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# Desk review of Early Warning Systems (EWS) in the Caribbean

An Examination of the Level of Investment Established to Strengthen the 4 Pillars of EWS at the Regional, National and Community Levels



# DESK REVIEW OF EARLY WARNING SYSTEMS (EWS) IN THE CARIBBEAN

## An Examination of the Level of Investment Established to Strengthen the 4 Pillars of EWS at the Regional, National and Community Levels

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This document is part of the activities implemented through the project “Strengthen integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean” project. This project supported concrete actions for an effective early warning system (EWS) and aimed to improve information management (IM) and operational capacity in an effort to strengthen the disaster preparedness mechanism for Caribbean regional response. The project was led by United Nations Development Program (UNDP), in collaboration and coordination with the Caribbean Disaster Emergency Management Agency (CDEMA), United Nations Office for the Coordination of Humanitarian Affairs (OCHA), and the International Federation of the Red Cross and the Red Crescent Societies (IFRC). Financial assistance was provided by the European Civil Protection and Humanitarian Aid Operations ECHO). This document has been produced with the financial assistance of the European Union (EU). The views expressed herein should not be taken, in any way, to reflect the official opinion of any of the partners involved in this project, nor those of the EU. Neither the partners, nor the EU, are responsible for any use that may be made of the information contained in this report.

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# Acronyms

- ACS** » Association of Caribbean States
- AF** » Adaptation Fund
- CARDI** » Caribbean Agricultural Research and Development Institute
- CARPHA** » The Caribbean Public Health Agency
- CCCCC** » Caribbean Community Climate Change Centre
- CDB** » Caribbean Development Bank
- CDEMA** » Caribbean Disaster Emergency Management Agency
- Cefas** » Centre for Environment, Fisheries and Aquaculture Science
- CIF** » The Climate Investment Funds
- CIMH** » Caribbean Institute of Meteorology and Hydrology
- CRFM** » The Caribbean Regional Fisheries Mechanism
- CTO** » Caribbean Tourism Organisation
- DIPECHO** » The European Commission Humanitarian Aid Department's Disaster Preparedness Programme
- ECHO** » European Union Civil Protection and Humanitarian Aid
- EWS** » Early Warning System
- FMI** » Finnish Met Institute
- GCF** » Green Climate Fund
- GDP** » Gross Domestic Product
- GEF** » Global Environment Facility
- GFCS** » Global Framework for Climate Services
- IFRC** » International Federation of Red Cross and Red Crescent Societies
- MHEWS** » Multi-Hazard Early Warning Systems
- NDO** » National Disaster Offices
- NHMS** » National Hydrology and Meteorology Services
- NOAA** » National Oceanic and Atmospheric Administration
- OCHA** » Office for the Coordination of Humanitarian Affairs
- OECS** » Organisation of Eastern Caribbean States
- PAHO** » Pan American Health Organization
- RCC** » Regional Coordination Centre
- RBLAC** » Regional Hub for Latin America and the Caribbean
- REWS** » Regional Early Warning Systems
- RFSF** » Regional Forest Support Facility, Martinique
- SIDS** » Small Island Developing States
- SPREP** » Secretariat of the Pacific Regional Environment Programme
- SRC** » Seismic Research Centre



- UKHO** » UK Hydrographic Office
- UNDP** » United Nations Development Programme
- UNDRR** » United Nations Office for Disaster Risk Reduction
- UNESCO/IOC CTIC** » Intergovernmental Oceanographic Commission of UNESCO Caribbean Tsunami Information Centre
- USAID** » United States Agency for International Development
- UWI** » University of the West Indies
- WFP** » World Food Programme

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# Executive Summary

# Executive Summary

With funding from the European Union Civil Protection and Humanitarian Aid (ECHO), the United Nations Development Programme (UNDP) is working under the leadership of the Caribbean Disaster Emergency Management Agency (CDEMA) and in alliance with the Office for the Coordination of Humanitarian Affairs (OCHA) and International Federation of Red Cross and Red Crescent Societies (IFRC) in an ECHO funded project called “Strengthened, integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean” project. The project is based on the previous DIPECHO 2017-2019 project called “Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer”. A key output of this predecessor project was the development of an EWS toolkit, which was adapted to the Caribbean context and is structured around the four key pillars of effective early warning systems.

As part of the sustainability of the project, this consultancy was launched to analyze a sample of the EWS initiatives in the Caribbean countries and the level of investment established to strengthen the EWS at regional, national and community levels.

The overall goal of this consultancy was to undertake a desk review of the level of investment and the budget established by the different actors (public institutions, international organism, donors and private sector) for the strengthening of EWS in the Caribbean countries, and to analyze where future investments should be directed, taking into account the gaps identified. Therefore, this desk review was highly dependent on the submission of project information, including budget and progress reports. With the support of the United Nations Development Programme’s Disaster Risk Reduction and Recovery Unit of the Regional Hub for Latin America and the Caribbean (RBLAC), email requests were sent to key actors in the disaster management landscape. In addition, the Consultant combed the websites of these listed agencies as well as: The Climate Investment Funds (CIF), Adaptation Fund (AF), Green Climate Fund (GCF), Global Environment Facility (GEF), National Disaster Management Offices (NDMOs) and National Hydrology and Meteorology Services (NHMS). The final list of project documents obtained from primary sources and online search are listed in the Reference.

The primary limitations to this stocktaking exercise are that there were limited budget details as it pertains to the following:

- i.** Budgets in project documents are not always results based, that is, not aligned to project results. As such, it was difficult to estimate the amount of monies targeting specific pillars of the EWS and even more difficult to estimate the level of investments at various scales – regional, national and community levels;
- ii.** No budget included in some project documents and/or summaries on websites;
- iii.** There were noted discrepancies in budget amounts for some projects across various sources



Other limitations included the fact that the Consultant was unable to retrieve significant information on community and/or national projects from countries; in many instances the Consultant was unable to access progress reports for projects and therefore unable to gain a comprehensive perspective on achievements, lessons, gender considerations etc.

The following criteria were applied during the project review stage for the final selection of projects that would be included in the analysis:

- i. The project had to be launched and/or completed between the years 2015-2020
- ii. It was agreed in collaboration with UNDP's representative that an EWS project should reflect 2-3 pillars in its programming to be considered as targeting the strengthening of EWS. Further, projects only focusing on the disaster risk knowledge or in the preparedness and response dimensions (pillar 1 and 4 of an efficient EWS) were not considered to be directly aimed at strengthening an EWS since these two pillars are part of the wider disaster risk management framework.

Projects that were deemed to be targeting the strengthening of EWS in the Caribbean were entered into an Excel Database to allow for synthesis of the information.

A total of 28 projects were utilized for this stocktaking exercise based on the selection criteria that were applied. Approximately 32% of the projects were completed and 39% are ongoing. The status of the remaining 29% of projects could not be confirmed in the documentation made available to the Consultant. The figure most representative of the level of overall investment in EWS in the Caribbean, albeit understated<sup>1</sup>, is the level of investment by donor, which is approximately US\$52,630,335.20. The 2016 Desk Review of EWS in the Caribbean, which covers the period 2005-2015 (10 years), reported the total investments in EWS in the Caribbean to be US\$57,234,991. This suggests a marked increase in support for EWS strengthening in the Caribbean between 2015-2020, since this Stocktaking reporting period only covers 5 years and investments are already estimated to be approximately US\$52,630,335.20. This increased support for strengthening EWS in the Caribbean could be attributed to increased awareness and planning for the mainstreaming of EWS in the Caribbean through previous EWS diagnostics (e.g. Collymore, 2016; WMO (2018) Review of The Caribbean 2017 Hurricane Seasons) and workshops and/or meetings convened in the Caribbean such as the hosting of the first Multi-Hazard Early Warning Systems Conference, which was held as a special event of the Global Platform in Mexico in May 2017. Other key activities include the endorsement of the MHEWS Checklist by the Caribbean Disaster Emergency Management Agency (CDEMA) Technical Advisory Committee (TAC) in April of 2018 in Barbados, and their recommendation for it to be implemented in CDEMA member states and elevated to the CDEMA Council of Ministers; and the official establishment of a Regional Early Warning Systems Consortium the beginning of 2017, which shall serve as a strategic and advisory body for the advancement and strengthened coordination of EWS within the Caribbean Region. The top donors investing in EWS in the Caribbean (2015-2020) include the World Bank (including the CREWS Initiative), USAID and European Union (primarily through ECHO and other mechanisms such as the EDF and GCCA).

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<sup>1</sup> Recall that 8 projects in the sample, which are strongly aligned towards strengthening EWS, have no budget details.



Private sector engagement was not extensively featured in majority of the EWS projects reviewed and their representation was not explicitly mentioned in the Terms of Reference of the Regional Early Warning Systems (REWS) Consortium; although one of their key role and function is to “(v) Articulate strategies for public-private partnerships in support of early warning systems” (TOR REWS: n.d). However, a few projects that were reviewed included their engagement such as the development of the Consistently Alerting People in Time (CAPIt) warning system application for iOS and Android phones for Anguilla Warning System, the CREWS Caribbean Initiative and the USAID funded Climate Change Adaptation Program (CCAP) Project.

Furthermore, majority of the projects reviewed have a national focus (51%), followed by regional (36%) and community (13%) (decreasing order of frequency). Further it should be noted that majority of the projects reviewed have multi-country impacts and even targeting a combination of scales. Whilst the low level of community projects could be attributed to the limited data accessed at this sub-national level, findings from the most recent diagnostic by CREWS Initiative (2020) highlighted that there is no regional strategy for the active engagement of communities in local hazard and vulnerability assessments and development of EWS, suggesting that this is one of the root causes of the gap in active community engagement in developing, deploying and sustaining EWS. In terms of national focus, the countries benefiting from majority of the EWS projects covered by this stocktaking include St. Vincent, St. Lucia, Dominica, Barbados, Grenada and Antigua and Barbuda. Countries benefitting to a more medium extent include Dominican Republic, Trinidad and Tobago, St. Kitts and Nevis, Haiti, Guyana, Belize and Jamaica. Majority of these countries benefiting from medium to high levels of EWS investments were heavily impacted by the Irma and Maria 2017 hurricane events and as such recognized the importance of EWS in saving lives. The countries benefiting to a less extent include Suriname, Cuba, Bahamas, Anguilla, Virgin Islands, Montserrat and Turks and Caicos Islands. Given that majority of these countries are Overseas Territories, it is believed that the low levels of support to this grouping is as a result of their ranking as British Territories and therefore they are not prioritized or eligible in some instances to receive aid. Also, Cuba is an exception to the list because they have national budgets dedicated towards strengthening their EWS coupled with investment of other agencies such as Canada and Russia. Hence, this is why many projects do not target Cuba as a beneficiary but more so a case study of the strength of EWS model in the Caribbean.

In terms of investment per EWS pillar, the findings from the stocktaking indicate that majority of the investments are targeting the advancement of Pillar 2 (Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences). The reasons that investments have been channeled heavily towards Pillar 2 could be due to the recognition that the hydro-meteorological network in the region was not sufficient to meet the required coverage and need. For example, it has been reported *“the expansion of the data generation networks (hydro-met stations) was essential to elevate the volume of data to a critical mass and sample size to reduce or eliminate uncertainties and errors in the modeling data and outputs. In larger ESC countries, such as Guyana and Suriname where there are significant differences in the topography and climatic conditions across the country, the current coverage was inadequate”* (CCCCC, 2019). Another reason could also be because CIMH was granted WMO Regional Coordination Centre (RCC) designation in November 2016, with official designation granted in May 2017 (Rahat, 2017). This milestone for the Caribbean has propelled the CIMH and its NMHS offices forward; but it came with an increasing demand for climate products and services by a diverse group of users and sectors in the region; which attracted further investments.

This suggests that investments in Pillar 2 were in response to identified gaps and needs in the Caribbean; however, given that the four pillars of an EWS are interrelated and need to be coordinated within and across sectors and multiple levels for the system, particularly in vulnerable communities to work effectively and to include a feedback mechanism for continuous improvement.

Other findings unveiled by the stocktaking is that there is an improvement in the types of hazards being addressed by EWS projects during the period 2015-2020; for example, there are well advance EWS related to fishery, food security, marine (coral reef) and health (aedes aegypti mosquitoes) sectors. Further, it was reported that during the 2000-2015 period, the multi-hazard EWS were still in its developmental stage and warning systems focus primarily on hurricanes and floods, and some work related to tsunamis and volcanic hazards (Collymore, 2016; CDEMA et al., 2016). Projects reviewed for this stocktaking indicates that there are at least 7 projects addressing multi-hazards and upon closer examination, these projects are among the medium-to-large size projects, particularly those funded by EU (DIPECHO) and World Bank.

Another key dimension explored is whether the EWS projects are promoting impact-based forecasts. That is, is the EWS observing/modelling, monitoring and predicting hazards and the consequent effects of hazards? The projects reviewed for this stocktaking demonstrate the inclusion of impact-based forecasting; for example the CREWS Caribbean Project; The Weather and Climate Ready National Project; The Enhancing Weather and Climate Early Warning Systems and Impact-based Forecasting Platforms in the Caribbean Region Project; and the Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean to note a few. This suggests improvements in the 2015-2020 period as it pertains to impact-based forecasts.

This stocktaking also took cognizance of the extent of gender consideration in the 28 projects reviewed. Only 8 projects were verified to be considering gender and these include among others, CREWS Caribbean Initiative, the CCAP Project and the UNDP DIPECHO I and II Projects. Therefore, it appears that the region is at a turning point when it comes to the inclusion of gender considerations in the strengthening of EWS and it is clear that having a tool to systematically guide the mainstreaming of gender considerations (The MHEWS Checklist) was a key driving factor. Looking forward, it is envisaged that the development of a regional strategy on EWS will continue to support the mainstreaming of gender considerations within the EWS framework.





01.

