspects;</p> <p>(f) Enhancing and extending awareness raising with multiple actors on early warning as integrated element of disaster risk management; and</p> <p>(g) Enhancing and extending existing awareness raising and capacity building for priority sector users through joint training with service provides.</p> <p>Component 3) Support for piloting high priority national activities including impact-based forecasting (estimated cost US\$ 1,400,000)</p> <p>This component will support piloting and implementation of a few high priority activities on the national level where the roadmap and prioritized action plans for hydromet modernization and improvement of EWSs are already available or under preparation. The specific scope will be discussed with the regional</p>
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		<p>organizations and potential beneficiary countries which would be also guided by the process of developing regional strategy and investment plan to be undertaken in the activity. The activities are expected to focus on strengthening institutions at national level supported by CDEMA and CIMH including capacity building and training, developing Concept of Operations (CONOPSs) and Standard Operating Procedures (SOPs). Lessons learned from these projects will be captured and fed into the finalization of the regional strategy and development of more comprehensive and integrated investment for the next phases.</p> <p>The implementation of the regional and national components of CREWS Caribbean will be closely coordinated by WMO, World Bank, UNISDR and regional implementing partners: CIMH, CDEMA and others.</p> <p>Additional funding to be implemented by UNDRR USD 1 million)</p> <p>The additional funding will reinforce institutional and community response capacities for the three original project components (see above); notably components 1 (regional strategy) and 3 (reinforce national institutions and community response capacities) by promoting a “systemic risk multi-sectorial and multi-stakeholder dialogue” and “creating the necessary enabling environment for impact-based forecasting and effective MHEWS”.</p> <p>I. Strengthening of Component 1 through a systemic risk multi-sectoral and multi-stakeholder dialogue</p> <p>Regional</p> <ol style="list-style-type: none"> 1. Strengthening the Regional Early Warning Systems (REWS) as a mechanism for securing synergies with other non-climate-related hazards EWS in the region. (e.g. Tsunamis, biological hazards, coral reef, etc.). 2. Mapping of existing regional and national EWS based on the UNDRR/ISC Hazard Taxonomy 3. Develop recommendations for service providers to ensure synergies among different individual EWS and cluster EWS to engender a MHEWS approach. 4. Development of a Risk, EWS and IBF Perception Study in selected countries to be implemented in close coordination with the University of West Indies, and the Red Cross and key vulnerable groups. 5. Development of knowledge products to be part of the educational offer of Caribbean Universities’: Impact-Based Forecasting MOOC 6. Integration of MHEWS Roadmap elements in different already planned trainings (e.g. Risk Financing, CRM, Systemic Risk, etc.)Project communication, visibility and engagement strengthened through development and implementation of communication, visibility and engagement strategies. <p>Strengthening of Component 3 by reinforcing and creating the necessary enabling environment for impact-based forecasting and effective MHEWS</p> <p>National (Guyana and Trinidad and Tobago)</p> <ol style="list-style-type: none"> 7. Analysis of points of entrance, and recommendations for integrating MHEWS and IBF, including the identification of roles and responsibilities, in: 1) National Strategies for Disaster Risk Reductions (Country Work Programmes*); 2) ARISE Public-Private Partnership Action Plans; and, 3) Gender Working Group Action Plans;
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	b. Implementing time frame	See Annex 1
	c. Contribution to CREWS Programming Framework	<p>This project will contribute to the achievement of the following outputs in the CREWS Programming framework:</p> <ul style="list-style-type: none"> ▪ Regional (cascading) weather and climate monitoring and prediction products with facilitated access for CREWS Project Countries; ▪ Pooled (regional) trainings for high impact sectors (disaster risk management, health, agriculture, tourism, energy and water resources among others) ▪ Regional monitoring, forecasting and warning products for extreme events (flood, drought, wind, extreme heat, other weather events); ▪ Regional inter-governmental organizations strengthened to support NMHSs and early warning capacities. ▪ NMHSs' service delivery improved including development of impact based capacity and tailored information for risk management. ▪ Long-term development plans for NMHSs, including the need for system interoperability at the national and regional levels. ▪ Targeted education and public awareness programs available for warning systems and related public action. ▪ Enhanced capacities of service providers to design, develop, implement, measure and monitor EWS effectiveness. ▪ Increased engagement and use of MHEWS by stakeholders and practitioners, including private sector entities and groups mobilizing women, peoples with disabilities, youth, for MHEWS and Impact-based Forecasting. ▪ Sustainability of MHEWS ensured by their inclusion of MHEWS and IBF considerations in current and future plans and strategies such as national DRR strategies, PPP work plans and work plans of various vulnerable stakeholder groups. ▪ Information and data are identified and mapped for effective MHEWS and Impact-based Forecasting
	d. Logical framework with indicators	See Annex 2
14	Organization and operating procedure	

