

Proceedings

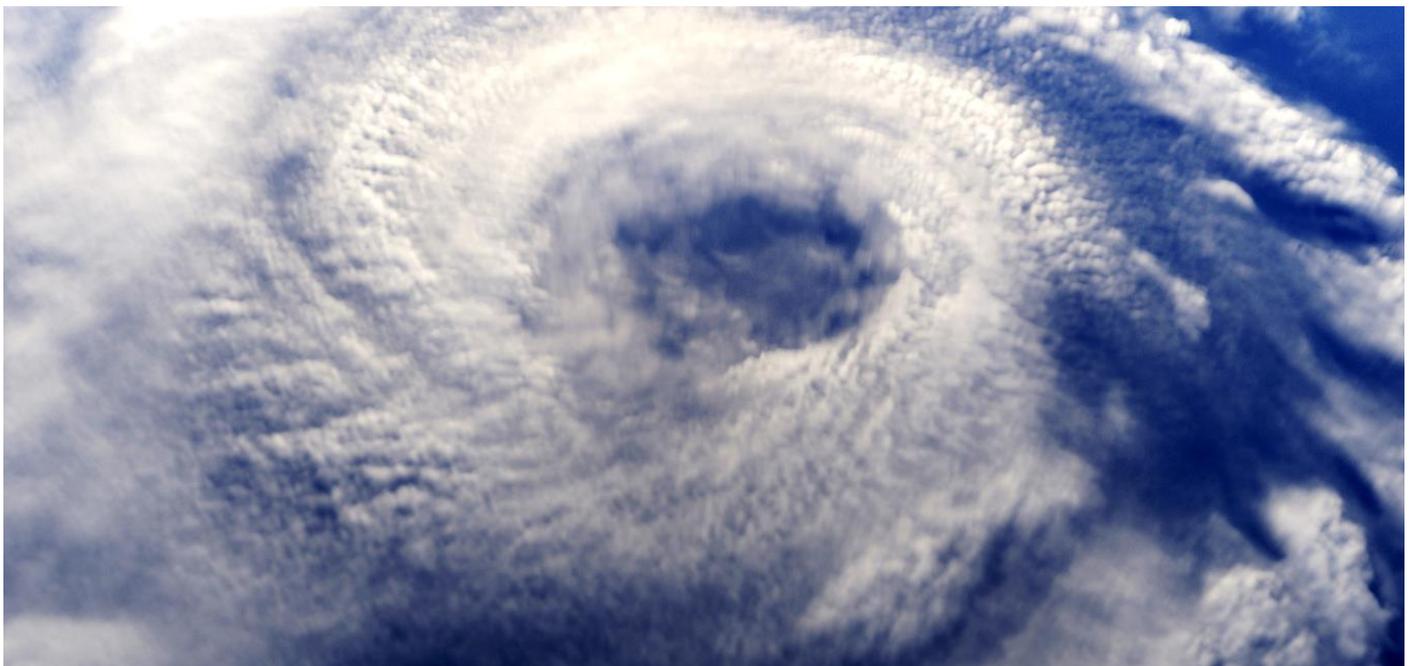
APRIL 2019

# Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean

## CREWS Caribbean Project Launch

*A Climate Risk and Early Warning Systems (CREWS) Regional Initiative*

Accra Beach Hotel  
Christ Church, Barbados  
November 20, 2018





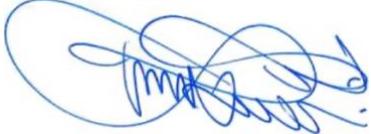
## Acknowledgements

The launch of the regional project *Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean* was made possible through strong collaboration and partnership with regional stakeholders. In particular, we would like to extend our gratitude to the Caribbean Institute of Meteorology and Hydrology (CIMH) of the Caribbean Meteorological Organization (CMO), for significant support to the coordination and logistics of the project launch, during the Caribbean Climate Outlook Forum (CariCOF) that took place November 20-21, 2018. CIMH and the Caribbean Disaster Emergency Management Agency (CDEMA) also provided critical input during the project design phase.

The US\$5.5 million project is financed through the Climate Risk and Early Warning Systems (CREWS) Initiative, a global initiative for which the World Meteorological Organization (WMO), The World Bank /Global Facility for Disaster Reduction and Recovery (GFDRR), and the United Nations Office for Disaster Risk Reduction (UNISDR) serve as Implementing Partners assisting the recipient countries and regional organizations in the design of the projects and providing implementation support.

Known as *CREWS Caribbean*, this three-year project aligns with the long-term vision of the Caribbean Community (CARICOM) to advance regional and national hydrometeorological capacity and service delivery towards better preparedness and reduction of risks associated with climate change. The project design is grounded on long-term efforts and lessons learnt on hydrometeorological and early warning services from regional agencies, development partners, and across the fifteen members that comprise CARICOM. *CREWS Caribbean* leverages existing networks to bolster regional knowledge exchange, which is integral to the project, while also tapping into the global knowledge base of its implementing partners.

We look forward to strengthening our partnerships in the region and building upon the mutual efforts to increase the climate resilience of the Caribbean.