# Introduction



# 01. Introduction

The Caribbean region is prone to a range of natural hazards including floods, hurricanes, landslides, earthquakes, volcanoes and tsunamis, making it the second most hazard prone region in the world. The region, extending in a wide arc from the Bahamas in the north to Guyana and Suriname in the south, has a population of more than 40 million living in Small Island Developing States (SIDS) that is especially challenged by climate change and extreme meteorological events, due to their isolated geographic situation, insularity, ecological fragility and the social and economic disadvantages related to their small size. Caribbean SIDS include Antigua and Barbuda, Aruba, the Bahamas, Barbados, British Virgin Islands, Cuba, Dominica, the Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, the Netherlands Antilles, Trinidad and Tobago, Turks and Caicos, and the United States Virgin Islands - most of them are within the recognized hurricane belt. Hurricane is one of the most frequent hydro-met hazards affecting the region, with associated floods and strong winds producing huge devastation and thus impairing the socio-economic development of many Caribbean islands. Amongst the most damaging hydrometeorological events were Hurricane Ivan's passage over Grenada which resulted in 2004 in damage and losses of about 200% of Gross Domestic Product (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)<sup>2</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. Climate change is expected to further exacerbate hazard levels while unplanned urban expansion and inadequate construction practices are continuously increasing vulnerability.

*"Early warning is a major element of disaster risk reduction, preventing loss of life and reducing the material and economic impact of a disaster. Its effectiveness relies in the timely provision of disaster risk information, providing guidance on how to act upon warnings, and reinforcing the need for preparedness"*<sup>3</sup>. In other words, an early warning system is understood as an *"integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities, systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events."*<sup>4</sup>

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

3 UNISDR 2009, "UNISDR Terminology on Disaster Risk Reduction", available at [http://www.unisdr.org/files/7817\\_UNISDRTerminologyEnglish.pdf](http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf)

4 United Nations. 2016. Report of the Open-ended Intergovernmental Expert Working Group on Indicators and Terminology Related to Disaster Risk Reduction (OIEWG) (A/71/644), adopted by the General Assembly on 2 February 2017 (A/RES/71/276)



## 1.1 Background

There are many Early Warning System (EWS) initiatives completed and ongoing in the Caribbean, however, there still exists the need for EWS capabilities to be strengthened (Collymore, 2016; CDEMA et al, 2016). As such, with funding from the European Union Civil Protection and Humanitarian Aid (ECHO), the United Nations Development Programme (UNDP) is working under the leadership of the Caribbean Disaster Emergency Management Agency (CDEMA) and in alliance or partnership with the Office for the Coordination of Humanitarian Affairs (OCHA) and International Federation of Red Cross and Red Crescent Societies (IFRC) in an ECHO funded project called “*Strengthened, integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean*” project, commonly referred to as DIPECHO II. This project seeks to increase preparedness capacity at the regional, national and community levels in the Caribbean through improved response, coordination and strengthened Early Warning Systems.

The project is based on the previous DIPECHO 2017-2018 project called “*Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer*” (commonly referred to as DIPECHO I). A key output of this predecessor project was the development of an EWS toolkit. The original EWS Checklist was drafted in 2006 by the Secretariat of the Third International Conference on Early Warning and was developed based on information gathered during the two and a half days of the conference. A revised checklist was prepared for the Multi-Hazard Early Warning Systems (MHEWS) Conference in Mexico in May 2017, where it was recommended that the checklist be widely disseminated for use by countries. The MHEWS Checklist was adapted to the Caribbean context in 2018 and is structured around the four key pillars of effective early warning systems, which are:

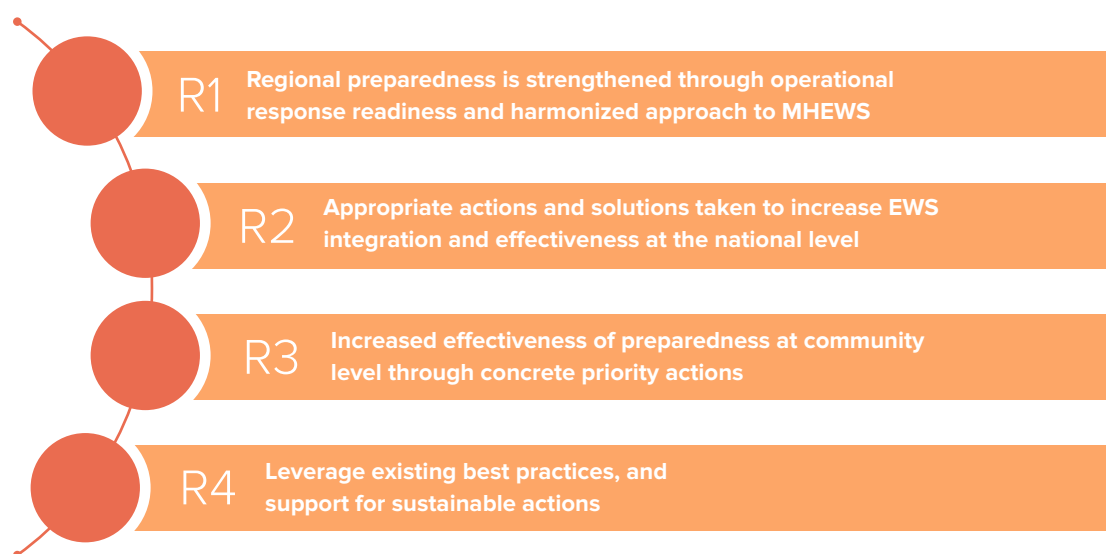
1. Disaster Risk Knowledge based on systematic collection of data and disaster risk assessments;
2. Detection, Monitoring, Analysis and Forecasting of the hazards and possible consequences;
3. Dissemination and Communication, by an official source, of authoritative, timely, accurate and actionable warning and associated information on likelihood of impact;
4. Preparedness at all levels to respond to the warning received

The MHEWS Checklist is a survey to assess whether a country has an effective EWS and which areas under the 4 pillars have to be strengthened. It is not intended to be a comprehensive design manual, but instead a practical, non-technical reference tool to ensure that the major elements of a good early warning system are in place <sup>5</sup>.

With the aim of building a more robust and integrated system of preparedness based on the previous experiences, predominately the 2017 hurricane season, the *Strengthening Integrated and Cohesive Preparedness Capacity at a Regional, National and Community Level in The Caribbean Project* targeted four results:

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5 UNDP, CDEMA, IFRC, ECHO (2018). Multi-hazard Early Warning Systems: A Checklist



As part of the sustainability of the project (Result 4), this consultancy was launched to analyze a sample of the EWS initiatives in the Caribbean countries and the level of investment established to strengthen the EWS at regional, national and community levels.

## 1.2 Purpose of Consultancy

The overall goal of this consultancy was to undertake a desk review of the level of investment and the budget established by the different actors (public institutions, international organism, donors and private sector) for the strengthening of EWS in the Caribbean countries, and to analyze where future investments should be directed, taking into account the gaps identified. Specifically, the Consultant addressed the following key activities, as per the Terms of Reference:

1. Undertook an EWS project mapping which entailed the collection, collating and review of relevant documents related to EWS initiatives in the Caribbean, with emphasis on regional level, national level and community level in the CDEMA Participating States.
2. Identified the main investment sources at regional and national levels in EWS and the budget allocated by each actor under the 4 pillars of EWS
3. Identified good practices, main achievements, challenges and lessons learned regarding EWS programs and activities to the best extent possible.

Noting that there have been several key EWS diagnostics and workshops completed within the past five years (See **Table 1**) that are complementary and instructive towards the development of regional and national EWS strategies and programs, it is useful to reflect on their scope to elucidate any confusion with this stocktaking exercise. As can be seen in **Table 1**, many of the previous diagnostics have examined EWS from various lenses– for example, the 2016 review examined EWS evolution highlighting key progress and gaps arising; the review of the 2017 Caribbean Hurricane Season sought to identify weakness and recommendations based on the post-disaster performance of EWS; and the most recent diagnostic (2020) examined what exists across countries and the Caribbean region in the context of the 4 pillars of an EWS. This

stocktaking is looking more closely at where the investments are going – which of the 4 EWS pillars, at which scale (regional, national, community), who are the primary actors (implementers, donors, key collaborators), gaps emerging and any notable lessons. Summaries of key projects are also contained in this report to promote awareness of the work that is being done at the regional and national levels, which in turn can instruct DRR practitioners (regional institutions, national agencies, NGOs et.) of opportunities that may exist for harmonizing and/or scaling up of efforts as well as avoiding duplication of efforts.

**Table 1: Key EWS Diagnostics and Meetings/Workshops in the Caribbean Spanning 2015-2020**

Key EWS Diagnostic undertaken in the last 5 years (2015-2020)	Focus/Objectives
<p><b>1. Collymore, J (2016). EWS in the Caribbean: A Desk Review</b></p>	<p>The emphasis of this review was an overview of <b><u>the evolution of early warning systems in the Caribbean, case studies of EWS and recommendations for enhancing EWS in the Caribbean.</u></b></p>
<p><b>2. CREWS Secretariat (2017). Stocktaking of Early Warning Systems in the Caribbean Region</b></p>	<p>The stocktaking on climate risk and early warning systems for the Caribbean Region was requested by the Climate Risk and Early Warning Systems (CREWS) Steering Committee to facilitate and guide future investment decisions for the region. Specifically, the CREWS Secretariat <b><u>carried out a rapid mapping of capacity, gaps, needs and ongoing initiatives on early warning in order to identify potential projects</u></b> in the Caribbean to be presented at the Third Meeting of the Steering Committee as part of the CREWS Investment Plan. The stocktaking benefited from existing regional reviews of climate risk and early warning systems in the Caribbean.</p>
<p><b>3.WMO (2018). The Caribbean 2017 Hurricane Seasons – An Evidence-Based Assessment of the EWS</b></p>	<p>This report <b><u>presents the key findings and recommendations for strengthening multi-hazard early warning systems in the Caribbean, following the first-ever systematic review of their performance in a post-disaster environment.</u></b> The review took place after the passage of Hurricanes Harvey, Irma and Maria, which significantly impacted more than 12 island States in the region in 2017.</p>
<p><b>4. CREWS Diagnostic - A Situation Analysis of the Caribbean Multi-Hazard End-to-End Early Warning System (January 2020)</b></p>	<p>To inform the process of developing a practical and robust Caribbean MHEWS strategy <b><u>the diagnostic seeks to identify specific potentially transformative initiatives to strengthen early warning services that would assist investors in directing resources to areas of most need.</u></b> This analysis is in the context of the requirements of the 4 pillars and what exists and where are the gaps across countries and the Caribbean region.</p>

Key EWS Workshops undertaken in the last 5 years (2015-2020)	Focus/Objectives
<p><b>5. CDEMA, UNDP, OECS, IFRC, UNDRR, DIPECHO (April 2016). Caribbean Early Warning System Workshop</b></p>	<p>In order to identify key elements towards the implementation of enhanced EWS in the Caribbean region, the Caribbean Early Warning System Workshop was organized from 14 to 16 April in Barbados. <b><u>The main workshop themes were institutionalization and harmonization of EWS with an emphasis on integrating vulnerable groups in all processes related to EWS.</u></b></p>
<p><b>6. CDEMA, DEM, IFRC, UNDP, UNDRR, ECHO (November 2016). Updated on DRR Priorities for the Caribbean -The Caribbean Disaster Management (CDM) Signature Event</b></p>	<p>In preparation to the Caribbean Disaster Management (CDM) Signature Event (Annual Achievements and Priorities in Disaster Risk Reduction (DRR) in the Caribbean) countries reviewed their <b><u>national DRR priorities and come up with their top three national priorities.</u></b> Discussions on achievements and gaps informed the process further.</p>
<p><b>7. UNDP, CDEMA, IFRC ECHO (February 2019). Multi-Hazard Early Warning Systems in the Caribbean: Achievements and Strategic Path Forward High-Level Handover Meeting</b></p>	<p>The objective of the meeting was to highlight the advances made under the project entitled ‘Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer’ both as project achievements and progress towards achieving the outcomes of the regional and global frameworks for Disaster Risk Reduction. The meeting also <b><u>provided a forum for discussions on key regional strategic, planning and programming actions that require regional leadership in MHEWS.</u></b></p>
<p><b>8. UNDP, CDEMA, IFRC, ECHO. Greater than the sum of its parts: Strengthening Multi-hazard Early Warning Systems in the Caribbean</b></p>	<p>This was a session at the 11th CDM Conference in Sint Martin, December 2019. The session sought to outline the future for EWS in the region, at the community, national and regional levels. Building on the efforts to date to strengthen EWS through the articulation of roadmaps in several countries in the region, this session discussed priority areas for investment, challenges and opportunities to increase sustainability and resilience at all levels. <b><u>The session showcased the progress on EWS as well as engaged key actors in defining next steps in the region.</u></b></p>

Source: Author







## 02. Approach



## 02 Approach

This desk review was highly dependent on the submission of project information, including budget and progress reports. With the support of the United Nations Development Programme's Disaster Risk Reduction and Recovery Unit of the Regional Hub for Latin America and the Caribbean (RBLAC), email requests were sent to key actors in the disaster management landscape including representatives from: Caribbean Disaster Emergency Management Agency (CDEMA), International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Development Program (UNDP), Caribbean Institute of Meteorology and Hydrology (CIMH), Caribbean Community Climate Change Centre (CCCCC), Seismic Research Centre (SRC), Caribbean Development Bank (CDB), The Caribbean Regional Fisheries Mechanism (CRFM), Association of Caribbean States (ACS), United Nations Office for Disaster Risk Reduction (UNDRR), World Food Programme (WFP), World Bank (WB), United States Agency for International Development (USAID) and members of the Regional Early Warning Systems (REWS) Consortium (which comprise a sample of NMHS and NDOs). Both the Consultant and representatives from UNDP RBLAC followed up with agencies to encourage their sharing of information in a timely manner. Information on projects (in various degrees of detail) were submitted majority of the agencies listed except: University of the West Indies (UWI) – Disaster Risk Reduction Centre (DRRC), Caribbean Agricultural Research and Development Institute (CARDI), The Caribbean Public Health Agency (CARPHA), Intergovernmental Oceanographic Commission of UNESCO, Caribbean Tsunami Information Centre (UNESCO/IOC CTIC) and the World Meteorological Organisation (WMO).

In addition, the Consultant combed the websites of these listed agencies as well as: The Climate Investment Funds (CIF), Adaptation Fund (AF), Green Climate Fund (GCF), Global Environment Facility (GEF), National Disaster Offices (NDOs) and National Hydrology and Meteorology Services (NHMS). The final list of project documents obtained from primary sources and online search are listed in the Reference.