	a. Institutional framework	<p>These additional activities will be implemented by UNDRR in close coordination with the other two implementing partners, the World Bank (project lead) and WMO. In addition, there will be extremely close collaboration with CIMH and CDEMA and with the University of West Indies, the Red Cross-National Societies and the CARICHAM.</p> <p>A Steering Committee will be assembled for this project (project steering committee - PSC) in order to support ensuring participation, harmonization and collaboration across international, regional and national stakeholders. The role of the PSC will be to provide overall oversight, policy direction on project implementation resolving any policy hurdles or policy conflicts and supporting project risk management. The PSC will be presented with and consulted regarding the implementation plan and annual budget, and will be briefed as often as needed but at least bi-annually on project progress.</p>
	b. Monitoring and evaluation system	<p>The M&E system will be based on the results framework that is an integral part of the project implementation. Performance monitoring and reporting will follow UNDRR's monitoring and evaluation system. The indicators will be, as applicable, gender disaggregated.</p> <p>Project reviews will take place on a bi-annual basis and will include reporting of progress and outputs to date. The project reviews will include an assessment of the engagement of various stakeholders and their actions taken as a result of the project through such mechanisms as surveys and interviews. The project reviews are conducted internally but integrate external expert opinions.</p>
15	Project viability and sustainability	
	a. Main identified risks	<p>Operational risks:</p> <p>Low commitment to coordinate and collaborate at national and regional level (risk level moderate). In order to manage this risk it will be critical to carry out a highly participatory and transparent process, especially as it relates to the development of a regional strategy, and take small, financially and institutionally sustainable steps.</p> <p>Delays due to the negative impacts of natural, socio-natural and social hazards, potentially triggering disasters (risk level moderate): Taking the example of the 2017 hurricane season, the large number of big disasters such a situation requires significant attention at regional and national level possibly leading to delays in the implementation of the project proposed in this document. In order to mitigate this risk, flexible adjustment of the sequence of activities is required. On the other side, continuous learning from disasters and the related forecasting and early warnings offers a great opportunity for this project to be relevant.</p> <p>The ongoing COVID-19 pandemic poses risks to planning in-person gatherings in the short and medium term. As such, the project adopts a business continuity strategy and support, and will be able to adapt to restrictions to travel and in-person meetings.</p> <p>Financial risks:</p> <p>Financial sustainability after finalization of the project: With the challenge of many ongoing projects, this proposal suggests minimizing this through a dedicated activity under component 1 which aims at the analysis of costs and benefits followed by advocacy at national, high political level. Furthermore, close coordination with national level projects with hydromet/EWS activities supported by the World Bank and other development partners is planned during project implementation. This should build the foundation for follow-up after the project at hand is closed.</p>

	b. Critical assumptions	<p>For the project to be successful, the following assumptions are critical:</p> <p>Strong commitment from all the implementing partners including the regional agencies CIMH and CDEMA.</p> <ul style="list-style-type: none"> ▪ Strong interest and engagement from the NMHSs and DRM agencies in the region; ▪ Openness and willingness to collaborate internationally, regionally and nationally; ▪ Willingness of different stakeholder groups to engage, notably women, people with disabilities, child and youth, local communities, and private sector, among others; ▪ Adaptability of the strategic processes to actively involve vulnerable groups; ▪ Strong interest of national governments to mainstream MHEWS in their policies and strategies, including setting up the necessary institutional architecture and budget allocation for it.
	c. Judgment on the project sustainability	<p>Sustainability of the project will be ensured in the long run through:</p> <ul style="list-style-type: none"> ▪ Close coordination with ongoing and future World Bank Projects: this proposed project would build on and closely coordinate with ongoing World Bank projects in order to ensure sustainability of investments from the lending operations as part of the regional cascading system with stronger regional collaboration and capacity building. On the other side, findings from this project will inform content and design of future World Bank projects and aim at continuing efforts. ▪ Ensuring ownership by CIMH, CDEMA, supported by the Regional EWS Consortium, as well as national NMHSs and DRM agencies during project development and implementation: stakeholder participation and engagement will be an important aspect of the project development and implementation process. With the project objectives and activities being in line with regional priorities and needs, as well as realistic in scope, a critical path towards sustainability is done. ▪ Increasing donor support and coordination: Investments made to date have resulted in limited sustainability of impact due to fragmentation of efforts, among other factors. Through the PSC and further mechanisms such as donor coordination meetings at various fora, the project team will make sure to coordinate and harmonize efforts with activities from other donors. ▪ Support countries to access international funds to further strengthen NMHS and DRM: Through the regional and several national “gap analysis” as well as the cost-benefit evaluation, the project will support countries to make a case for and access funds for further strengthening of hydromet and EWS. ▪ Support mobilization of domestic resources to continue efforts after project finalization: Advocacy at high levels of national governments for better regional and national support and ensuring sustainability of investments is a key element of the project. The cost-benefit analysis will serve as foundation for these conversations.