		
<b>Joaquin Toro</b>	Mary Power	Nahuel Arenas
<b>Disaster Risk Management Regional Coordinator</b>	Director, Development and Regional Activities	Deputy Chief of Regional Office for the Americas and the Caribbean
<b>The World Bank</b>	<b>World Meteorological Organization</b>	<b>UN Office for Disaster Risk Reduction</b>

## About CREWS

**Climate Risk and Early Warning Systems (CREWS)** is a specialized initiative that aims at saving lives, assets and livelihoods in Least Developed Countries (LDCs) and Small Island Developing States (SIDS).



CREWS is a financing mechanism that is driven by the expertise and specialist networks of its implementing partners: The World Bank, Global Facility for Disaster Reduction and Recovery (GFDRR), the United Nations Office for Disaster Risk Reduction (UNISDR), and the World Meteorological Organization (WMO).

In 2015, CREWS was announced by the Minister of Foreign Affairs of France, at the World Conference on Disaster Risk Reduction in Sendai, Japan. Later that year, CREWS was launched at the 21<sup>st</sup> Conference of Parties on Climate Change (COP21) in Paris by five countries – Australia, France, Germany, Luxembourg and the Netherlands – with the mandate to work directly with countries at high risk to extreme climate events.

## Approach – CREWS Initiative

The overall objective of CREWS is to substantially reduce global disaster mortality by 2030 (Sendai Framework Target A) and to significantly increase access to early warnings and risk information in LDCs and SIDS (Sendai Framework Target G). Support is provided to countries to measure early warning access and effectiveness. This allows countries to identify priorities for programming, institutional capacity development and related resource allocation. To achieve this goal, CREWS applies a people-centered and multi-hazard, impact-based early warning systems approach in all national and regional projects.

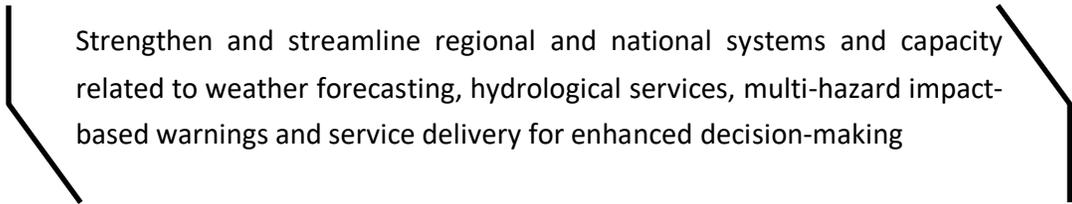


## 1. Introduction

The launch of the regional project – *Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean* – took place in Barbados as part of the Caribbean Climate Outlook Forum (CariCOF) on November 20, 2018. The US\$5.5 million, regional project is financed through [Climate Risk and Early Warning Systems \(CREWS\)](#) – a global initiative to significantly increase the capacity to generate and communicate effective, impact-based, multi-hazard, gender-informed early warnings to protect lives, livelihoods, and assets.

The CREWS Caribbean is the first project to leverage all of the three Implementing Partners, with overall coordination led by The World Bank Group (WBG). It is being implemented in close collaboration with key regional agencies: the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Institute of Meteorology and Hydrology (CIMH), and the Caribbean Meteorological Organization Headquarters Unit (CMO HqU). The project addresses regional- and national-level priority areas in order to comprehensively strengthen hydro-meteorological (hydromet) services and early warning systems (EWS) across the region.

The three-year project focuses on the 15 member countries of the [Caribbean Community \(CARICOM\)](#)<sup>1</sup> with the **core objective** to:



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

To achieve this goal, the *CREWS Caribbean* project is comprised of **three components**: 1) Development of a regional strategy and identification of priority investments; 2) Institutional strengthening and capacity building; and 3) Implementation of national-level pilot projects to comprehensively strengthen EWS. A cross-cutting theme – gender considerations and vulnerable populations – is integrated throughout all aspects of the project and components to ensure that the needs of these groups are reflected in the design and implementation of early warning systems (see Project Overview - Section 3).

---

<sup>1</sup> CARICOM's full member states include: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago;

## 2. Event Summary

The launch event for *CREWS Caribbean* officially marked the beginning of the three-year project, which provided project details to key regional stakeholders in the Caribbean, primarily representatives from National Hydrometeorological Services (NHMS) and National Disaster Management Organizations (NDMOs), along with regional partners and agencies. More than 65 representatives attended from 20 countries and territories, including 12 regional Caribbean organizations (See Participant List - Annex 1).

The implementing partners shared information on their respective responsibilities for each component, introducing some of the concepts that underpin the *CREWS Caribbean* project. Presentations offered an overview of project implementation and priority activities, expected outputs and project timelines. CDEMA and CIMH gave an overview of the challenges related to weather forecasting, EWS and their necessary links with the Comprehensive Disaster Management strategy to improve preparedness to disasters in the Caribbean region. At the same time, comments from regional and national stakeholders surfaced questions and suggestions on how to improve coordination mechanisms and implementation across the region (see Agenda - Annex 2).