The following criteria were applied during the project review stage for the final selection of projects that would be included in the analysis:

1. The project had to be launched and/or completed between the years 2015-2020
2. Given that an efficient EWS comprises the 4 pillars discussed in the Introduction (see **Figure 1** below); it was agreed in collaboration with UNDP's representative that an EWS project should reflect 2-3 pillars in its programming to be considered as targeting the strengthening of EWS. Further, projects only focusing on the disaster risk knowledge or in the preparedness and response dimensions (pillar 1 and 4 of an efficient EWS) were not considered to be directly aimed at strengthening an EWS since these two pillars are part of the wider disaster risk management framework.

Figure 1: Pillars of a MHEWS



Source: UNDP, CDEMA, IFRC, ECHO (2018). Multi-hazard Early Warning Systems: A Checklist



Projects that were deemed to be targeting the strengthening of EWS in the Caribbean were entered into an Excel Database to allow for synthesis of the information. Lastly, key reports related to EWS assessments were reviewed to triangulate and verify information. These included the following key literature (see Reference for full list):

- i.** Collymore, J (2016). EWS in the Caribbean: A Desk Review
- ii.** CREWS Secretariat (2017). Stocktaking of Early Warning Systems in the Caribbean Region
- iii.** WMO (2018). The Caribbean 2017 Hurricane Seasons – An Evidence-Based Assessment of the EWS
- iv.** CREWS initiative (World Bank, WMO and UNDRR) (2020). Diagnostic - A Situation Analysis of the Caribbean Multi-Hazard End-to-End Early Warning System
- v.** UNDRR, CDEMA, UNDP, IFRC, UNISDR, CADRIM, ECHO. (April 2016). Caribbean Early Warning System Workshop
- vi.** CDEMA, DEM, IFRC, UNDP, UNDRR, ECHO (November 2016). Updated on DRR Priorities for the Caribbean -The Caribbean Disaster Management (CDM) Signature Event
- vii.** UNDP, CDEMA, ICRF, ECHO (February 2019). Multi-Hazard Early Warning Systems in the Caribbean: Achievements and Strategic Path Forward High-Level Handover Meeting





## 2.1 Limitations to the Desk Review

**Table 2: Challenge, Implications and Mitigation Measures Related to the Consultancy**

Challenge	Implications	Mitigation Measures
<p>Limited budget details as it pertains to the following:</p> <p><i>i. Budgets in project documents are not always results based, that is, not aligned to project results. As such, it was difficult to estimate the amount of monies targeting specific pillars of the EWS and even more difficult to estimate the level of investments at various scales – regional, national and community levels;</i></p> <p><i>ii. No budget included in some project documents and/or summaries on websites;</i></p> <p><i>iii. There were noted discrepancies in budget amounts for some projects across various sources – for example across project documents, online project briefs, press releases etc.</i></p>	<p>The estimates of investment levels are not precise but moreso an approximation across EWS pillars and scales.</p> <p>The level of investments reported is considered to be understated given the gaps in budget information reported</p>	<p>The chapter on findings also highlights the total number of projects supporting each pillar, country or scale to serve as a proxy indicator of the level of support being provided.</p>
<p>In many instances the Consultant was unable to access progress reports for projects and therefore unable to gain a comprehensive perspective on achievements, lessons, gender considerations etc.</p>	<p>Limit the richness of the overall data collected on the projects and the depth of the analysis</p>	<p>The consultant undertook online searches to find any type of information on projects such as press releases etc. However, in many instances it proved to be futile.</p>
<p>Unable to retrieve significant information on community and/or national projects from countries</p>	<p>Unable to estimate level of investment per country and community level.</p> <p>With regards to community level, there was 1 project found online which was inadequate to include any analysis (trends, gaps, lessons etc) on the community level in this report.</p>	<p>The analysis section of this report highlights the # of EWS projects each country is benefiting from, which is being used as a proxy indicator of the level of investments in EWS per country. The underlying assumption is that the more projects a country is benefiting from, their EWS investment amounts should be higher.</p>

Challenge	Implications	Mitigation Measures
Tight timeline for the consultancy: it spanned 3 weeks (February 24th to March 16th)	Limited timeline assigned to data collection. Follow up interviews would not be held to get additional information/feedback on the performance of projects, particularly for those that the Consultant was unable to retrieve progress reports.	March 9th was implemented to allow for time for literature review, data analysis and report preparation.
This desk report reports the investments in United States Dollars; however, several projects are in Euros and span different timelines	Exchange rates vary daily and therefore this desk review can only provide an <b>approximation</b> of investment levels to guide future programming.	These challenges cannot be mitigated. However, it is not considered a serious limitation in this study as the findings will still be instructive in terms of the identification of gaps in investments. It should be noted that the exchange rate as at March 2020 was used for all projects budgeted in Euros.

Throughout this analysis there is mention of challenges in accessing information related to project budgets. This was also a noted limitation in the 2016 Desk Review by Collymore. It signals a larger issue with respect to accountability and transparency as it pertains to grants. The Paris Declaration on Aid Effectiveness, which has as one of its requirements to promote mutual accountability for development results, calls on donors to “Provide timely, transparent and comprehensive information on aid flows so as to enable partner authorities to present comprehensive budget reports to their legislatures and citizens”<sup>6</sup>. Cognizant that not all the development partners operating in the Disaster Risk Reduction space in the Caribbean have signed onto this convention, it does not negate the importance and need for enhanced transparency and information sharing if harmonization and coordination of EWS initiatives in the Caribbean is to be enhanced. To this end, it is being recommended that the newly established Regional Early Warning Systems (EWS) Consortium utilize their platform for addressing this challenge.



6 The Paris Declaration on Aid Effectiveness and the Accra Agenda for Action (2005/2008): pg 8.





03.

## Analysis of Literature

# 03 Analysis of Literature

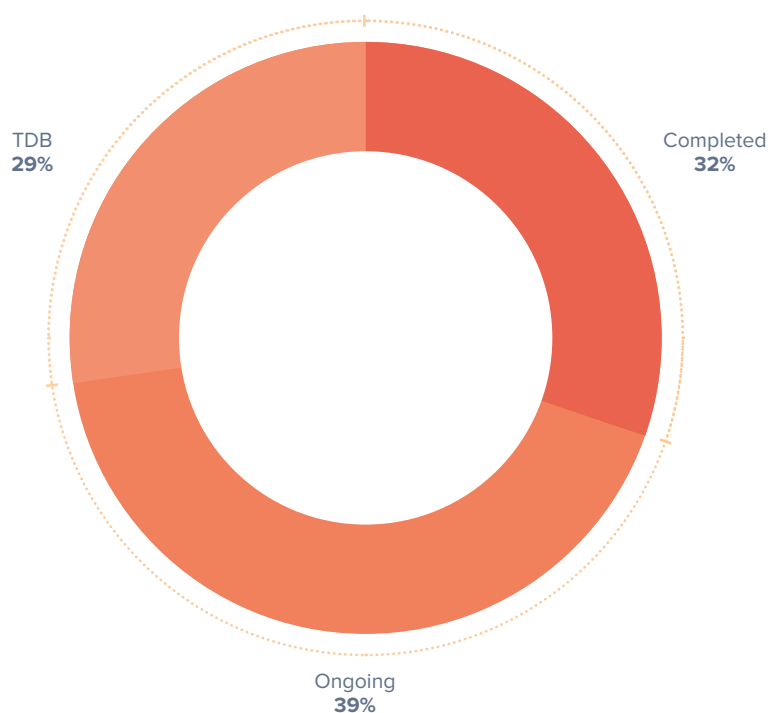
This section of the report presents the findings based on the trends observed for the period 2015-2020 as per the key investment sources, the levels of investment per scale (regional, national), the level of investment per EWS pillar, what are the key hazards of emphasis regional and extent of gender considerations.

Given that majority of the projects reviewed coupled regional and national level results and activities, the report does not differentiate the trends/findings at the regional and national levels. A few projects do include community level components, which is highlighted, where possible – but overall, there was not sufficient data collected for a comprehensive and valid analysis to be done at the community level. An attempt is made to differentiate the level of investment at the regional versus national levels and key projects are summarized in this section to highlight the work being done at these two levels. This is considered to be useful information for donors and key actors in the EWS landscape to be apprised of in the interest of south-south cooperation and harmonization of efforts.

## 3.1 Limitations to the Desk Review

A total of 28 projects were utilized for this stocktaking exercise based on the selection criteria outlined above and as at March 2020, approximately 32% of the projects were completed and 39% were ongoing. The status of the remaining 29% of projects could not be confirmed in the documentation made available to the Consultant (See **Figure 2**).

**Figure 2: Implementation Status of EWS Projects Reviewed**





The aggregate value of the 28 projects is approximately US\$67,479,336. It is further estimated that approximately 76% (US \$52,630,335.20) of this aggregate budget is allocated specifically towards EWS-related activities. This variation is attributed to the fact that the Caribbean Regional Track of the Pilot Program for Climate Resilience (Caribbean PPCR) and the USAID Climate Change Adaptation Program (CCAP) have significant investments in promoting climate change adaptation with EWS featured as a small-medium size component of the wider program. For the remaining projects with budget information, 85-100% of the budgets are assigned to EWS. It should also be noted that for 8 projects no budget could be sourced from the websites or responsible parties for these projects. These include the following projects:

**i. Severe Weather Forecasting Demonstration Project (SWFDP)** - Countries participating in the project are able to benefit from advances in the science of weather forecasting, especially the dramatic development in Numerical Weather Prediction (NWP) including Ensemble Prediction Systems (EPS) which give guidance to weather forecasters in advance of potential hazardous weather conditions for issuance of alerts and warnings. SWFDP uses a “Cascading Forecasting Process” (global to regional, to national). This project is being implemented by CMO, WMO and CIMH

**ii. Advanced Flood Forecasting Project** - This project proposes to develop a robust, reproducible, and transparent approach to flood forecasting that produces outputs from a quasi-distributed hydrological model designed to simulate the complete hydrologic processes of dendritic watershed system that is forced with numerical precipitation prediction data. The approach overcomes some of the deficiencies encountered in more traditional approaches to flood forecasting in small watershed where there is a short time lag between precipitation events and the onset of flood. This project is being implemented by CIMH. Other partners are still to be confirmed.

**iii. Programme for Implementing the Global Framework for Climate Services (GFCS) at Regional and National Scales** - The programme funded by a grant from Canada will implement GFCS in the Pacific, the Caribbean, South Asia and the Arctic. This will be achieved by providing improved climate information, predictions, products and services to support climate risk management and adaptation strategies, decision-making and actions at national and regional level. This project is being implemented by CIMH, WMO, CMO, SPREP

**iv. Climate Change Adaptation and Risk Reduction Technology and Strategies to Improve Community Resilience Project (CARTS)** – this project has 4 components focusing on (i) Floodwater Control Master Plan and Early Warning System (EWS); (ii) Community Disaster Risk Reduction and Climate Change Public Education and Awareness and Capacity Building; (iii) Community Disaster Risk Reduction Demonstration Projects and (iv) Ecosystem-based Livelihood Enhancement Pilots. It is being implemented by CDB

**v. SRC Volcano EWS Project in SVG** - The Project seeks to reduce vulnerability to the multi-hazard environment of the Soufriere Volcano through a combination of activities designed to enhance community early warning procedures, increase adaptive capacities, strengthen awareness, and enhance response capacities. The Project comprises four components which seek to increase the resilience of the 12 communities in St. Vincent and the Grenadines to volcanic and other natural hazard events and CC. This project is being implemented by SRC

**vi. Community Resilience and Institutional Preparedness in Saint Vincent and the Grenadines and the Lesser Antilles facing Natural Hazards** – the objective of this project is to reduce the impact of natural hazards on vulnerable populations of the Lesser Antilles. Specific Objective: Increase resilience of communities and ORM national and regional stakeholders by implementing multi-risk preparedness activities in order to cope with natural disaster. Targeted Results: Institutional partners, disaster management stakeholders and communities improved their ORM knowledge, strengthened their coordination and tested their preparedness and response capacities facing hydrological and geological hazards

**vii. The CAPiT Anguilla Warning System Application for iOS and Android phones** - Once an individual downloads the CAPiT mobile app free of cost from the Google Play Store or the Apple App store and installs it onto their smartphone, alerts from the Anguilla Warning System will come directly to their mobiles offering 24 hour access to critical potentially lifesaving information. This initiative appears to be organized by the Department of Disaster Management in Anguilla with the support of Digicel, FLOW, DITES, Ron's Sign Shop and Hi-Tek graphics

**viii. Commonwealth Marine Economies Programme** - Enabling safe and sustainable marine economies across Commonwealth Small Island Developing States (SIDS) - Supporting Caribbean and Pacific Small Island Developing States (SIDS) to preserve their marine environments and make the most of their maritime resources to catalyse sustainable economic development, whilst safeguarding the health of the ocean. This project is being implemented by UK Government (managed via the Foreign and Commonwealth Office)

### 3.1.1 Investment Sources

In the ensuing sections, the levels of investments are highlighted per scale (regional, national etc.) and by EWS pillars but the figures differ due to the variation in budget details for the project documents that were accessed. They are presented in the interest of observing the trends and gaps, which can guide future programming. However, it should be noted that **the figure most representative of the level of overall investment in EWS in the Caribbean, albeit understated<sup>7</sup>, is the level of investment by donor (US\$52,630,335.20)** as shown in **Table 3** below. This is because the selection criterion applied to projects ensured that the project was explicitly targeting the strengthening of EWS (2 or more pillars). Further, **Table 3** adjusts for the fact that the Caribbean PPCR and CCAP have large components related to climate change adaptation and therefore, only figures related to the EWS components of these projects are included.

It is noteworthy that **the 2016 Desk Review of EWS in the Caribbean, which covers the period 2005-2015 (10 years), reported the total investments in EWS in the Caribbean to be US\$57,234,991.** This suggests a marked increase in support for EWS strengthening in the Caribbean between 2015-2020, since this Stocktaking reporting period only covers 5 years and investments are already estimated to be approximately US\$52,630,335.20. This

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<sup>7</sup> Recall that 8 projects in the sample, which are strongly aligned towards strengthening EWS, have no budget details.

could be as a result of increased awareness and planning for the mainstreaming of EWS in the Caribbean through the previous EWS diagnostics and workshops and/or meetings convened in the Caribbean (See Table 3). For example, at the CDM Signature Event in 2016, countries highlighted EWS as one of five priority areas requiring immediate attention and support in the Region. Another notable event propelling the importance of strengthening EWS in the Caribbean was the hosting of the first Multi-Hazard Early Warning Systems Conference, which was held as a special event of the Global Platform in Mexico in May 2017. A key output of this conference was the development of the Revised Multi-Hazard Early Warning Systems Checklist<sup>8</sup>. Also important to note is that the Caribbean Disaster Emergency Management Agency (CDEMA) Technical Advisory Committee (TAC) endorsed the MHEWS Checklist at the 9th Technical Advisory Committee Meeting in April of 2018 in Barbados, and their recommendation is for it to be implemented in CDEMA member states. Furthermore, 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.