		<ul style="list-style-type: none"> ▪ Within the implementation of the project, there should be as part of the sustainability model a look at models for revenue generation or cost recovery that would create funds at either national or regional level that could be used to sustain aspects of the project. For example, under the BRCCC programme, the CIMH implemented a renewable energy programme and “paperless” office among other things that produced substantial cost savings with regards to our operational budget. These cost savings have been reprogrammed into new areas of activities that are sustaining and expanding activities under the BRCCC. Under CREWS, we could look at markets and developing suites of products and services to the private sector that go generate revenue or reduce cost. In any case, the CREWS could conceptualize and implement pilot models for revenue generation and cost savings that could be reinvested into the sustaining activities in addition to those mentioned above. The outputs of this approach could perhaps add some innovation to the Caribbean CREWS initiative. ▪ Linking MHEWS with national and regional plans, strategies and legislation will ensure the sustainability of project activities in the long-term.
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	FY 2019				FY 2020				FY 2021				FY 2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1) Development of regional strategy to strengthen and streamline early warning and hydromet services																
(a) Evaluation of user needs and institutional capacities of NMSs, NHSs and DRM agencies		X	X													
(b) Development of a strategy for strengthening institutional alignment and coordination including conceptualization of a regional “cascade”			X	X	X	X										
(c) Develop an appropriate approach to risk informed decision making regarding EWS at the regional and national level considering existing and identifying the need risk assessments;																
(d) Integration of gender aspects and other vulnerable groups (children, elderly and the disabled) in the regional strategy for early warning systems.	X	X	X	X	X	X										
(d1) Taking forward recommendations from the WMO report on lessons learned from the 2017 hurricane season focusing on gender.	X	X														
(e) Develop pre-feasibility study for strengthening Doppler radar network			X	X	X	X										
(g) Review potential opportunities and make recommendations to build partnerships between public and private sector to improve delivery of hydromet services and functioning of the EWS;					X	X	X									

(f) Evaluate the resiliency of basic NMHSs and DRM infrastructure including regional communication and observation network, forecasting centers, shelters and other facilities, and develop recommendations for making them more resilient.				x	x	x										
(g) Evaluate opportunities and develop recommendations for broader use of social science to improve formulation the warnings and information on severe weather					x	x	x	x								
(h) Assessment of socio-economic benefits of stronger hydromet and EWS as well as the regional approach						x	x	x	x							
(i) Identification of priority investment needs and development of investment proposals						x	x	x	x	x	x	x				
(j) Strengthening REWS as a mechanism for securing synergies with other non-climate-related hazards EWS in the region. (e.g. Tsunamis, biological hazards, coral reef, etc.).													x	x	x	x
(k) Development of recommendations for service providers to ensure synergies among different individual EWS and cluster EWS to engender a MHEWS approach.															x	
(l) Mapping of existing regional and national EWS based on the UNDRR/ISC Hazard Taxonomy													x	x		
(m) Development and implementation of communication, visibility and engagement strategy.													x	x		