The Honorable Edmund Hinkson, Barbados Minister of Home Affairs, in his address at the launch stated, “It is undeniable that Early Warning Systems are well-recognized as critical life-saving disaster risk reduction tools.” He added, that the multifaceted approach brings global partners together with regional partners for the first time, recognizing the strong collaboration among key stakeholders that is fundamental to the project’s success and long-term sustainability (see Annex 4 – Press Release).



### Key Takeaways

- ) While CARICOM countries are directly targeted in the project, all islands and territories will benefit from regional knowledge sharing and training opportunities that support increased cooperation in the region;
- ) Gender mainstreaming is central to all aspects of the regional strategy development and project implementation to ensure EWS and preparedness reach across entire populations to the “last mile”;
- ) Global and regional stakeholders bring together the expertise and knowledge of technical partners, regional agencies and national institutions is critical to the project design and implementation;
- ) Building awareness among decision makers is important to bolster hydromet services in national planning and investments in climate adaptation and EWS to protect against weather and climate-related hazards.

### 3. Session Highlights and Presentations

**Setting the Stage on the CREWS Initiative** *Donna Pierre – Disaster risk management specialist seconded from the World Bank to the CREWS Secretariat* – provided an overview of the global Initiative that is hosted by the WMO in Geneva. She presented the overall portfolio of national and regional investment projects and emphasized the mission to reduce the number of people at risk to hydrometeorological hazards, a loss of life that is disproportionately higher in Least Developed Countries (LDCs) and Small Island Developing States (SIDS). CREWS aims to close the capacity gap on weather climate and hydrometeorological services among developed and developing countries with sustained investments in EWS, including infrastructure, communications and preparedness.



CREWS aims to close the capacity gap on weather climate and hydrometeorological services among developed and developing countries with sustained investments in EWS, including infrastructure, communications and preparedness.



**Lessons Learnt from the 2017 Hurricane Season** *Lina Sjaavik, – Project Officer, WMO* – presented the key findings from a

[Regional assessment of national early-warning systems](#) (EWS)

during the 2017 Caribbean Hurricane Season, which the WMO and the CREWS Secretariat conducted from December 2017 through September 2018. **Keys recommendations** from the report include: (i) Advocate for developing strategy and legislation for NMHS and NDMOs, (ii) Develop prediction capacities

and EWS for secondary hazards including extreme flooding events; (iii) Shift from

generic forecasts to impact-based forecasts (iv) Increase human and financial resources for NMHSs, (v)

Prioritize redundancy in emergency communication systems to address challenges in communication

between critical stakeholders, (vi) Develop joint programming between NMHS and

NDMOs, including public outreach and media engagement; and (vi) Expand the

stakeholder base to incorporate *Gender Bureaus* to advance the inclusion of gender

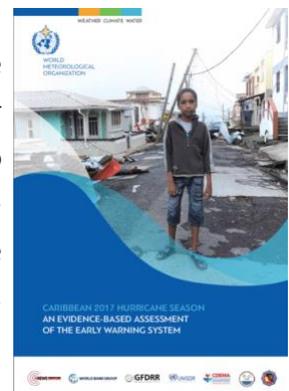
in EWS (see Annex 3 for a more detailed description of the findings). WMO also

presented the activities planned under the project’s component 2 to strengthen the

NMHS’ service delivery, EWS, preparedness and impact-based forecasting. The

implementation under component 2 will be informed by the recommendations

coming out from the 2017 Assessment of the EWS in the Caribbean.



## Overview of the CREWS Caribbean Project and Implementation Approach

*Melanie Kappes – Disaster Risk Management Specialist, The World Bank* – provided an overview of the three-year project, including a breakdown of the project components and responsibilities for each implementing partner. She explained the World Bank's approach to the regional Project adding that the first phase of the World Bank component will be to develop a regional strategy and to identify priority investments towards strengthening and streamlining EW and hydrometeorological services. This strategy will be based on a diagnostic of current capacities,

needs, gaps, lessons learnt and opportunities and will largely inform the selection and implementation of activities under components 2 and 3. Kappes stated that UNISDR has the responsibility of ensuring that the cross-cutting nature of integrating gender aspects and other vulnerable groups (e.g. children, elderly and the disabled) into the regional strategy and implementation plan occurs throughout the three components. UNISDR will also target institutional strengthening activities at the regional and national level to facilitate the clarification of roles and responsibilities within the context of weather, climate and hydrological services and EWS.