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<sup>8</sup> It updates the original document, *Developing Early Warning Systems: A Checklist*, which was produced as an outcome of the Third International Conference on Early Warning: From Concept to Action, held from 27 to 29 March 2006 in Bonn, Germany. Through the lens of the Sendai Framework, it incorporates the acknowledged benefits of multi-hazard early warnings systems, disaster risk information and enhanced risk assessments (WMO, 2018)

**Table 3: Estimated Total Investment (USD) Per Donor in the Caribbean for the Period 2015-2020**

Donor	Investment Amount (USD) in EWS	%
<b>1. United States Agency for International Development (USAID)</b>	<b>\$ 10,348,684.41</b>	<b>19.66%</b>
<b>2. Government of Italy</b>	\$ 2,465,441.00	4.68%
<b>3. Climate Risk and Early Warning Systems (CREWS) Initiative</b>	<b>\$ 5,500,000.00</b>	<b>10.45%</b>
<b>4. Inter-American Development Bank (IDB)</b>	\$ 1,198,039.47	2.28%
<b>5. The European Commission Humanitarian Aid Department's Disaster Preparedness Programme (ECHO)</b>	<b>\$ 5,350,910.38</b>	<b>10.17%</b>
<b>6. EU-GCCA</b>	\$ 800,000.00	1.52%
<b>7. 11th European Development Fund</b>	\$ 1,429,344.94	2.72%
<b>8. Ministry for Foreign Affairs of Finland (MFAF)</b>	\$ 1,128,650.00	2.14%
<b>9. Government of Barbados, UNESCO and USAID<sup>9</sup></b>	\$ 626,400.00	1.19%
<b>10. UNDP<sup>10</sup></b>	\$ 90,000.00	0.17%
<b>11. Government of Canada</b>	TBD	Unknown
<b>12. World Bank</b>	<b>\$ 23,580,000.00</b>	<b>44.80%</b>
<b>13. UK Government</b>	TBD	Unknown
<b>14. Dutch funding through Partners for Resilience (PfR)</b>	\$ 112,865.00	0.21%
<b>TOTAL ESTIMATED FUNDING DIRECTED TO EWS IN THE CARIBBEAN (2015-2020)</b>	<b>\$ 52,630,335.20</b>	

Source: UNDP

<sup>9</sup> This grouping could not be separated because the budget was not sufficiently detailed to extract contribution by donor.

<sup>10</sup> UNDP is involved in many of the EWS projects being rolled out in the Caribbean as a key implementing partner. However, only one of the projects reviewed explicitly highlighted the funding they provided. Their monetary contribution could be more; but this could not be verified by the desk review. More details on their role as an implementing agency is provided in Section 3.4.



The top donors investing in EWS in the Caribbean (2015-2020) include the World Bank (including the CREWS Initiative), USAID and European Union (primarily through ECHO and other mechanisms such as the EDF and GCCA). The top donors reported are more or less the same between the 2016 Desk Review and this Stocktaking Exercise, with the World Bank more prominently featured for the 2015-2020 reporting period. **The contribution of the EU and USAID towards the strengthening and advancement of EWS in the Caribbean over the past 1.5 decades (2005-2020) should be recognized and applauded.** The new players, although only making small contributions currently, include the Finnish and Dutch Governments.

Given that these 3 donors account for more than 80% of the most recent investments in EWS in the Caribbean, **Table 4** below highlights key information about their policies/strategies/expertise and how it is aligned towards supporting the advancement of the EWS Pillars. More information on the scope of their projects and programs in the Caribbean is detailed in Sections 3.2 and 3.3.



**Table 4: About the Key EWS Donors Operating in the Caribbean**

Donor	About the Donor – Strategy, Expertise, etc.	Linkage to/Advancement of the EWS Pillars
<p><b>The World Bank, including the CREWS initiative Caribbean Project</b></p>	<p>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 (CREWS, Launch Report 2018).</p> <p>GFDRR provides analytical work, technical assistance, and capacity building to help vulnerable nations improve resilience and reduce risk. One of their technical areas of specialization is to improve the ability of developing countries to understand, predict, and warn their citizens of meteorological and hydrological hazards. Specifically, they provide support related to (i) upgrading EWS infrastructure, including advising service management how to modernize and operate information systems needed to collect data, develop forecasts, and communicate the findings to the public and to risk managers (ii) training and capacity building and (iii) coordination (for example: integrating the work of separate departments for sustainable hydromet and EWS service). For more information see <a href="https://www.gfdr.org/en/hydromet-services-and-early-warning-systems">https://www.gfdr.org/en/hydromet-services-and-early-warning-systems</a></p> <p>CREWS is a mechanism that funds Least Developed Countries (LDC) and Small Island Developing States (SIDS) for risk informed early warning services, implemented by 3 partners, based on clear operational procedures. Its operations covers improving risk knowledge through identification of risks, modernizing hydrometeorological infrastructure, improving dissemination and communication of actionable warnings, Strengthening capacity of National Meteorological and Hydrological Services, Developing linkages with sectors and communities by tailoring services and products and Strengthening the ability to prepare for and respond to warnings</p>	<p>The GFDRR and CREWS Initiative are well placed to support the advancement of EWS in the Caribbean. They have the mandate, expertise, and funding available. Noteworthy is that the expertise of the GFDRR is particularly relevant and aligned to the 4 pillars of the EWS.</p> <p>The scope and focus of the CREWS Caribbean project are relevant and timely given that it is supporting all 4 pillars of the EWS. The result areas of focus are also in-keeping with identified needs for the Caribbean at the regional and national levels. For example, at the regional level, they are supporting the development of a regional strategy to strengthen and streamline EWS and hydromet services – this was one of the key recommendations coming out of the CDM Signature Event in November 2016. At the national level, component 3 is designed to be fully flexible to the needs of the country. This component is very timely since under the DIPECHO project “Strengthen Integrated Early Warning Systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer” they were able to administer the MHEWS checklist in 5 countries and support the development of national EWS gap report and a national EWS roadmap; these collectively provide a blueprint for further improvement and investment in early warning systems and disaster risk reduction efforts. Also, the management arrangements promote the close engagement of the three most relevant players to support implementation in the Caribbean – CDEMA, CIMH and CMO.</p>

Donor	About the Donor – Strategy, Expertise, etc.	Linkage to/Advancement of the EWS Pillars
<b>USAID</b>	<p>USAID’s humanitarian action is to protect vulnerable populations, provide disaster assistance, reduce the risk of disasters, and build resilience to future shocks and stresses is grounded in the principles of humanity, impartiality, and operational independence. Upholding these principles in moments of crisis enables countries’ long-run self-reliance and global stability (USAID Policy Framework, n.d: pg 22<sup>11</sup>).</p> <p>USAID is reportedly prioritizing and strengthening early warning, preparedness, mitigation, and prevention (USAID, 2019). Through its Office of U.S. Foreign Disaster Assistance (USAID/OFDA), they have experience in supporting a variety of disaster risk reduction programs to prevent or minimize damage cause by disasters through early warning systems, disaster preparedness and mitigation efforts, as well as training for disaster response. Many of their successful programs have improved collection and use of data on disaster risks, including building capacity and infrastructure to observe, analyze, and forecast hazards. This may include mapping hazards, developing people-centered early warning systems, and facilitating exchange of information on risks.</p>	<p>USAID has the policy framework driving their work, particularly as it relates to disaster risk reduction, inclusive of EWS related activities. Their experience in the region over the years supporting EWS makes them a key driver and partner for promoting the EWS pillars.</p> <p>The CAP project is supporting the advancement of the Coral Reef Early Warning System (CREWS) and installation of automatic weather stations and LIDAR stations based on identified gaps. They will also support capacity building in countries and at the CCCCC in the use of these instrumentation and enhance capacities for data storage at CIMH and CCCCC and finally to strengthen governance arrangement for the management of the stations and lead decision making in the public’s interest as it relates to the dissemination of information. Collectively, these activities support Pillars 1, 2 and 3.</p>
<b>EU (primarily through ECHO and other mechanisms such as the EDF and GCCA)</b>	<p>The DIPECHO Humanitarian Implementation Plan (HIP) 2017 specifically highlights that “collaboration between countries on Early Warning Systems to exchange on good practices should be fostered” and stresses that the “compilation of DRR tools and processes endorsed at national and regional level” should be priority areas for action.</p> <p>The GCCA identified disaster risk reduction as a priority area and priority sector for their work.</p>	<p>Whilst much information could not be found on the EDF and GCCA funding mechanisms and their linkages explicitly to EWS, the prominence of EWS for DIPECHO is notable.</p> <p>All of the projects being supported by the collective EU financing instruments (EDF, ECHO and GCCA) are 100% focusing on EWS in the Caribbean and collectively touching all 4 pillars. These projects are supporting the retrieval of cutting-edge information as it pertains to national needs to be able to strategically advance EWS; targeting various hazards such as marine, biological (mosquito proliferation), geologic, climate and weather. Also, these projects are targeting regional, national and community level advancement of EWS.</p>

Source: Author

<sup>11</sup> <https://www.usaid.gov/policyframework>

**Private sector engagement was not extensively featured in majority of the EWS projects reviewed**, but the following cases should be noted:

- i.** The development of the Consistently Alerting People in Time (CAPiT) warning system application for iOS and Android phones for Anguilla Warning System identified private sector as a key partner. See more details of this project in Section 3.3.
- ii.** The CREWS Caribbean Initiative, as part of Component 1 (Development of regional strategy to strengthen and streamline early warning and hydromet services), includes a sub-activity related to: 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. They have been looking at the work that UNDRR and ARISE<sup>12</sup> have been doing as a starting point.
- iii.** The USAID funded CCAP Project notes that the private sector is a contributor and benefactor of the project and the private sector is represented on the Program Advisory Committee;

A further important observation is that **private sector representation was not explicitly mentioned in the Terms of Reference of the Regional Early Warning Systems (REWS) Consortium; although one of their key role and function is to “(v) Articulate strategies for public-private partnerships in support of early warning systems” (TOR REWS: n.d)**. The role of the private sector in EWS cannot be understated; they are key beneficiaries as well as potentially key supporters to ensure the sustainability of key investments in EWS. CREWS Initiative (2020) has noted that *“Contributions from long-standing EWS systems insularly located within the private sector do not receive enough attention, yet can reveal effective EWS models, business continuity mechanisms and humanitarian response capacities that could strengthen national EWS service delivery”*.

### 3.1.2 Investment Sources

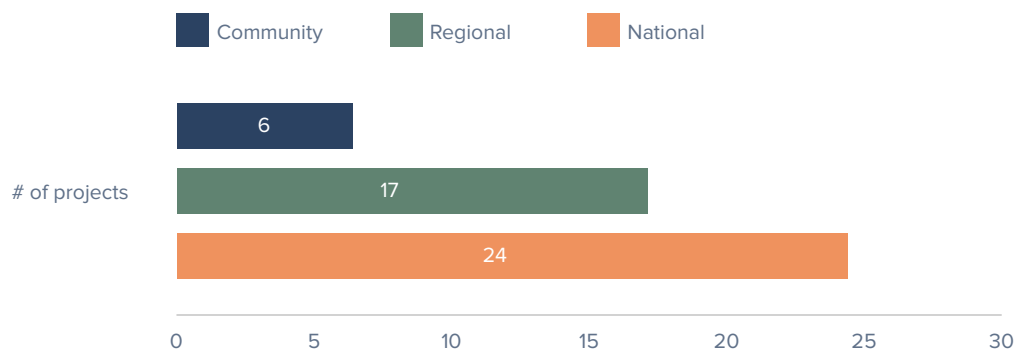
As seen in **Figure 3, majority of the projects reviewed have a national focus (51%), followed by regional (36%) and community (13%)** (decreasing order of frequency). Further it should be noted that **majority of the projects reviewed have multi-country impacts and even targeting a combination of scales**. That is, many projects have a combination of regional, national and community components, which could be attributed to the fact that there were minimal projects submitted by countries as well as accessed online.

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<sup>12</sup> The United Nations ARISE private sector platform seeks to “promote proactive actions to prevent economic loss and new business opportunities related to disaster.”<sup>8</sup> ARISE brings together companies of all sizes interested in creating more resilient societies and safer business environments, as well as supporting national efforts to implement the Sendai Framework for Disaster Risk Reduction and SDGs 9 and 11.

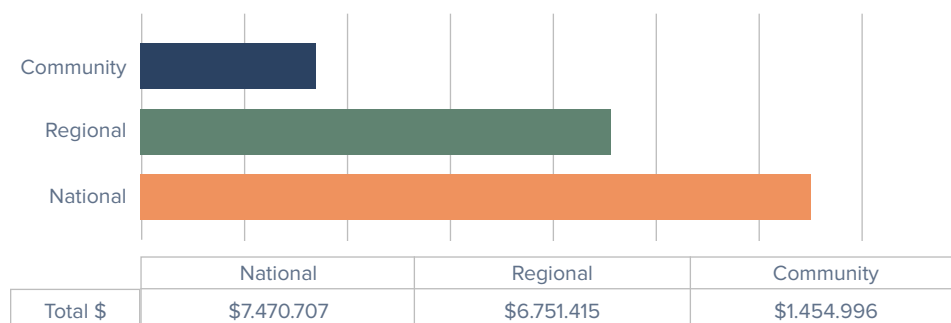


**Figure 3: # of Projects Advancing EWS at the Regional, National and Community Levels**



The level of investment per scale is depicted in **Figure 4** but, as illustrated in **Table 5**, the level of investment per scale is higher in reality; for example, 16 out of the 24 projects that had national level components, the Consultant was unable to assign concrete investment values given the lack of details in the budget. The same can be said for the projects targeting national and community levels.