(n) Development of a Risk, EWS and IBF Perception Study in selected countries to be implemented in close coordination with the University of West Indies and the Red Cross.														x	x		
(o) Development of knowledge products to be part of the educational offer of Caribbean Universities’.														x	x	x	x
Component 2) Strengthening and streamlining of early warning and hydromet services																	
(a) Institutional strengthening at regional, sub-regional and national level of NMSs, NHSs and DRM agencies		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
(a1) Support regional and national integration of National Disaster Management Offices, National Meteorological and Hydrological services (2 regional workshops)		WS 1								WS2							
(b) Strengthening of hydrological observation, data management and flood forecasting					x	x	x	x	x	x	x	x	x	x			
(c) Implementation of WMO cascading initiatives			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
(d) Introduction of Multi-Hazard Early Warning Systems, risk assessments and Impact-Based Forecasting				x	x	x	x	x	x	x	x	x	x	x	x	x	x
(e) Support broader use of social/communication science to improve formulation of information and warnings to make them more actionable					x	x	x	x	x	x	x	x	x	x	x	x	x
(f) Awareness raising with multiple actor on early warning as integrated element of disaster risk management					x	x	x	x	x	x	x	x	x	x	x	x	x

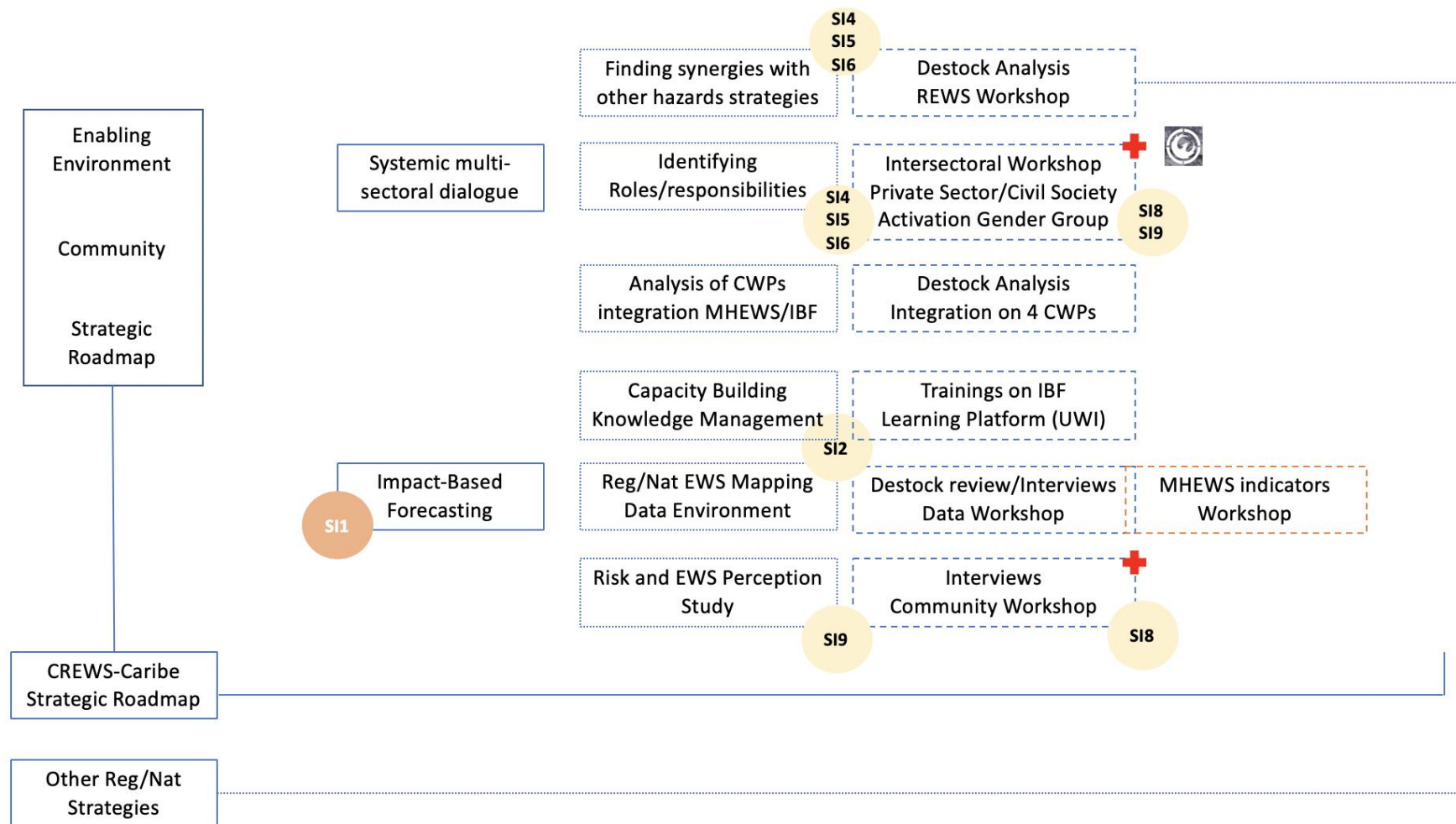
(g) Awareness raising and capacity building for priority sectoral users through joint training with service providers			x	x	x	x	x	x	x	x	x	x	x	x	x	x
Component 3) Support for piloting high priority national activities including impact-based forecasting																
a) Identification of pilot countries, priority activities and coordination with component 1 findings						x	x									
b) Implementation of activities in close coordination with regional activities							x	x	x	x	x	x	x	x	x	x
c) Analysis of points of entrance, and recommendations for integrating MHEWS, including the identification of roles and responsibilities, in: 1) National Strategies for Disaster Risk Reductions (Country Work Programmes); 2) ARISE Public-Private Partnership Action Plans; and, 3) Gender Working Group Action Plan;													x	x	x	x
d) Mapping the data environment for IBF in two countries (Guyana, and, Trinidad and Tobago). [In line with the CREWS Measuring Effectiveness of Early Warning Systems project]													x	x	x	x

Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean
Concise Logical framework with results and impacts indicators

Objective	Indicator	Means of Verification (MoV)	Baseline	Target	
				Mid-term (if applicable)	Final
Strengthening of Regional Hydromet Services and EWS	Regional development strategy agreed with regional and national stakeholders	The strategy, including the socio-economic benefits analysis, finalized and confirmed at regional and national levels	TBD	+1	1
	Operating procedures support regional cooperation strategy	Operational procedures and official agreements supporting cascading forecasting and coordination mechanisms on early warning systems are in place and endorsed by the regional and national level	TBD	+ 1	+ 3
	Potential for investments and partnerships	The list of priority investments and potential partnerships, including with private sector, identified	TBD	+1	1
	Number of non-climate actors engaging in dialogue through the REWS mechanism	A regional workshop report documenting the contributions of the various climate and non-climate actors and the roadmap document highlighting the synergies identified	0	0	1
		Map of existing regional and national EWS based on the UNDRR/ISC Hazard Taxonomy	0	0	1
		A report providing recommendations for service providers to ensure synergies among different individual EWS and cluster EWS to engender a MHEWS approach			
	Increased understanding of risk, impact-based forecasting and early warning systems perceptions of institutions and communities	Risk, EWS and IBF Perception Study in selected countries	0	0	1
		MOOC training available on Impact-Based Forecasting	0	0	1
	Increase engagement of different stakeholders	Communication, visibility and engagement strategy	0	0	1
Strengthening and streamlining of early	Piloting Multi-Hazard Early Warning Systems and Impact-Based Forecasting	Number of countries with access to MHWS and IBF	TBD	+1	+3

warning and hydromet services	Strengthening of the regional forecasting capacity	Implementation of WMO cascading initiatives: Severe Weather Forecasting Demonstration Project, Global Flash Flood Guidance System, Caribbean Climate Outlook Forum, and Caribbean Early Warning Information Systems Across Climate Time Scales Consortium Meetings	TBD	+2	+4
	Number of beneficiaries reached by new/enhanced early warning systems and other risk reduction measures	Number of people located in high risk areas that are better prepared and informed before a major hydromet event strikes (including ratio between females and males)	TBD	+1,000	+,000
	Number of professionals trained	Signature and instructors' validation on the participation sheets (including ratio between females and males)	0	40	80
Institutional Strengthening and Capacity Building	Institutional Strengthening at the national level	CONOPSs and SOPs developed for priority countries; IBF is introduced to priority countries.			
	Availability of better/more relevant/higher quality regional guidance tools for impact-based forecast and warning services	Survey of satisfaction of national level users	TBD	TBD	TBD
	Availability of better/more relevant/higher quality products for at least one priority sector	Survey of satisfaction of sectorial users	TBD	TBD	TBD
	MHEWS better aligned in (can state a target number here, i.e. in at least 3) national frameworks and action plans	Document highlighting the recommendations for integrating MHEWS, including the identification of roles and responsibilities, in: 1) National Strategies for Disaster Risk Reductions (Country Work Programmes); 2) ARISE Public-Private Partnership Action Plans; and, 3) Gender Working Group Action Plan;	0	0	3
	Number of mapping reports of national data environments for IBF	Mapping reports of the data environment for IBF available.	0	0	2