## Mainstreaming Gender and Perspectives of Vulnerable Groups

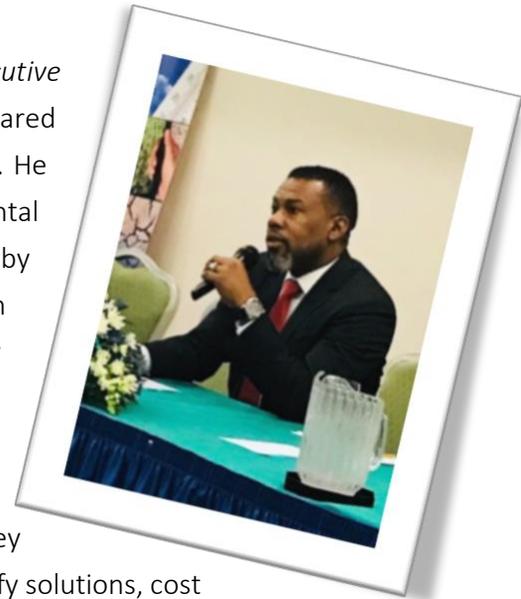
*Nahuel Arena and Maria Kontro – Deputy Chief and DRR Advisor for the Caribbean, UNISDR* – both presented on core activities and responsibilities of UNISDR for CREWS Caribbean. UNISDR has a lead role of integrating cross-cutting themes into the overall project, namely gender aspects and vulnerable populations (children, elderly and the disabled). In Component 1, UNISDR will help to guide the development of the regional strategy and implementation plan. For Component 2, UNISDR

will support the region in clearly defining roles and responsibilities within the context of disaster management, weather forecasting and the delivery of climate and hydrological services. Overall, UNISDR will lead on technical assistance to design and implement the gender-Inclusive, cascading early warning system for the region, building on recommendations from the gender-strengthening component of the 2017 WMO report. UNISDR is expected to design and coordinate two regional workshops that focus on the coordination between national and regional hydromet and disaster management offices as related to the four elements of EWS<sup>2</sup> UNISDR will disseminate the outcomes and lessons learned through social media and PreventionWeb, and share recommendations that can be applied at global, regional, and national levels.



<sup>2</sup> (i) Risk Knowledge (systematically collect data and undertake risk assessment); (ii) Dissemination and Communication (communicate risk information and disseminate early warning); (iii) Monitoring and Warning Service (hazard monitoring and warning generation); (iv) Response Capability (building national community response capabilities)

**Priorities and Comments from CDEMA’s Perspective** *Ronald Jackson – Executive Director, Caribbean Disaster Emergency Management Agency (CDEMA)* – shared his unique vantage point as a regional leader in disaster risk management. He underscored that long-term sustainability and support is a fundamental problem in the past, but that CREWS Caribbean can be a game changer by strengthening institutions and mobilizing funds towards investments in resilience. CDEMA is one of the three lead implementers of the DIPECHO<sup>3</sup> project (UNDP), the largest single investment in Multi-Hazard EWS in the Caribbean and contributing to the Priority Outcome on Advancing People Centered Early Warning Systems within the CDM Strategy, which takes a multi-hazard lens as a necessary condition for future investments. EWS is a key priority and the project generates a gap analysis in select countries to identify solutions, cost estimates, develop a national roadmap to guide country specific investment in People Centered Multi-Hazard Early Warning Systems. He further hopes to replicate this methodology in other CDEMA member states. The key vantage point, he presented, is that you can’t view EWS as a stand-alone element, but rather as part of an entire resilience system.



**Priorities and Comments from CIHM’s Perspective** *David Farrell – Principal, Caribbean Institute for Meteorology and Hydrology (CIMH)* – discussed regional challenges to building resilience, especially considering climate change and the expected severity of future extreme weather events in the region. He noted that CIMH continues to play a crucial role in supporting the strengthening of EWS in the Caribbean. He further presented on regional projects already in place that align with CREWS Caribbean and underlined the importance of leveraging such experience to support the implementation and sustainability of the CREWS Caribbean program. In his presentation, Dr Farrell highlighted a key lesson learned from hurricane impacts in 2017 - the lack of resilience of the region’s hydromet systems to extreme weather events. He noted that addressing this matter was critical to protecting lives, livelihoods and property during and after such events. As a result, Dr. Farrell recommended that the resilience of the hydromet systems in the Caribbean should be viewed as a matter of national and regional security and treated with an appropriate level of priority. He noted that through the CREWS Caribbean program it was expected that issues surrounding the resilience and sustainability of hydromet systems in the Caribbean will be addressed and appropriate solutions developed and implemented that will provide long-term benefits.



<sup>3</sup> Disaster preparedness – European Civil Protection and Humanitarian Aid Operations

## 4. About CREWS Caribbean

### Background and Rationale

The Caribbean region is highly exposed to natural hazards, in particular, hydrometeorological hazards such as hurricanes and tropical storms, floods, landslides and storm surge, which have caused significant damage in the region. According to the WMO<sup>4</sup>, 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. Amongst the most damaging hydrometeorological events, in 2004 Hurricane Ivan's passage over Grenada resulted in damage and losses of about 200% of GDP; more recently in 2017, Hurricane Maria struck Dominica, causing damage and losses equivalent to 220% of GDP. Climate change is expected to further exacerbate hazard levels while unplanned urban expansion and inadequate construction practices are continuously increasing vulnerability.

### Approach

An initial proposal was developed prior to the events associated with the 2017 hurricane season. Subsequently, WMO undertook a post-disaster EWS assessment of the 2017 Caribbean Hurricane Season from December 2017 through September 2018. The main findings and lessons learned from the study (see Annex C) were incorporated into the revised project design and implementation plan of the *CREWS Caribbean project*.