**Figure 4: Investments (USD) in Advancing EWS at the Regional, National and Community Levels**



**Table 5: # of Projects per Scale as well as # of Projects with missing budget information**

Scale	Total # of Projects	# of projects unable to identify budget by scale <sup>13</sup>	Value of Projects that budget information was accessed
National	24	16	\$ 7,470,707
Regional	17	10	\$ 6,751,415
Community	6	3	\$ 1,454,996
Total			\$ 15,677,118 <sup>14</sup>

<sup>13</sup> These are the number of projects out of the total projects. For example, for the national scale, 16 out of 24 project documents accesses were not sufficiently detailed to gauge investment by scale.

<sup>14</sup> Recall that the levels of investments per scale (regional, national etc.) and by EWS pillars differ due to the variation in budget details for the project documents that were accessed

Notwithstanding the limitations noted, the trends observed could be reflective of reality. For instance, whilst the low level of community projects could be attributed to the limited data accessed at this sub-national level, findings from the CDM Audit (2015-2016) suggest that *“community resilience is generally weakly addressed among Caribbean countries...there are for example low levels of community organization with 67% of countries not having a well-defined community resilience programme.”* Further, a priority need expressed by countries at the CDM Signature Event in 2016 is that *“it is critical to reinforce community-based EWS that feed into the national EWS and the national connect to the community-based systems. Such mechanism is currently not existent although progress has been made [in advancing EWS in the Caribbean].”* The most recent diagnostic by CREWS initiative (2020) highlighted that there is no regional strategy for the active engagement of communities in local hazard and vulnerability assessments and development of EWS, suggesting that this is one of the root causes of the gap in active community engagement in developing, deploying and sustaining EWS.

Therefore, **there have been limitations in advancing the strengthening of EWS (and wider DRR agendas) at the community level but the following progress should be recognized:**

- i. The DIPECHO project “Strengthening Capacities of Early Warning and Response for Tsunamis and Other Coastal Hazards in the Caribbean” is currently finalizing the implementation of the Tsunami Recognition Programme<sup>15</sup> in five (5) new selected communities (1 each) in Antigua and Barbuda, Barbados, Dominican Republic, St. Vincent and the Grenadines, and Trinidad and Tobago and renewed this status in Anguilla and maintained in the Virgin Islands (UK).
- ii. The DIPECHO project “Strengthening the integration of early warning systems for more effective disaster risk reduction, through knowledge and tools transfer”, as part of result area 3 led by IFRC, it Increasing the effectiveness of preparedness in 4 countries at community level through concrete priority actions. A notable example is the work done in i St. Vincent and the Grenadines; where the South Rivers community in the Colonaire River and Vermont community in the Buccament has increased river monitoring data generation with the purchase and installation of additional river monitoring equipment. These efforts were supported by Cuban technical assistance, leveraging tested tools and methods such as the volunteer river monitoring methodology in Cuba.
- iii. The DIPECHO project “Strengthen integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean”, strengthened the EWS of 10 communities in 5 countries (Dominica, Dominican republic, SVG, SLU and A&B), developing a better understanding of potential risk and taking protective actions through public awareness and public education; providing communities with the necessary technology to mitigate the risk and testing their understanding and ability to act through drills and simulations. Furthermore, due the global pandemic of COVID-19, a strategic plan for response was implemented in the target communities.

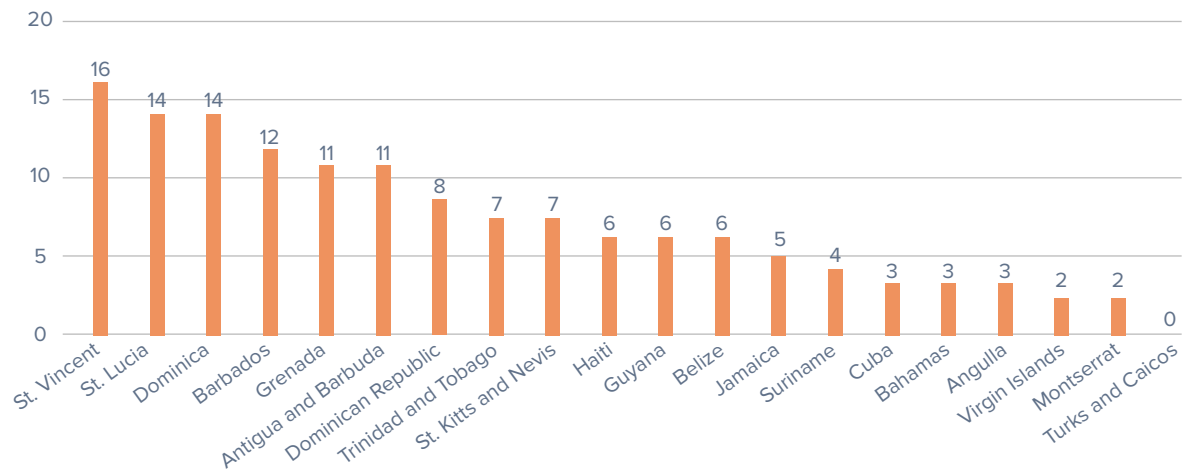
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<sup>15</sup> See more details on the tsunami recognition programme at [http://itic.ioc-unesco.org/index.php?option=com\\_content&view=category&id=2234&Itemid=2758](http://itic.ioc-unesco.org/index.php?option=com_content&view=category&id=2234&Itemid=2758)

In terms of regional and national level investments, what can be said is that the gap in the level of investments going towards national versus regional level could be much greater than what is currently indicated. This is because the Consultant estimated that at least 16 more projects are contributing to national EWS strengthening and 10 more projects for regional EWS strengthening (See **Table 5**, column #2). Samples of regional and national projects are detailed in **Sections 3.2 and 3.3** and the full list of national and regional projects reviewed is at **Annex I**.

As noted earlier, most projects accessed had a regional and national component with the national component targeting multiple countries. **Figure 5** depicts the number of projects each country is benefiting from but caution should be taken when using the trends presented in this figure given the lack of budget details and the fact that a limited number of national level projects related to EWS were received; hence the distribution of EWS projects by country does not include any nationally funded or initiatives fostered through bi-lateral arrangements.

**Figure 5: # of EWS Projects Per Country during the Period 2015-2020**



As seen in **Figure 5**, the countries benefiting from majority of the EWS projects covered by this stock taking include St. Vincent, St. Lucia, Dominica, Barbados, Grenada and Antigua and Barbuda. Countries benefitting to a more medium extent include Dominican Republic, Trinidad and Tobago, St. Kitts and Nevis, Haiti, Guyana, Belize and Jamaica. Majority of these countries benefiting from medium to high levels of EWS investments were heavily impacted by the Irma and Maria 2017 hurricane events and as such recognized the importance of EWS in saving lives. Also notable is that Antigua and Barbuda, Dominica, Saint Lucia and St Vincent and the Grenadines have benefitted from the MHEWS diagnostic and gaps and national roadmaps have been developed to guide investments. These countries have also received support to advance some of the priority areas identified from the application of the MHEWS checklist through the UNDP DIPECHO Project - Strengthening the integration of early warning systems for more effective disaster risk reduction, through knowledge and tools transfer.

The countries benefiting to a less extent include Suriname, Cuba, Bahamas, Anguilla, Virgin Islands, Montserrat and Turks and Caicos Islands. Given that majority of these countries are Overseas Territories, it is believed that the low levels of support to this grouping is as a result of their ranking as British Territories and therefore they are not prioritized or eligible in some



instances to receive aid. Also, Cuba is an exception to the list because they have national budgets dedicated towards strengthening their EWS as well as some investments of other agencies such as Canada and Russia; therefore they have not been a key beneficiary of projects but more so a case study of the strength of EWS model in the Caribbean.

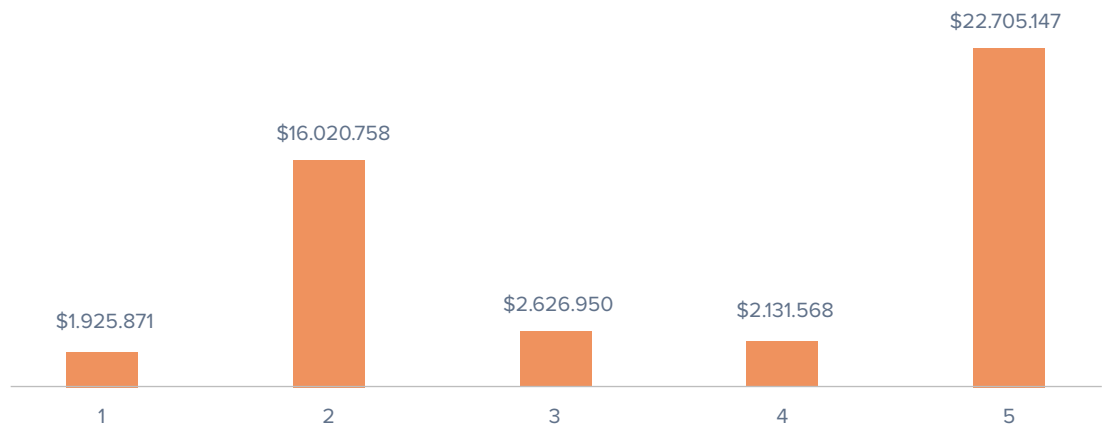
The intention will not be to comprehensively justify why these trends are being observed, since there is a degree of error to be considered in view of the comments noted above. Further, none of the project documents reviewed explicitly provided rationales for the selection of their beneficiary countries.

### 3.1.3 Investments Per EWS Pillar

The level of investments per EWS Pillar across the 28 projects is depicted in **Figure 6**. Firstly, the reason that the total investments, based on EWS pillar, varies from total investments reported by scale (final row in **Table 5** above) is that in more instances it was easier to identify budget allocations by pillar than by scale. This is because within pillars there can be regional, national, community level interventions and without enough budget details at output and/or activity level, it is more challenging to identify the contribution of the project to these scales.

The trend indicates that **majority of the investments are targeting the advancement of Pillar 2 (Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences) with Pillars 1, 3 and 4 receiving similar levels of investments**<sup>16</sup>. Notable is that the 2016 Desk Review also indicated that “*data suggest that the majority of the interventions focused on the warning tool, equipment and capacity building components of the early warning system*” (Collymore, 2016); that is, Pillar 2 of the EWS.

**Figure 6: Investments (USD) Per EWS Pillar**



<sup>16</sup> Recalling the limitation with budget details as noted above, these investment levels are considered to be understated.

**Table 6: # of Projects per Pillar as well as # of Projects with missing budget information**

Pillar	Total # of Projects	# of projects unable to identify budget by Pillar <sup>17</sup>	Value of Projects that budget information was accessed
1	13	8	\$ 1,925,871
2	27	13	\$ 16,020,758
3	8	3	\$ 2,626,950
4	10	6	\$ 2,131,568
Total			\$ 22,705,147

The reasons that investments have been channeled heavily towards Pillar 2 could be due to the recognition that the hydro-meteorological network in the region was not sufficient to meet the required coverage and need. For example, the 2017 Stocktaking Report flagged that “all the Caribbean states/territories with NMHSs have their own observation networks. Some have a limited number of real-time Automated Weather Stations (for example, as of 2012, one in Saint Vincent, two in Barbados, two in Antigua and Barbuda, and two in Dominica)”. Other reports have noted that “the expansion of the data generation networks (hydro-met stations) was essential to elevate the volume of data to a critical mass and sample size to reduce or eliminate uncertainties and errors in the modelling data and outputs. In larger ESC countries, such as Guyana and Suriname where there are significant differences in the topography and climatic conditions across the country, the current coverage was inadequate” (CCCCC, 2019).

Another reason could also be because CIMH was granted WMO Regional Coordination Centre (RCC) designation in November 2016, with official designation granted in May 2017 (Rahat, 2017). WMO RCCs are Centres of Excellence that create regional products including long-range forecasts that support regional and national climate activities, and thereby strengthen the capacity of WMO Members in a given region to deliver better climate services to national users (WMO, 2011). This milestone for the Caribbean has propelled the CIMH and its NMHS offices forward; but it came with an increasing demand for climate products and services by a diverse group of users and sectors in the region; which attracted further investments. Some popular climate products and services recently enhanced/developed by CIMH include the Caribbean Drought Bulletin, CariCOF Caribbean Climate Outlook Newsletter, CariCOF Drought Outlook, CariCOF Precipitation Outlook, CariCOF Temperature Outlook, CariCOF Seasonal Climate Outlook and CariCOF Wet Days/Wet Spells Outlook. Evaluation reports suggest that almost all of the climate products and services are being reported by users to inform decision-making is several sectors, which include water, health, agriculture and disaster risk reduction (Rahat, 2017).

<sup>17</sup> These project #s are a result of the Consultant being able to classify the projects into pillars based on its objectives and/or scope of activities, but the Consultant was unable to decipher associated budgets.

The foregoing highlights that the **investments in Pillar 2 were in response to identified gaps and needs in the Caribbean; however, given that the four pillars of an EWS are interrelated and need to be coordinated** within and across sectors and multiple levels for the system, particularly in vulnerable communities to work effectively and to include a feedback mechanism for continuous improvement; **failure in one component or a lack of coordination across them could lead to the failure of the whole system.**

### 3.1.4 Hazards of Emphasis

**Figure 7<sup>18</sup>** below illustrates the hazards of focus for the 28 EWS projects that were reviewed. There may be some degree of overlap, for instance, projects that have been characterized as multi-hazard are more than likely also touching on weather elements. However, the classification was done based on details available per project.