Annex 3: Relation Between the Current Planned Activities with the New Activities in the Framework of the Additional Funding



Annex 4: Budget Breakdown for the Additional Funding

Activities	Estimated Total Cost (USD)
Outcome 1 : Strengthening of Component 1 through a systems multi-sectoral dialogue	
Output 1.1: Strengthening the Regional Early Warning Systems (REWS) as a mechanism for securing synergies with other non-climate-related hazards EWS in the region.	104 000
Output 1.2: Mapping of existing regional and national EWS based on the UNDRR/ISC Hazard Taxonomy	35 000
Output 1.3: Development of general recommendations for ensuring synergies on different individual and cluster hazards EWS.	77 000
Output 1.4: Development of knowledge products to be part of the educational offer of Caribbean Universities'	40 000
Output 1.5: Development of a Risk, EWS and IBF Perception Study in selected countries to be implemented in close coordination with the University of West Indies and the Red Cross	94 000
Output 1.6: Development and implementation of communication, visibility and engagement strategies.	20 000
Sub-Total	370 000
Outcome 2: Strengthening of Component 3 by reinforcing and creating the necessary enabling environment for impact-based forecasting and effective MHEWS	
Output 2.1: Analysis of points of entrance, and recommendations for integrating MHEWS, including the identification of roles and responsibilities, in: 1) National Strategies for Disaster Risk Reductions (Country Work Programmes*); 2) ARISE Public-Private Partnership Action Plans; and, 3) Gender Working Group Action Plan;	160 222
Output 2.2: Mapping the data environment for IBF in both countries. [In line with the CREWS Measuring Effectiveness of Early Warning Systems project]	80 000
Sub-Total	240 222
Cross-cutting activities	
Programme Management	274 734
Total Activities	884 956
Project Support Cost (13%)	115 044
Overall total	1 000 000

Annex 5: Matrix of problems identified, CREWS strategic objectives, new proposed outcomes and new proposed outputs

Problems/Issues to be addressed	CREWS Programming Framework	General Outcome	General Outputs
Recent international agreements such as the Sendai Framework for Disaster Risk Reduction 2015–2030, the 2030 Agenda for Sustainable Development and the Paris Agreement have all recognized the importance of developing and operationalizing multi-hazard early warning systems that integrate the specificities of single and cluster hazards early warning systems in a holistic, systematic and coordinated manner to promote synergies and maximize efficiency. While much progress has been made in recent years towards the advancement of knowledge and practice related to early warning systems worldwide, the lack of multi-disciplinary and transboundary cooperation among and across communities of scientists, decision-makers and practitioners continues to be a key challenge for the successful establishment and operation of these systems. ³	Enhanced capacities of service providers to design, develop, implement, measure and monitor EWS effectiveness	Strengthening the Regional Early Warning Systems (REWS) as a mechanism for securing synergies with other non-climate-related hazards EWS communities of scientists, decision-makers, practitioners and stakeholders (including vulnerable populations), in the region. (e.g. Tsunamis, biological hazards, coral reef, etc.).	<ol style="list-style-type: none"> 1) A regional workshop report documenting the contributions of the various climate and non-climate actors and the roadmap document highlighting the synergies identified 2) Map of existing regional and national EWS based on the UNDRR/ISC Hazard Taxonomy 3) A document stating recommendations for service providers to ensure synergies among different individual EWS and cluster EWS to engender a MHEWS approach.
Global researchers ⁴ and practitioners ⁵ of EWS have highlighted that one of the most important factors influencing the effectiveness of early warning (EW) systems is the human factor. That is, how those who are at risk from hazards perceive that risk, and how this in turn influences their response to warnings. Therefore, it is an urgent need to consider how, by taking such factors into account, EW systems might be made more effective. In this perspective the CREWS Global Initiative, is developing Operational Procedures for People-Centered Early Warning.	Increased engagement and use of MHEWS by stakeholders and practitioners, including private sector entities and groups mobilizing women, peoples with disabilities, youth, for MHEWS and Impact-based Forecasting.	Increased understanding of risk, impact-based forecasting and early warning systems perceptions of institutions and communities	<ol style="list-style-type: none"> 1) A Risk, EWS and IBF Perception Study in selected countries to be implemented in close coordination with the University of West Indies, and the Red Cross National Societies targeting individuals (including representatives of vulnerable groups), communities and institutions. The study will be disseminated with communities of scientists, decision-makers, and practitioners; notably those involved in the implementation of the three components of the CREWS Caribbean Initiative.