During the first phase of the project, a regional diagnostic will be conducted to guide the development of a holistic strategy and prioritized action plan to strengthen and streamline early warning [systems] and hydromet services across the CARICOM countries. The strategy will identify capacity building needs at both the regional and national levels and this will guide the design of a targeted training. The strategy will serve to design an implementation plan for pilot project investments to increase *impact-based forecasting*. These combined efforts demonstrate a holistic approach to regional cooperation and coordination to deliver a 'cascading' [forecast] system that feeds into weather, climate and flood forecasting.

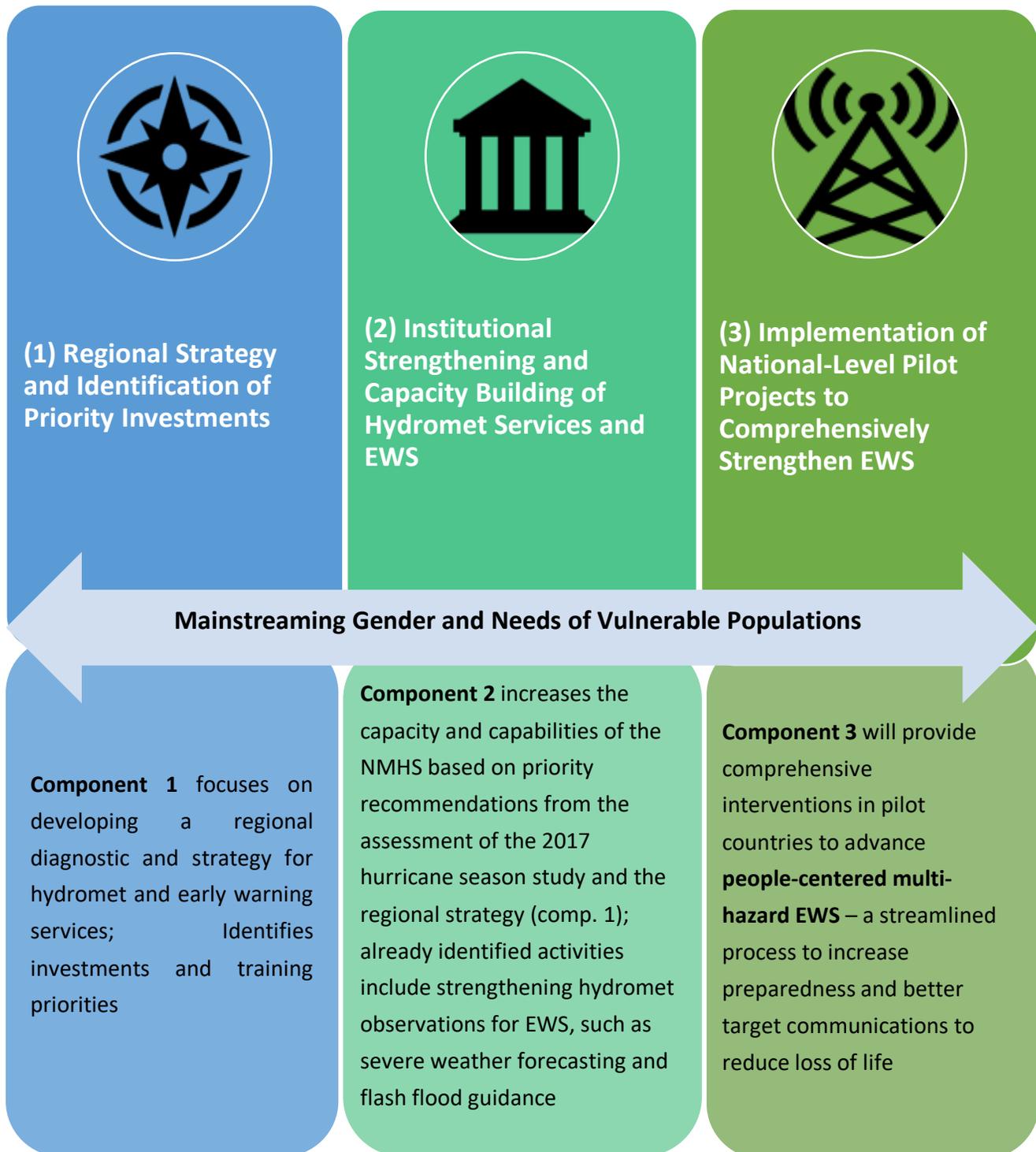
In addition, CREWS Caribbean places emphasis on gender considerations and particularly vulnerable populations, such as persons with disabilities, ensuring EWS and communications are effective in saving all lives. Some groups face greater vulnerability, such as children, elderly and people living with disabilities, and often there are different needs and social roles of women and men, girls and boys that can affect their vulnerability profiles. The project specifically incorporates recommendations from the WMO report which focus on addressing *gender through the UNISDR global network*.