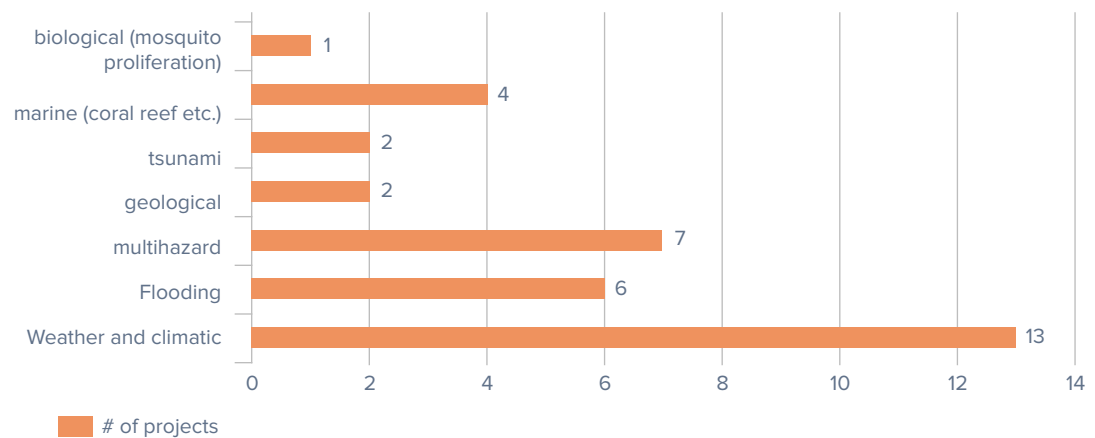
Based on previous EWS diagnostics completed, **there is an improvement in the types of hazards being addressed by EWS projects during the period 2015-2020**; for example, case studies highlighted in **Sections 3.2 and 3.3** illustrate that there are well advance EWS related to fishery, food security, marine (coral reef) and health (aedes aegypti mosquitoes) sectors. For example, through the Program for Building Regional Climate Capacity in the Caribbean (BRCCC) [2013-2017] and Enhancing Weather and Climate Early Warning Systems and Impact-based Forecasting Platforms in the Caribbean Region Project [2017-2019], there have been work (led by CIMH) with regional and national climate and health stakeholders in the Caribbean to develop a modeling framework that will ultimately provide spatio-temporal probabilistic forecasts of the risk of transmission of DENV, CHIKV, and ZIKV.

Further, it was reported that during the 2000-2015 period, the multi-hazard EWS were still in its developmental stage and warning systems focus primarily on hurricanes and floods, and some work related to tsunamis and volcanic hazards (Collymore, 2016; CDEMA et al., 2016). **Figure 7** indicates **that there are at least 7 projects addressing multi-hazards and upon closer examination, these projects are among the medium-to-large size projects, particularly those funded by EU (DIPECHO) and World Bank.** Notable is that the Sendai Framework for Disaster Risk Reduction, in particular its global target (g), calls on countries to “*substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.*” Improvements in the types of hazards being addressed by EWS and the promotion of multi-hazards EWS could be attributed to similar reasons noted earlier as it pertains to the triggers for the increase investment in EWS in the Caribbean.



18 There is a total of 35 project because some projects have a combination of hazards, with one or more of those hazards having an assigned category. For example, the Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean Project is targeting climatic, marine and biological hazards. It was not classified as “multi-hazard” to not lose the details in the information.



**Figure 7: Hazards of Focus for EWS Projects Reviewed for 2015-2020**

Another key dimension is whether the EWS encompasses impact-based forecasts. That is, is the EWS observing/modelling, monitoring and predicting hazards and the consequent effects of hazards. This is essential to ensure access to the best possible science, and the optimum services, to manage multi-hazard events today, and to provide the best possible evidence base on which to make the costly decisions on infrastructure needed to protect the population in the future as climate changes. (WMO, 2015). The WMO (2018) Review of the 2017 Hurricane Season found that there is need for more impact-based forecasting to increase the effectiveness of the warnings among impacted populations for the 2017 hurricane season. The projects reviewed for this stocktaking demonstrate the inclusion of impact-based forecasting; for example the CREWS initiative Caribbean Project; The Weather and Climate Ready National Project; The Enhancing Weather and Climate Early Warning Systems and Impact-based Forecasting Platforms in the Caribbean Region Project; and the Expanded Weather and Climate Forecasting and Innovative Product and Service Development and Delivery in the Caribbean to note a few. This suggests **improvements in the 2015-2020 period as it pertains to impact-based forecasts.**

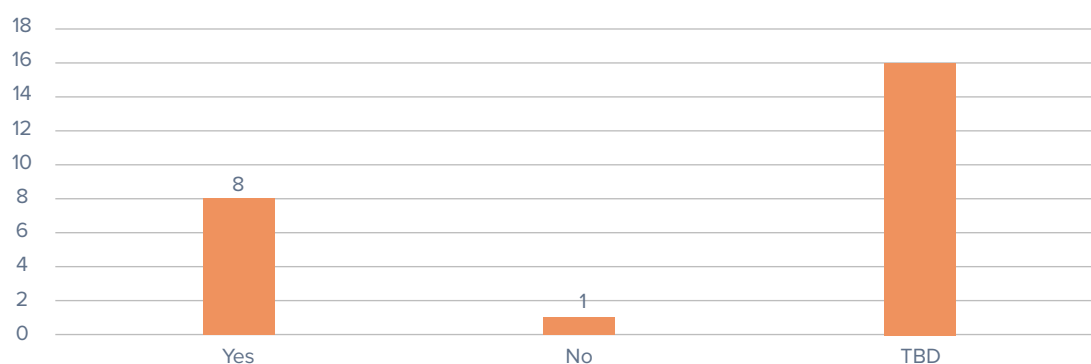
### 3.1.5 Gender Considerations

*“Knowledge, acceptance and respect for gender differences and strong social norms in early warning can reduce mortality and morbidity rates as well as facilitate equitable distribution of emergency relief, improve safety conditions in relief shelters, and improve mitigation”* (MHEWS Checklist, 2018: 15).

This stocktaking took cognizance of the extent of gender consideration in the 28 projects reviewed. **Figure 8** below indicates that 8 projects were verified to be considering gender and they include, among others: the CREWS Caribbean Initiative, the CCAP Project and the UNDP DIPECHO I and II Projects are making advancements for the mainstreaming of gender in the strengthening of EWS. With regards to the CREWS Caribbean Initiative, the World Bank, WMO and UNDRR have been working closely on the integration of gender and vulnerable groups as a cross-cutting theme in the diagnostic and regional strategy. Four national level<sup>19</sup> trainings and consultations have been conducted on gender and vulnerable group inclusion in EWS (exceeding the originally planned three workshops, due to high interest of the countries). The CCAP appears to be treating gender as a cross cutting theme of the project as there is the intention to ensure that activities target the neediest groups and do not exacerbate existing gender inequalities, where applicable. The DIPECHO I Project incorporated gender

considerations in the development of the MHEWS checklist for the Caribbean. Further, the systematization of the application of the EWS checklist in countries revealed that “the MHEWS Gap Report and Roadmap addressed several issues that have often been overlooked, such as gender-sensitive EWS”. The DIPECHO II Project has developed a gender sensitive model national MHEWS policy and adaptation guide, which were prepared, validated and adapted in Saint Lucia. The process of review and validation was supported by the REWSC and national stakeholders from five CDEMA Participating States and national stakeholders in Saint Lucia. Subsequent to these two exercises, gender considerations from UNDP were integrated into the document. Other key outputs include the development of guidelines for inclusion of gender perspective in the south-south cooperation between countries and Cuba; the review and improvement of gender perspective communication targeted messaging to one simulation exercise and the mainstreaming of gender in the interoperability handbook.

**Figure 8: # of Projects Addressing Gender Considerations**



Therefore, **it appears that the region is at a turning point when it comes to the inclusion of gender considerations in the strengthening of EWS and it is clear that having a tool to systematically guide the mainstreaming of gender considerations (The MHEWS Checklist)** was a key driving factor. Looking forward, it is envisaged that the development of a regional strategy on EWS will continue to support the mainstreaming of gender considerations within the EWS framework.

## 3.2 Highlights of Regional Projects

This section attempts to highlight a few case studies/projects that illustrate the diversity of the regional level projects. It is intended to promote awareness of these initiatives and encourage partners to easily identify opportunities for collaboration and synergies, including replication/scaling up. See Annex I for the full list and summary information of the 28 projects reviewed for this stocktaking.

<sup>19</sup> The workshops were conducted in St. Lucia (July), St. Vincent and the Grenadines (September), Dominica (November) and Antigua & Barbuda (November) during 2019

Title	Program for Building Regional Climate Capacity in the Caribbean (BRCCC)
<b>Agency/Institution (s) implementer</b>	WMO, CIMH, NMHS
<b>Donor</b>	USAID
<b>Status</b>	Completed
<b>Objectives Supporting EWS</b>	<p>Objectives 1-3 (of 5):</p> <ol style="list-style-type: none"> <li>1. Enhanced capacity at the CIMH and across the Caribbean to effectively convert climate data to products and services to better inform decision-making in key critical climate sensitive sectors;</li> <li>2. Enhancement of CIMH climate monitoring and forecasting, feeding into early-warning systems, and improvement of data acquisition networks across the Caribbean;</li> <li>3. Establishment of the Caribbean Environmental and Climate Computational Centre to provide CIMH staff and regional scientists with the necessary resources to simulate regional environmental and climate processes to better inform regional decision making in areas of disaster risk reduction, water resources management and adaptation to climate change and increasing climate variability;</li> </ol>
<b>Main results</b>	<p>CIMH attained recognition as the World Meteorological Organization (WMO) Regional Climate Centre (RCC) for the Caribbean. The RCC is responsible for leading the implementation of the Global Framework for Climate Services in the Caribbean and, more specifically, with the development and implementation of operationally focused climate services in the following sectors (i) Agriculture and Food Security, (ii) Water, (iii) Disaster Risk Reduction, (iv) Health and (v) Energy. Regionally, this list has been extended to include Tourism. See more at <a href="http://rcc.cimh.edu.bb/brccc/">http://rcc.cimh.edu.bb/brccc/</a></p> <p>The BRCCC programme supported the establishment, operation and coordination of the Caribbean Early Warning Information System Across Climate Timescales (EWISACTs) Partner Consortium. See more at <a href="http://rcc.cimh.edu.bb/ewisacts/">http://rcc.cimh.edu.bb/ewisacts/</a></p> <p>The BRCCC enhanced/developed and promoted awareness of the Caribbean Drought Bulletin, CariCOF Caribbean Climate Outlook Newsletter, CariCOF Drought Outlook, CariCOF Precipitation Outlook, CariCOF Temperature Outlook, CariCOF Seasonal Climate Outlook and CariCOF Wet Days/Wet Spells Outlook. A key achievement unearthed from the final evaluation is that almost all of the climate products and services are being reported by users to inform decision-making (Rahat, 2017).</p>
<b>Target area (regional, national and/or community level)</b>	Regional and National
<b>Budget</b>	US\$5,085,000.00
<b>Has the project gender approach? Yes/No</b>	Not explicitly stated to have considered gender and/or vulnerable groups



Title	The CREWS Caribbean – Strengthening hydro-meteorological early warning services in the Caribbean
<b>Agency/Institution (s) implementer</b>	WB/GFDRR, WMO and UNDRR, CIMH, CDEMA
<b>Donor</b>	Climate Risk and Early Warning Systems (CREWS) Initiative and contribution from Canada to WMO
<b>Status</b>	Ongoing
<b>Objectives Supporting EWS</b>	<p>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.</p> <p>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 crosscutting 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</p>
<b>Main results</b>	<p>The CREWS team has reached an agreement with the Regional Early Warning Systems Consortium (REWSC) that the regional strategy will be aligned with the Action Plan of the REWSC. Further, a detailed situational analysis to inform the development of the Regional Strategy was just completed.</p> <p>The World Bank and UNDRR have been working closely on the integration of gender and vulnerable groups as a cross-cutting theme in the diagnostic and regional strategy. Four national level trainings and consultations have been conducted on gender and vulnerable group inclusion in EWS (exceeding the originally planned three workshops, due to high interest of the countries). For the private sector role in EWS as a second cross-cutting theme, the UNDRR work with ARISE has been used as starting point for integration of information and suggestions into the diagnostic and strategy.</p>
<b>Target area (regional, national and/or community level)</b>	Regional and National
<b>Budget</b>	US\$5,500,000.00
<b>Has the project gender approach? Yes/No</b>	A crosscutting 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

Title	Fisher Early Warning and Emergency Response (FEWER) ICT Solution
<b>Agency/Institution (s) implementer</b>	IDB, CRFM, UWI MORI
<b>Donor</b>	IDB
<b>Status</b>	Ongoing
<b>Objectives Supporting EWS</b>	<p>The objective of the FEWER assignment was to develop, test and deploy an ICT-based Early Warning and Emergency Response System for fishers in 4 pilot countries that were also PPCR participating countries (Dominica, Saint Lucia, St Vincent and the Grenadines and Grenada), and to conduct the requisite training in the use and administration of the system. It is expected to reduce fishers' vulnerability to the impacts of climate changes while at the same time provide for their sharing of local ecological knowledge to inform climate-smart fisheries planning and management decision-making as well as risk management in the fisheries sector.</p>
<b>Main results</b>	<p>A Regional Inter-Agency Strategic Meeting on the Sustainability of FEWER was convened in 2018 with representatives from CDEMA, CIMH, CNFO, CRFM and UWI MORI. CDEMA has since agreed to adopt and host the FEWER infrastructure, and this is welcomed as it will ensure the integration of the fisheries-related early warning and emergency response communication and information exchanges into the overall regional CDEMA framework. The Forum should note that the CRFM is working with the PPCR project to procure the necessary hardware, software and technical support to facilitate a smooth transfer of the hosting capabilities of FEWER from the consulting firm that developed it to CDEMA.</p> <p>For the pilot countries, face to face national consultations and e-meetings were held to identify those national agencies required to serve a supporting role in a comprehensive national fisheries early warning and emergency response system, and to keep them informed and actively engaged in the process of development of the FEWER ICT Solution. In addition to training of fishers, technical experts from the key national agencies received training in FEWER usage and administration services. These activities informed development of specific national inter-agency MOUs for each of the pilot countries, which were finalized following completion of final country-level technical expert and fisher engagement activities.</p>
<b>Target area (regional, national and/or community level)</b>	Regional and National
<b>Budget</b>	US\$153,039.47
<b>Has the project gender approach? Yes/No</b>	Not explicitly, but the needs of vulnerable groups are considered.