³ https://link.springer.com/chapter/10.1007/978-3-319-59469-9_9

⁴ Twigg, J. (2003). The Human Factor in Early Warnings: Risk Perception and Appropriate Communications. Early Warning Systems for Natural Disaster Reduction, 19–26. doi:10.1007/978-3-642-55903-7_4

⁵ https://en.unesco.org/sites/default/files/study_on_palu_tsunami-ind.pdf

Activities on this project stream would inform this process.			
Implementing partners and Project Steering Committee Members, have highlighted that the CREWS Caribbean project has many actors and interest groups, but that it currently lacks a visibility and communication plan. Without a plan to engage stakeholders in creating awareness, a large project may be in risk of failing to connect with and build a collective understanding among the different stakeholders. The project would also benefit from support to diverse stakeholders in the collection and sharing of learning and good practices. This would serve several complementary purposes, firstly to engage stakeholders in identifying challenges and the lessons that can be drawn from practical experience, secondly to engage stakeholders in exploring diverse media and participatory methods for inclusively communicating learning and insight to different segments of the population, and thirdly in order to engage stakeholders in connecting the different EWS steps with practical examples of the different elements of MHEWS to build a shared understanding of how they can drive transformative action.	Increased engagement and use of MHEWS by stakeholders and practitioners, including private sector entities and groups mobilizing women, peoples with disabilities, youth, for MHEWS and Impact-based Forecasting.	Project communication, visibility and engagement strengthened through development and implementation of communication, visibility and engagement strategy.	1) Communication, visibility and engagement strategy.
As recognized in the Strategic Roadmap for Advancing MHEWS in the Caribbean 2020-2030, the insufficient understanding both by the authorities responsible for emergency management and by the population at risk of the impacts of severe hydrometeorological hazards can be the cause of loss of life and significant adverse economic consequences. This is a major gap in the EWS in most countries, including in the Caribbean region despite generally accurate and timely forecasts and warnings disseminated by NMHSs. Put simply, while there is a realization of what the weather might be, there is frequently a lack of understanding of what the weather might do. By focusing on impacts, it is expected that those exposed to a particular hazard	Targeted education and public awareness programs available for warning systems and related public action.	Development of knowledge products to be part of the educational offer of Caribbean Universities'	<ol style="list-style-type: none"> 1) Impact-Based Forecasting MOOC 2) Integration of MHEWS Roadmap elements/modules in different already planned trainings (e.g. Risk Financing, CRM, Systemic Risk, etc.)

will have a better understanding of the risk and will be more likely to take appropriate action. There is still a lot of confusion and lack of understanding about what IBF is and how it can be implemented. Learning products will help contribute to common understanding about IBF contextualized to the region and could be included in other trainings covering topics such as systemic risk, CRM and risk financing.			
Implementing partners and Project Steering Committee Members, have highlighted the fact that historically in the region, most of the advancements on early warning systems have been made possible thanks to projects. Even though this approach has allowed some progress, there it is a need for a more sustainable approach that ensure that the necessary developments for an effective EWS will be included in long term visions, strategies and plans, and that within them budget allocations, implementation capacities, clear roles and mandates, and, monitoring evaluation and reporting be defined. In this sense It is envisaged that the various stakeholder groups will integrate MHEWS and IBF considerations in their current and future plans and strategies such as national DRR strategies, PPP work plans and work plans of various vulnerable stakeholder groups.	Sustainability of MHEWS ensured by their inclusion of MHEWS and IBF considerations in current and future plans and strategies such as national DRR strategies, PPP work plans and work plans of various vulnerable stakeholder groups.	Creating the necessary enabling environment for impact-based forecasting and effective MHEWS	1) recommendations for integrating MHEWS and IBF, including the identification of roles and responsibilities, in: <ul style="list-style-type: none"> a. National Strategies for Disaster Risk Reductions (Country Work Programmes*); b. ARISE Public-Private Partnership Action Plans; c. Gender Working Group Action Plans;
As recognized in the Strategic Roadmap for Advancing MHEWS in the Caribbean 2020-2030, where there is some initial capacity, it is recommended in the first instance to deliver qualitative impact-based forecasts by translating meteorological and hydrological hazards into actionable and understandable information. In those countries that already practice qualitative impact-based forecasting, a technically more complex approach could be adopted that would blend hazard forecasts with information on exposure and vulnerability in a more quantitative manner. Therefore, there is a need to systematically collect national data, maps, and information on	Information and data are identified and mapped for effective MHEWS and Impact-based Forecasting	Creating the necessary enabling environment for impact-based forecasting and effective MHEWS	1) Mapping the data environment for IBF in two countries.