---

<sup>4</sup> Strengthening of Risk Assessment and Multi-Hazard Early Warning Systems for Meteorological, Hydrological and Climate Hazards in the Caribbean, WMO (2011)

## Project Components – CREWS Caribbean

The *CREWS Caribbean* is a comprehensive regional investment that aims at strengthening and streamlining early warning systems and hydrometeorological services. Project activities are implemented under **three (3) main components and one (1) cross-cutting theme**:



**“The CREWS Caribbean initiative brings comparative advantage of all agencies together. It provides an opportunity to increase the knowledge base in these areas to ultimately strengthen resilience of the Caribbean in the face of extreme weather and climate-related hazards.”**

- Honorable Edmund Hinkson, Minister of Home Affairs – Barbados

## Snapshot of the Implementing Partners

**United Nations Office for Disaster Risk Reduction (UNISDR)** is a coordinator on disaster risk reduction (DRR) and the implementation of the *Sendai Framework for DRR*. UNISDR works globally to strengthen EWS, which aligns to the seven global targets of the Sendai Framework, calling for a substantial increase of multi-hazard EWS. The Sendai Framework further refers to EWS as a critical element for disaster risk reduction. Within the project UNISDR will be taking forward recommendations from the WMO report on lessons learned from the 2017 hurricane season focusing on gender, as well as supporting the definition of roles of regional and national Disaster Management Offices, Meteorological and Hydrological services.



**The World Bank Group (WBG) and the Global Facility for Disaster Reduction and Recovery (GFDRR)** For the past decade, The World Bank and GFDRR have been working with partners to increase awareness of, and investments in, reliable and sustainable hydromet services. The World Bank/GFDRR have partnered with leading national meteorological services across the globe to strengthen the network of hydromet services. The CREWS Caribbean project is implemented by The World Bank which oversees the overall project management responsibilities and coordinates with implementing partners and regional stakeholders. The WBG brings decades of experience from investments in disaster risk management and response, including climate resilient infrastructure and information-based decision making.



**World Meteorological Organization (WMO)** is the UN mandated agency for weather, water and climate services with the core function to enhance hydromet service delivery including capacity development on weather and climate forecasting, and coordinates across the globe the National Meteorological and Hydrological Services (NMHS) and the global observing system, state of climate reporting and related networks. Within CREWS Caribbean, WMO focuses on the implementation of impact-based forecasting and *cascading initiatives*, such as: The Severe Weather Forecasting from regional to national levels and Global to Regional and National Flash Flood Guidance System. It also contributes in providing technical inputs and guidance to the Caribbean Climate Outlook Forum and Caribbean Early Warning Information Systems Across Climate Time Scales Consortium Meetings.



## Snapshot of the Regional Agencies

The **Caribbean Institute on Meteorology and Hydrology (CIMH)** and the Caribbean Meteorological Community (CMO). 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). CIMH maintains very strong relationships with NMHSs in the Caribbean and, brings a high-level of expertise in building the competence of meteorological, hydrological and climatological staff of NMHSs in the region. CIMH is the technical arm of the CMO and is also an affiliate of the University of the West Indies. The CIMH maintains strong relationships with many technical and funding agencies and institutions in the region and internationally.



The CMO is a specialized agency of the Caribbean Community that coordinates the joint scientific and technical activities in weather, climate and water – related sciences in sixteen English-speaking Caribbean countries.

**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. CDM is an integrated and proactive approach to disaster management and seeks to reduce the risk and loss associated with natural and technological hazards and the effects of climate change to enhance regional sustainable development.



## Project Steering Committee

The development of a Project Steering Committee (PSC) is underway, which will be comprised of implementing partners and representatives from regional and national agencies. The PSC will provide advice and be responsible for ensuring participation, harmonization and collaboration across international, regional and national stakeholders. Key functions and responsibilities are to: provide project oversight; advise on policies and issues related to project implementation; support with the identification of project risks and mitigation measures, provide guidance on and update the project implementation plan as needed. The PSC is expected to meet twice a year in coordination with regional events.

## ANNEX 1: Participant List – CREWS Caribbean, Project Launch Event

Country/Territory	Department / Agency	First Name	Last Name
Antigua	Antigua and Barbuda Meteorological Office	Orvin	Paige
Aruba	Meteorological Department of Aruba	Rodney	Tromp
Bahamas	Department of Meteorology and Hydrology	Arnold	King
Barbados	Barbados Meteorological Services	Wayne	McGeary
Belize	National Meteorological Service	Michelle	Smith
Cayman Islands	Cayman Islands National Weather Service	Winston	Gall
Curacao	Meteorological Department	Tyrone	Luidens
Dominica	Dominica Meteorological Service	Vernie	Marcellin-Honore
Dominica	Office of Disaster Management	Fitzroy	Pascal
Dominican Republic		Cecilia	Viloria
Grenada	Grenada Meteorological Service	Fimber	Frank
Grenada	National Disaster Management Agency	Sylvan	McIntyre
Guyana	Hydrometeorological Service	Komalchand	Dhiram
Guyana	Hydrometeorological Service	Donessa	David
Guyana	Civil Defense Commission	Kester	Craig
Haiti	National Meteorological and Hydrological Service (UHM)	Marie	Chery
Jamaica	Meteorological Service Division	Glenroy	Brown
Martinique	Meteorological Service of France (Météo-France)	Philippe	Legoutte
Saint Kitts		Vincere	Benjamin
Saint Lucia		Eugenie	Francis
Saint Maarten		Sheryl	Etienne-LeBlanc
Saint Vincent and the Grenadines	Meteorological Service	Joan	McDonald
Saint Vincent and the Grenadines	National Emergency Management Organization	Michelle	Forbes
Suriname	Meteorologische Dienst	Santousha	Kartadji
Trinidad and Tobago NDMO	Meteorological Service	Kaidar	Kissoon
UK	Met Office Hadley	Chris	Hewitt
UK	Met Office Hadley	Rebecca	Osborne
Barbados	MET	Brian	Murray
Barbados	DEM	Robert	Harewood
Barbados	CTO	Sean	Smith
Barbados	BWA	Jaime	Paul
Barbados	BWA	Nicole	Austin
Barbados	MOH	Leslie	Rollock