Title	
Coral Reef Early Warning System (CREWS)	
<b>Agency/Institution (s) implementer</b>	CCCCC, NOAA
<b>Donor</b>	EU-GCCA
<b>Status</b>	TBD
<b>Objectives Supporting EWS</b>	The CREWS stations are part of an integrated network of climate and biological monitoring stations that collect data on climate, marine and biological parameters for use by scientists to conduct research into the health of coral reefs in a changing and variable climate.
<b>Main results</b>	The CCCCC has procured and installed five Coral Reef Early Warning System (CREWS) stations at a cost of approximately US\$800, 000 in Belize, Trinidad and Tobago, Barbados, and the Dominican Republic (2 stations). The new CREWS stations became part of the NOAA's Integrated Coral Observing Network (ICON) of climate and biological monitoring stations that collect data on climate, marine and biological parameters for use by scientists to conduct research into the health of coral reefs in a changing and variable climate.
<b>Target area (regional, national and/or community level)</b>	Regional and National
<b>Budget</b>	US\$800,000
<b>Has the project gender approach? Yes/No</b>	TBD





Forecast-based Financing (FbF)	
<b>Agency/Institution (s) implementer</b>	World Food Programme
<b>Donor</b>	Dutch funding through Partners for Resilience (PfR)
<b>Status</b>	Ongoing
<b>Objectives Supporting EWS</b>	To support countries in the mitigation and management of climate risks, WFP is implementing innovative programme approaches to reduce losses and damages in the livelihoods of people who are faced with increasing climate extremes. The approach that has the biggest potential of closing the humanitarian funding gap is Forecast-based Financing (FbF). Forecast-based Financing enables anticipatory actions for disaster mitigation at the community and government level using credible seasonal and weather forecasts. These forecasts are linked to predetermined contingency plans, actors and funding instruments which are used to reduce the humanitarian caseload in the critical window between a forecast and an extreme weather event. This mechanism is changing the way the humanitarian system responds to climate-related disasters: it complements the existing readiness of humanitarian actors to respond to humanitarian needs with an anticipatory system to reduce the scale of these needs before they materialize.
<b>Main results</b>	For the Caribbean region, work has commenced in the Dominican Republic. Partners include the Dominican Republic National Emergency Commission (CNE), the Center for Emergency Operations (COE), the National Institute for Water Resources (INDRHI), the National Meteorological Centre (ONAMET), the National Geological Service (SGN), among others as part of an FbF taskforce, and the subnational Committees for Prevention, Mitigation and Response that are responsible for carrying out preparedness and early actions at the community level. WFP's efforts within this FbF initiative have aimed at mapping the challenges and gaps in the country's early warning, emergency preparedness and response structure, sensitizing key stakeholders on the need for change, and improving preparedness procedures. Key activities undertaken include: Strengthening the forecasting capacity of national hydro-meteorological services, and enhancing national and community early warning systems; Developing and testing national and community level SOPs for anticipatory actions to river flooding such as cash-based transfers, in-kind food baskets
<b>Target area (regional, national and/or community level)</b>	Regional and National; with some community level work
<b>Budget</b>	US\$112,865.00 <i>**This is more an initiative with multiple funding streams and phases. Budget is only an estimate from one source - the level is investment in this is more.</i>
<b>Has the project gender approach? Yes/No</b>	TBD

Title	Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer (DIPECHO I)
<b>Agency/Institution (s) implementer</b>	UNDP Regional Hub, UNDP Barbados and the OECS, CDEMA, IFRC/Red Cross Societies., UNDP Cuba, UNDP Dominican Republic.  National Disaster Management Offices, communities, regional Institutions, National Met Offices (in beneficiary countries)
<b>Donor</b>	ECHO
<b>Status</b>	Completed
<b>Objectives Supporting EWS</b>	<p>This initiative seeks to emphasize the 4 components of EWS - and close priority gaps - at a national level, contributing to the integration of national and community EWS and addressing sustainability and national ownership of EWS through 4 expected results:</p> <p>R1: Increase access to existing tools and knowledge of EWS at a national and regional level;</p> <p>R2: Provide integrated EWS solutions in five target countries through knowledge sharing;</p> <p>R3: Increase EWS effectiveness in five target countries through concrete priority actions;</p> <p>R4: Ensure EWS knowledge transfer, documentation and communication.</p>
<b>Main results</b>	<p>There is an increase in downloading online EWS toolkit (<a href="http://www.cdema2.org/ews/">http://www.cdema2.org/ews/</a>), and promotion and awareness of the toolkit at all field visits and meeting event.</p> <p>The EWS Checklist was adopted for all target countries; along with EWS Gap Reports; EWS tools adapted from south-south cooperation with Cuba with EWS tools adapted and translated in addition to Development of solutions packages based on Cuban model for target countries;</p> <p>EWS solution packages and roadmaps delivered in target country – Dominica &amp; St. Vincent and the Grenadines</p> <p>Field Visits and Reports on concrete action implemented for integrated EWS in each target country - Dominica &amp; St. Vincent and the Grenadines – for Hazard, Vulnerability and Risk Studies Methodology (Dominica), and River and Rainfall Volunteer Observer (St. Vincent and the Grenadines); Further, Target Country National meeting on sustainability reports for each</p> <p>National Handover Meeting Agreement for target countries, including the donor community, and Documentation of handover process</p>
<b>Target area (regional, national and/or community level)</b>	Regional, National and Community
<b>Budget</b>	\$1,537,891.67
<b>Has the project gender approach? Yes/No</b>	Yes

Title	Strengthen integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean (DIPECHO II)
<b>Agency/Institution (s) implementer</b>	<p>UNDP Regional Hub and Country Offices (Barbados and the OECS, Cuba and Dominican Republic), CDEMA, OCHA, IFRC/Red Cross Societies.</p> <p>National Disaster Management Offices, National Met Offices, CDEMA's Sub Regional focal points (in beneficiary countries)</p>
<b>Donor</b>	ECHO
<b>Status</b>	Ongoing
<b>Objectives Supporting EWS</b>	<p>The project proposes four (4) expected results:</p> <p>R1: Regional preparedness is strengthened through operational response readiness and harmonized approach to MHEWS;</p> <p>R2: Appropriate actions and solutions taken to increase EWS integration and effectiveness at the national level;</p> <p>R3: Increased effectiveness of preparedness at community level through concrete priority actions;</p> <p>R4: Leverage existing best practices, and support for sustainable actions.</p>
<b>Main results</b>	<p><b>RA 1:</b></p> <ul style="list-style-type: none"> <li>•A gender sensitive model regional MHEWS Policy and adaptation guide</li> <li>•A revised vision for EWS in the Caribbean – ‘An effective, people-centred and reliable Multi-Hazard Early Warning System that protects lives and livelihoods in the Caribbean’</li> <li>•An agreed mission for the REWSC - ‘To provide leadership in the coordination of a dynamic regional Multi-hazard Early Warning System effective in saving lives and livelihoods of People in the Caribbean’</li> <li>•Articulated roles and responsibilities of 10 members of the REWSC</li> </ul> <p>5 of RRM procedures harmonized with the CDEMA/OCHA procedures and an interoperability manual developed</p> <p>29 focal points of the 4 CDEMA's Sub-hubs equipped to implement information management during times of emergencies.</p>

Title	Strengthen integrated and cohesive preparedness capacity at a regional, national and community level in the Caribbean (DIPECHO II)
<p><b>Main results</b></p>	<p><b>In relation to Result 2 (EWS integration and effectiveness at the national level) the following has been achieved through updating the methodology on public education on the national EWS system in Saint Lucia:</b></p> <ul style="list-style-type: none"> <li>•Draft Final National MHEWS policy for Saint Lucia</li> <li>2 National/municipal protocols and emergency plans in the DR</li> <li>4 EWS public awareness methodologies/campaigns in SLU, Dominica, SVG and A&amp;B</li> <li>3 CAP trainings and radio and TV media interrupters' equipment installed in SVG, Dominica and A&amp;B</li> <li>2 National Tsunami plan and its drill implemented</li> <li>2 SSC missions to increase national capacities in A&amp;B and SLU</li> </ul> <p>•81 first responders with increased capacity for dealing with persons with disabilities during and after emergencies</p> <p>•67 caretakers and persons with disabilities with increased awareness of the disaster risk information and shelters.</p> <p><b>In relation to Result 3</b>, IFRC strengthened the EWS of 10 communities in coordination with the NDMOs of the 5 corresponding countries, through PAPE, trainings, installation of equipment, and drills.</p> <p><b>Result 4</b> was focused on the project's sustainability strategy through product visibility and promoting EWS public awareness</p>
<p><b>Target area (regional, national and/or community level)</b></p>	<p>Regional, National and Community</p>
<p><b>Budget</b></p>	<p>\$1,707,245.65</p>
<p><b>Has the project gender approach? Yes/No</b></p>	<p>Yes</p>





### 3.3 Highlights of National Projects

Majority of the regional projects shared in **Section 3.2** also have national level components. The projects featured in this section are more targeted to individual countries, and a few with community component.

Title	Implementation of a Geo-information Centre in the Caribbean island of Saint-Lucia
<b>Agency/Institution (s) implementer</b>	Government of SLU - Water Resource Management Agency (WRMA) and national Meteorological Office (Met Office)
<b>Donor</b>	Government of Italy
<b>Status</b>	See notes below
<b>Objectives Supporting EWS</b>	See notes below
<b>Main results</b>	<p>No details on specific results shared. However, the scope of the project is as follows:</p> <ol style="list-style-type: none"> <li>1. Early Warning Alerting, that combines information and data derived from multiple ground and satellite sources in order to deliver a unified picture</li> <li>2. Local meteorological information, by radar with 120 Km of radius on medium high intensity phenomena</li> <li>3. Hydraulic information through hydro models, exploiting the already existing hydrometric networks in St. Lucia</li> <li>4. Flood mapping capability, for post event damage assessment, based on the analysis of both SAR and optical satellite images, freshly acquired during the peak of the event and immediately after.</li> </ol>
<b>Target area (regional, national and/or community level)</b>	National – Saint Lucia
<b>Budget</b>	US\$2,465,441.00
<b>Has the project gender approach? Yes/No</b>	TBD

Title	
<b>Agency/Institution (s) implementer</b>	Seismic Research Centre (SRC)
<b>Donor</b>	TBD
<b>Status</b>	TBD
<b>Objectives Supporting EWS</b>	<p>The Project seeks to reduce vulnerability to the multi-hazard environment of the Soufriere Volcano through a combination of activities designed to enhance community early warning procedures, increase adaptive capacities, strengthen awareness, and enhance response capacities. The Project comprises four components which seek to increase the resilience of the 12 communities in St. Vincent and the Grenadines to volcanic and other natural hazard events and CC. The communities have been separated into two groups and they are (a) Windward communities comprising Fancy, Owia, Sandy Bay, Overland and Big Level, South Rivers, Park Hill, Colonaire, and (b) Leeward communities comprising Fitz Hughes, Chateaubelair, Rose Hall, and Spring Village.</p>
<b>Main results</b>	<p>Level of achievement TBC.</p> <p>The expected Project outputs at the end of the two-year implementation period are:</p> <ul style="list-style-type: none"> <li>(a) Alerting protocols developed and used to alert communities.</li> <li>(b) Multi-hazard maps developed and strategically displayed throughout communities.</li> <li>(c) Evacuation signage with safe assembly points and danger zones developed and strategically erected throughout communities.</li> <li>(d) Framework for designating Volcano-Ready communities developed, approved, and piloted.</li> <li>(e) CVEP developed and tested in all communities.</li> <li>(f) Technical capacities developed and available to assess risks as well as plan community based ORR measures.</li> <li>(g) Volcano awareness and education programmes developed and implemented for schools, business, vulnerable populations, and general community.</li> <li>(h) A suite of hazard specific public education materials developed and distributed throughout the target communities.</li> <li>(i) Best practices captured and shared with other communities and stakeholders through appropriate mechanisms.</li> <li>(j) Partnerships identified and formally established to support community-based organizations.</li> <li>(k) Community residents empowered and assist in organization activities.</li> <li>(l) CERT's established, equipped, trained, and available for use in the community.</li> </ul>
<b>Target area (regional, national and/or community level)</b>	National and Community- SVG
<b>Budget</b>	TBD
<b>Has the project gender approach? Yes/No</b>	TBD

Title	
Department of Disaster Management is officially launching the CAPiT Anguilla Warning System Application for iOS and Android phones	
Agency/Institution (s) implementer	DDM – AXA
Donor	Digicel, FLOW, DITES, Ron's Sign Shop and Hi-Tek graphics
Status	See notes below
Objectives Supporting EWS	See notes below
Main results	<p>The CAPiT acronym "Consistently Alerting People in Time" accurately describes the intention of the smartphone app, the latest addition to the Anguilla Warning System. Once an individual downloads the CAPiT mobile app free of cost from the Google Play Store or the Apple App store and installs it onto their smartphone, alerts from the Anguilla Warning System will come directly to their mobiles offering 24 hour access to critical potentially lifesaving information. The smartphone application which was developed to replace the obsolete Blackberry application developed by the Department in 2010 is fast and reliable and provides access to currently active alerts as well as an archive of previous alerts. The Department continues to visit radio stations to talk about the warning system and the app and will be engaging in several other outreach activities over the coming weeks in order to achieve its goal of 100 percent smartphone penetration.</p>
Target area (regional, national and/or community level)	National
Budget	TBD
Has the project gender approach? Yes/No	TBD



Title	
Disaster Vulnerability Reduction Project – Grenada	
<b>Agency/Institution (s) implementer</b>	World Bank
<b>Donor</b>	Ongoing
<b>Status</b>	See notes below
<b>Objectives Supporting EWS</b>	See notes below
<b>Main results</b>	Component 2 of the DVRP includes the optimization and modernization of the hydro-meteorological data collection network and data management system. Specifically, Investments are designed to modernize the current rain and stream gauge network in order to improve field data resolution to capture and analyze the recurrence of short-term events to support the development of Intensity, Duration and Frequency (IDF) curves to be used in engineering and planning. Together with the geospatial data developed, hydro-meteorological data provides the analytical input for hydraulic and hydrologic analysis. Investments in hydrometeorological infrastructure and data management include inter-alia: (i) Hydrologic analysis and station optimization study; (ii) Hydromet Data management system; and (iii) Rain and stream gauge instrument network.
<b>Target area (regional, national and/or community level)</b>	National
<b>Budget</b>	US\$13,580,000.00
<b>Has the project gender approach? Yes/No</b>	TBD