<p>vulnerability and exposure as a key tool in developing impact-based forecasts. Such Information should include critical infrastructures such as roads, bridges, schools, hospitals and clinics, shelters, individual homes, electricity supplies, water and sanitation systems, local governance, and demographic data including gender, disability and vulnerable groups.</p>			
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Annex 6: Feedback from experts

The CREWS Experts consulted on this project suggested to strengthen the explanation about how the studies and consultations conducted through the project would lead to improving MET services.

- UNDRR agreed to modify the proposal to further clarify that the studies, consultations and lessons-learned through the project will be shared with all key project stakeholders to contribute to improve meteorological services developed in Components 2 and 3 of the project. The project will seek to engender a continuous learning feedback loop.

The CREWS Experts also encouraged UNDRR to take the following information into consideration when implementing the project:

- To leverage existing materials for the MOOC training and the study on risk perceptions. The experts agreed to share relevant materials with UNDRR, which UNDRR agreed to take onboard.
- When engaging with Red Cross Climate Centre and IFRC at multiple levels, the experts encouraged UNDRR to clarify understanding of such terminology as impact-based early warning systems, as they may have slightly different definitions or understanding. UNDRR agreed to discuss to seek common understanding with all key partners in the project, as it will be a critical enabler of successful project implementation.
- When engaging private sector partners seek to leverage them as both users and producers of risk information. UNDRR agreed to share additional information about its ARISE Network.
- To share information about the findings and lessons-learned through the project throughout project implementation to support and reinforce other efforts ongoing in the region.

Annex 7: Profile of partners to be involved in the implementation of this additional funding

IFRC and the Red Cross-National Societies

The IFRC and our 192 National Societies respond to, and work to prevent or lessen the impacts of, all types of crises and disasters. IFRC and its National Societies do so for all people, with a focus on supporting the most vulnerable. Their priorities are to save lives, reduce suffering and uphold human dignity. Among their many approached IFRC claims to promote Early action, also known as anticipatory action or forecast-based action, meaning taking steps to protect people before a disaster strikes based on early warning or forecasts.

In this sense, IFRC and the National Societies will support the implementation of this project by involving and promoting a meaningful engagement with at-risk communities. In addition to this, IFRC has produced different material on Impact-based Forecasting that will be adopted, adapted and contextualized for Caribbean countries with the support of their Climate Centre.

The University of West Indies

For over seven decades, The University of the West Indies (The UWI) has provided service and leadership to the Caribbean region and wider world. The UWI's mission is to advance learning, create knowledge and foster innovation for the positive transformation of the Caribbean, and is centered on producing critical thinkers and leaders who serve the needs of the 21st century society. The UWI serves as the Secretariat for Universities Caribbean, an association of Caribbean-based universities and research institutes spread across CARICOM countries as well as Cuba, Haiti, Puerto Rico, Colombia, and the French and Dutch-speaking Antilles, working to foster cooperation among the higher education institutions in the Caribbean region, leveraging expertise and strengthening the alignment between higher education, development agencies, the public and private sectors and civil society.

The UWI has a track record in implementing successful research, projects and programmes in the area of Disaster Risk Management. The DRRC, through which the project will be led, has carried out consultancies for UNDP, DIPECHO, the Office of Disaster Preparedness and Emergency Management and CDEMA among others. The Centre has also executed DRM-related projects, including the recently concluded Enhancing Knowledge Application for Comprehensive Disaster Management.

The University of The West Indies, will support the implementation of project activities, notably in areas related to research and capacity building initiatives described in the project document.