**Proceedings – CREWS Caribbean Project Launch – Barbados, November 2018**

<b>Organization</b>	<b>First Name</b>	<b>Last Name</b>
Caribbean Farmers Network (CaFAN)	Claude	Browne
Caribbean Agricultural Research and Development Institute (CARDI)	Rasheeda	Hall-Hanson
The Caribbean Public Health Agency (CARPHA)	Lyndon	Robertson
Caribbean Community Climate Change Centre (CCCCC)	Albert	Jones
Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE)	Francene	Blackman
Caribbean Disaster Emergency Management Agency (CDEMA)	Ronald	Jackson
Caribbean Institute on Meteorology and Hydrology (CIMH)	Roche	Mahon
Caribbean Institute on Meteorology and Hydrology (CIMH)	Wayne	Depradine
Caribbean Institute on Meteorology and Hydrology (CIMH)	Jodi-Ann	Petrie
Caribbean Institute on Meteorology and Hydrology (CIMH)	Pietra	Brown
Caribbean Institute on Meteorology and Hydrology (CIMH)	Cherise	Brathwaite
Caribbean Institute on Meteorology and Hydrology (CIMH)	Adrian	Trotman
Caribbean Institute on Meteorology and Hydrology (CIMH)	Cedric	van Meerbeeck
Caribbean Institute on Meteorology and Hydrology (CIMH)	Shontelle	Stoute
Caribbean Institute on Meteorology and Hydrology (CIMH)	Teddy	Allen
Caribbean Institute on Meteorology and Hydrology (CIMH)	Lisa	Kirton-Reed
Caribbean Institute on Meteorology and Hydrology (CIMH)	Andrea	Applewhaite
Caribbean Meteorological Organization (CMO)	Arlene	Laing
Climate Studies Group Mona (CSGM)	Felicia	Whyte
Caribbean Water and Wastewater Association (CWWA)	Candi	Hosein
Organization of Eastern Caribbean States (OECS)	Cornelius	Isaac
University of West Indies (UWI)	Delando	Grant

<b>Organization</b>	<b>Job Title</b>	<b>First Name</b>	<b>Last Name</b>
CREWS Secretariat	Disaster Risk Management Specialist	Donna	Pierre
PAHO	Senior Adviser, Water, Sanitation and Environmental Health for the Caribbean Subregion	Adrianus	Vlugman
International Research Institute for Climate and Society	Chief Climate Scientist / Trainer	Simon	Mason
UNISDR	Deputy Chief of Office	Nahuel	Arenas
UNISDR	DRR Advisor for the Caribbean	Maria	Kontro
WMO	Senior Programme Manager	Jay (Joséphine)	Wilson
WMO	Project Officer	Lina	Sjaavik
World Bank	Disaster Risk Management (DRM) Specialist	Melanie	Kappes
World Bank	Sr. DRM Specialist	Saurabh	Dani
World Bank	Social Development Specialist	Julia Saenz	Ortigosa
World Bank	DRM Specialist	Cecile	Lorillou

## Annex 2 – Agenda, CREWS Caribbean Project Launch

### Strengthening Hydro-Meteorological and Early Warning Services in The Caribbean

November 20, 2018 – Accra, Barbados

<i>TIME</i>	<i>SESSION</i>	<i>PRESENTER(S)</i>
8:30-9:00	Arrival	
9:00-9:30	Opening Remarks - Honorable Edmund G. Hinkson, M.P., Minister of Home Affairs – Barbados - David Farrell, Principal – Caribbean Institute for Meteorology and Hydrology (CIMH) - Ronald Jackson, Executive Director – Caribbean Disaster Emergency Management Agency (CDEMA)	
9:30-9:40	Setting the Stage on the CREWS Initiative	CREWS Secretariat
9:40-9:45	Lessons Learnt from the 2017 Hurricane Season	World Meteorological Organization (WMO)
9:45-9:55	Overview of the CREWS Caribbean Project & Implementation Approach for the Development of a Regional Strategy to Strengthen and Streamline Early Warning and Hydrometeorological Services	World Bank (WB)
9:55-10:05	Implementation Approach for Strengthening the Capacity of EWS and Hydrometeorological Services	WMO
10:05-10:15	Implementation Approach for Mainstreaming Gender and Perspectives of Vulnerable Groups, and Supporting Institutional Coordination	United Nations Office for Disaster Risk Reduction (UNISDR)
10:15-10:40	Questions and Answers	All
10:40-11:00	Coffee Break	
11:00-11:10	Priorities and Comments from CDEMA's perspective	Caribbean Disaster Emergency Management Agency (CDEMA)
11:10-11:20	Priorities and Comments from CIMH's perspective	Caribbean Institute for Meteorology and Hydrology (CIMH)
11:20-11:55	Discussion: Reflections, Guidance and Feedback	All
11:55-12:00	Closing Remarks	
12:00-13:00	Lunch	