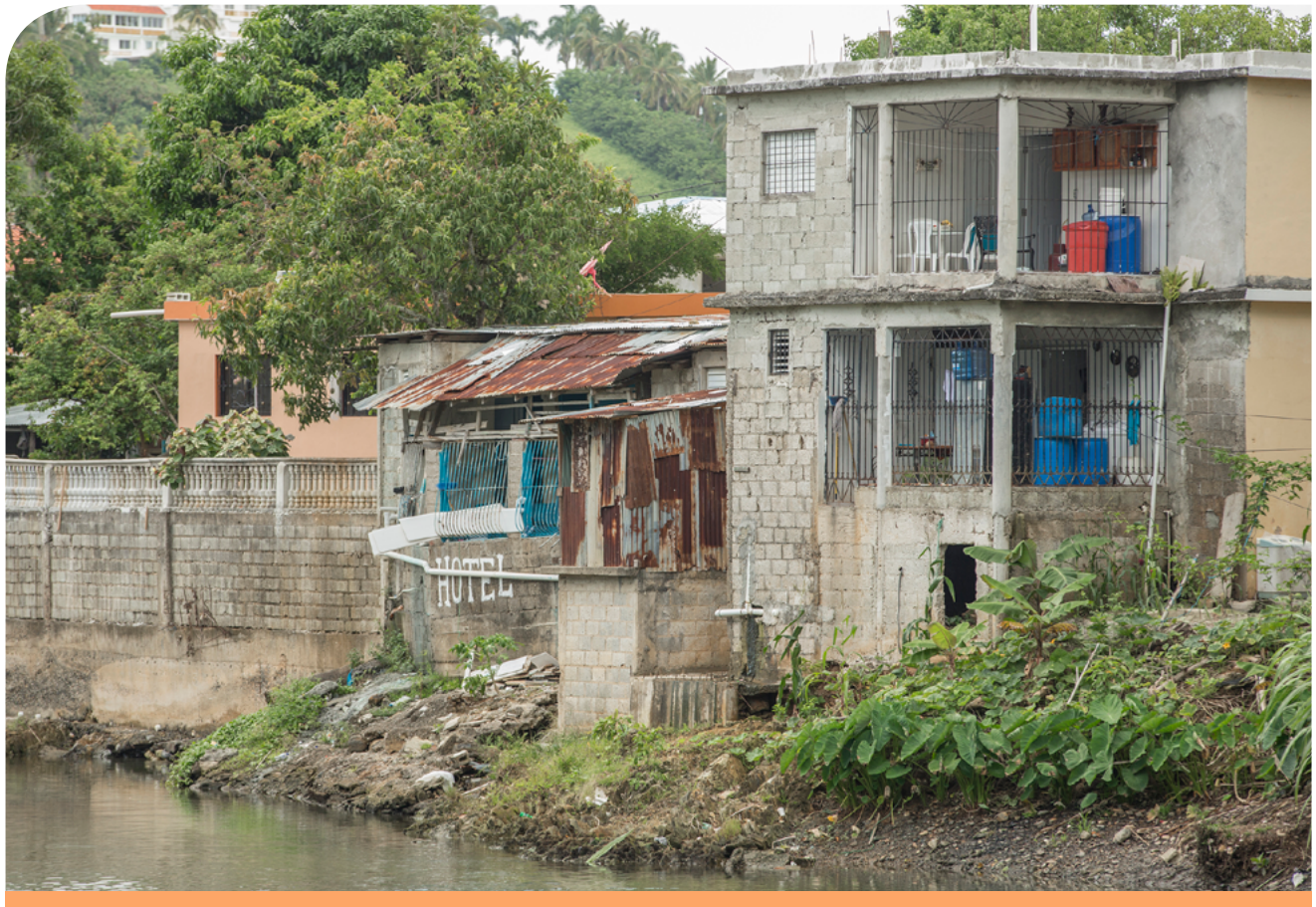
Title	
Disaster Vulnerability Reduction Project - Saint Lucia	
<b>Agency/Institution (s) implementer</b>	Ministry of Finance, Grenada, National Climate Change Unit
<b>Donor</b>	Ongoing
<b>Status</b>	See notes below
<b>Objectives Supporting EWS</b>	See notes below
<b>Main results</b>	Component 2– Technical Assistance for Improved Assessment and Application of Disaster and Climate Risk Information in Decision-Making (US\$10 million). This component would support capacity building for open systems and platforms to create, share, analyze and use disaster risk and climate change data and information for improved decision making and engineering design for risk reduction and climate change adaptation. Specifically, the component would finance, inter alia: (i) the creation of a high resolution digital topographic and bathymetric model for Saint Lucia; (ii) sea level rise modelling and coastal flood and erosion risk mapping; (iii) design and deployment of meteorological, hydrological, and sea level rise monitoring networks to provide high resolution hydrologic data; (vi) deployment of an environmental health surveillance system; and (v) technical assistance and regional capacity building and training workshops to promote safe and uniform building standards and harmonize geospatial data standards across the Eastern Caribbean.
<b>Target area (regional, national and/or community level)</b>	National
<b>Budget</b>	US\$10,000,000.00
<b>Has the project gender approach? Yes/No</b>	TBD



## 3.4 Key EWS Actors

This actors map (**Figure 9**) includes the key actors strengthening the EWS pillars at the regional and national levels in the Caribbean based on the information found in the 28 project documents that were reviewed spanning the period 2015-2020. The actor's map is intended to guide future investors in identifying possible collaborators/partners for strengthening EWS in the Caribbean. Further, the actors mapping was compared to the recommended key actors to be engaged in the advancement of the 4 pillars of an EWS, as per the MHEWS Checklist, and the key limitation noted is the limited participation of the private sector, non-governmental organisations and major social groups such as youth organisations, indigenous people etc. Other limitations of the actors' map (not related to a comparison with the recommendations in the MHEWS checklist) are as follows:

- i. Given that limited community level projects were collected the actors map does not include details of actors at the community level
- ii. Donors are identified by pillar given that in more instances it was easier to identify budget allocations by pillar than by scale. However, this level of detail could not be done for key partners/implementers based on project information accessed. But, it is believed that the support offered by majority of the named partners/implementers/actors at the regional and national levels cover all of the pillars since many of the agencies are part of project steering committees and therefore influencing the implementation of all facets of projects and not only specific pillars.



**Figure 9: Key Actors Strengthening The EWS Pillars At The Regional And National Levels In The Caribbean Spanning The Period 2015-2020**





## KEY PARTNER NAT'L

IFRC National Societies

United Nations Development Programme (UNDP)

NDOs

NHMS

National Water Resource Management Agencies

Ministries of Health

Ministries of Agriculture

Ministries of Education

Ministries of Finance

Gender Affairs Bureau

UNDP Country Offices

UNESCO National Liaison Officers

District Disaster Committees

National Climate Change Units

Digicel

FLOW







04

## Conclusions

# 04 Conclusions

This stocktaking exercise of investments in EWS in the Caribbean for the period 2015-2020 was successful in identifying trends in the level of investment per EWS pillar and scale. There were noted limitations in the project documentation received that precluded a precise estimate of the investment levels per EWS pillar and scale. Nevertheless, the trends observed are believed to be in keeping with the realities on the ground given that they were triangulated with literature emanating from past EWS diagnostics, studies and stakeholder workshops/consultations.

The findings when viewed in the context of sustainable investments indicate that there is need for greater focus on engaging the private sector and communities including the vulnerable groups in the strengthening of the EWS pillars at the national and regional levels. Also, the implementation of the MHEWS checklist in countries is another key mechanism towards promoting sustainable investments since it ensures that future investments are meeting the needs of countries and the checklist itself promotes community engagement, gender considerations and the engagement of the private sector. These components are key for promoting national ownership, support and awareness of what needs to be done to ensure lives are being saved.

Whilst work is still needed, this stocktaking period (2015-2020) indicate that the Caribbean is at a turning point towards addressing EWS in a comprehensive and sustainable manner, particularly with the establishment of the REWS Consortium, the development of the gender sensitive model national MHEWS policy, the mapping of institutional roles by key EWS stakeholders in the Caribbean, the development of a regional strategic vision, the application and systematization of the MHEWS checklist, the WMO RCC designation that has been achieved by CIMH and their demonstrated ability to full these functions. Cognizance should also be given to work underway that are highly important and relevant towards strengthening and sustaining investments in EWS, such as the development of a regional strategy to strengthen and streamline early warning and hydromet services, which is said to include emphasis on gender considerations as well as the engagement of the private sector, community and vulnerable groups.

## 4.1 Recommendations

The following recommendations are provided based on the stocktaking of the level of investments channeled to EWS in the context of the 4 pillars and across the regional and at national levels. These recommendations should be considered in tandem with the EWS diagnostics completed in the past, particularly the most recent ones – the national EWS gaps and national roadmaps completed under UNDP DIPECHO I Project and the World Bank Situational Analysis of the Caribbean Multi-Hazard End-to-End Early Warning System (January 2020).

***Develop a regional strategy to promote active community engagement in developing, deploying and sustaining EWS***

There are a series of recommendations provided in the Collymore, 2016 review as it pertains to consolidating community and national integrated EWS, inclusive of the use of IFRC's Community EWS toolkit (See page 80 of the Collymore 2016 Report) which should be explored. Further, the case study of St. Vincent and the Grenadines benefiting from a partnership with Cuba (DIPECHO I Project) as it pertains to integrating communities and vulnerable groups into the development and implementation of EWS was systematized and can offer as a model to other countries. Same can be said for DIPECHO II Project, which can particularly serve as a good model for the inclusion of vulnerable groups. For instance, in advancing a more inclusive EWS system in Saint Lucia required the integration of persons with disabilities in EWS; hence workshops were held. The first set of workshops were attended altogether by 81 first responders who were engaged in sign language training and practical exercises in guiding and transporting persons with disabilities and the elderly. The second set of workshops engaged 67 persons of different disabilities, including two persons with cerebral palsy and caretakers. During these two workshops, awareness among persons with disabilities was raised as to how to respond to warnings of impending disaster and post disaster responses. They engaged in disaster and shelter exercises as practical ways to explain the information shared. Also, the DIPECHO (UNESCO/IOC CTIC) project focusing on Strengthening Capacities of Early Warning and Response for Tsunamis and Other Coastal Hazards in the Caribbean has a component that aims to establish tsunami ready communities. This approach can be systematized and its utility in the context of addressing multi-hazards can be explored. There are also useful community initiatives noted in the CREWS Initiative report (2020)<sup>20</sup> that should be systematized to support the development of a regional strategy for strengthening the engagement of communities and vulnerable groups in EWS. Some key examples highlighted include - Management of Slope Stability in Communities (MoSSaiC) project undertaken in St. Lucia by the University of Bristol, UWI-SRC community level work in addressing vulnerability to volcanic hazards, the Red Cross Caribbean Community Resilience to Disaster Risk (CCRDR) project and the PAHO SMART Healthcare Facilities initiatives.

***Whilst there is significant investment in Pillar 2 at the regional and national levels, there is still need for continued support to this pillar.***

This is because Pillar 2 is the corner stone of the entire EWS – there is need for constant investment to ensure that innovative, scientific and cutting-edge research and development is being undertaken and/or adapted in the Caribbean. Also, the recent diagnostic by the CREWS Initiative (2020) highlighted that “*NHMSs are critical partners within the national institutional structure of EWS, providing data, information, forecasts, warnings and analysis to support all four pillars of early warning systems. To provide a high level of service within MHEWS, NMSs need technical capacities, trained staff and SOPs to frame the mechanisms between NMS and DRM agencies, stakeholders, media, etc. [further] the funding for NMSs typically comes from the national government which is in most cases insufficient for sustainable performance, including the constant needs for capacity building, adequate operations and maintenance of equipment.*”

***Investments should be heavily directed towards advancing Pillars 1, 3 and 4 at all levels (regional, national and community).***

There are many recommendations from previous diagnostics, including recent assessments of the national EWS in 5 countries (Antigua and Barbuda, Dominica, Dominican Republic, St. Lucia

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<sup>19</sup> See Section 3.3.1 of Pillar 1 of the Report - A Situation Analysis of the Caribbean Multi-Hazard End-to-End Early Warning System (January 2020)



and St. Vincent and the Grenadines) with emerging gaps and roadmap for strengthening EWS in the context of the 4 pillars. The CREWS Initiative (2020) report is also timely as it provides significant context and recommendations at the level of sub-components of the 4 pillars.

***Continue to invest in the strengthening of impact-based forecasting***

Whilst the 2015-2020 period demonstrates an improvement in impact-based forecasting, given the benefits it can offer towards making warning systems more impactful and effective, it should be factored into all future EWS investments.

***Continue investments in multi-hazard and sector specific EWS***

Continuous investments are needed to further strengthen the work being undertaken in some of the newer sectors with respect to EWS, such as fisheries, food security and health sectors.

***Need for an aggregate report on the EWS gaps and national roadmaps completed by 5 countries***

An aggregate report will provide an overview of the overall direction that investments should be made per EWS pillar in the context of national needs. Further, similar gaps across countries can be prioritized for investments and a comparison of national strengths and weaknesses can support the identification of opportunities for south-south cooperation.

***Need to stimulate the involvement of private sectors in the development of national EWS as well as a more prominent role for them in advancing the regional agenda on strengthening EWS***

This is important since businesses benefit from the EWS warnings. There is need for more discussions with national chambers of commerce on how their active participation in EWS can be promoted and sustained. In the case of the regional governance mechanism, the REWS would need to include appropriate private sector representation, particularly since the Consortium is responsible for articulating strategies for fostering public-private partnerships.

***Update this EWS desk review including all CDEMA PS through the National Disaster Office and National Met Offices***

To truly capture what is happening on the ground, that is, community level projects related to EWS, consideration for the support of missions to a sample of the countries is highly recommended. This would provide an opportunity to gather documents and interview relevant stakeholders to best systematize what is happening at the community and national levels with respect to advancing the EWS agenda. This level of research will require more budget and time; but should be seriously considered given that the MHEWS Checklist (DIPECHO, 2018) recognizes that “communities, particularly those most vulnerable, are fundamental to people-centred multi-hazard early warning systems. They should be actively involved in all aspects of the establishment and operation of early warning systems; be aware of the hazards and potential impacts to which they are exposed; and be able to take actions to minimize the threat of loss or damage. They should take ownership of these systems. Local governments, like communities and individuals, are at the centre of effective early warning systems. They should be empowered by national governments, have considerable knowledge of the hazards to which their communities are exposed and be actively involved in the design and maintenance of early warning systems.”





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