## Annex 3 – Main Findings & Lessons, 2017 WMO Regional EWS Assessment

Key findings from the WMO report – 2017 Hurricane Assessment include:

- i) Predictions of hurricane paths and intensity were overall accurate, nevertheless, challenges remain regarding the forecast in changes in intensity and communication of uncertainty.
- ii) Increasing the prediction capacity and early warning systems for secondary hazards such as storm surge and flash floods would contribute to reducing loss of lives and assets across the region.
- iii) There needs to be a shift from extreme event forecasts to impact-based forecasts
- iv) Efforts are required to ensure radar coverage, and to keep installed radars operational in accordance with the recommendations of WMO Integrated Global Observation System (WIGOS)
- v) Need for disaster-resilient NMHS infrastructure, including buildings, and observation infrastructure.
- vi) Need to ensure redundancy in emergency communication systems
- vii) The Caribbean citizens were insufficiently aware of the bulletins, watches and warnings provided for their islands by the Weather Forecast and Warning Offices.
- viii) There is a need for a better understanding of how to include gender in EWS. The review revealed a need for a systematic analysis of how different genders access, communicate and use warnings and alerts.
- ix) Institutional cooperation between NMHSs and NDMOs should be clearly defined and strengthened.

## Annex 4: Press Release

### [Caribbean to strengthen early warning systems and resilience to climate change](#)<sup>5</sup>

Published: November 27, 2018

An initiative to strengthen multi-hazard early warning systems in the Caribbean was launched on November 20 during the dry season Caribbean Climate Forum (CariCOF) meeting in Barbados. The Caribbean region is highly exposed to high-impact hydrometeorological hazards such as hurricanes and tropical storms, causing floods, landslides and storm surge. In 2017, Hurricane Irma caused massive destruction in Barbuda resulting in the subsequent full evacuation of the island while Hurricane Maria caused devastation Dominica. Barbados suffered from flooding as a result of Tropical Storm Kirk in September 2018.

“It is undeniable that Early Warning Systems are well-recognized as critical life-saving disaster risk reduction tools,” Honorable Edmund Hinkson, Barbados Minister of Home Affairs, told the launch.

The project titled “Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean” will be led by the World Bank together with the World Meteorological Organization (WMO) and the United Nations Office for Disaster Risk Reduction (UNISDR). At the regional level the lead implementers will be the Caribbean Disaster Emergency Management Agency (CDEMA) and the Caribbean Institute of Meteorology and Hydrology (CIMH). Hinkson lauded the multifaceted approach being used by this initiative which brings global partners together with regional partners for the first time. “The Climate Risk and Early Warning Systems Initiative (CREWS) brings comparative advantage of all agencies together,” Hinkson added. This approach intends to build community resilience through a functioning, gender-inclusive, cascading early warning systems for the region.

The minister, who’s ministry is responsible for disaster risk management, acknowledged that, while the capacity of the national agencies was becoming stronger, most of them were still struggling with limited financial and human resources which resulted in the limited services. Hinkson stated that support to regional centres in the Caribbean had the biggest potential for success. A regional framework would help people make informed decisions during natural hazards, and would improve cooperation, and leverage more funding.

Ronald Jackson, Executive Director of the CDEMA, endorsed the support provided to small islands development, and advocated for more sustainable investment in national institutions. He also stressed the need to make provisions for people with disabilities. “All of what we do will have an impact at community level. If we do not look at national level to sustain our current investments, they might not be here ten years from now.” David Farrell, principal of the CIMH encouraged a gender informed early warning system. “Communication is essential to leverage and extend what we have done so far,” he said. “CREWS Caribbean builds on our vision of what we think the region can achieve”.

Participants in the launch included 65 representatives from meteorological, hydrological, disaster risk management and priority sectors, as well as key expert institutions and partner agencies from the region. This initiative is financed by the CREWS Initiative. Contributing partners include Australia, France (Chair), Luxembourg, Germany, and the Netherlands. Canada is also contributing to CREWS through support to WMO. The discussion during the launch emphasized the need for high quality forecasts with timely warnings delivered to vulnerable communities and translated into preventive actions helped save many lives and reduced economic losses in the Caribbean Region during recent hurricanes ‘seasons.

According to WMO, 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.

---

<sup>5</sup> <https://public.wmo.int/en/media/news/caribbean-strengthen-early-warning-systems-and-resilience-climate-change>