

Mid-Term Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015 – 2030



“Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030”.

Sendai Framework Global Target G



Executive summary

The Caribbean thematic case of Multi-Hazard Early Warning Systems (MHEWS) has been built based on three sources of information. First, a desk review of relevant documents being published recently. Second, on the regional MTR SF MHEWS consultation with the Caribbean countries, organized on May 2022 in Trinidad and Tobago. Third, key informant interviews were conducted with some of the key regional and international MHEWS actors and experts.

From 2015 to date, the Caribbean region has experienced several major climate related events and the COVID-19 has proven the systemic nature of risk to be a reality to which the region is highly exposed. These events, however, have also triggered new thinking and investments to the Caribbean MHEWS. The region has been getting more organized with early warning systems (EWS), particularly with an increasing focus on multi-hazards and the region has increasingly started to adopt the 4-pillar MHEWS (figure 1), although the progress among pillars has not been even. There has also been significant progress in developing EWS governance mechanism, such as the establishment of the Regional EWS Consortium (REWSC). There is also a growing interest towards multi-hazard *impact based* early warning systems (MHEWS). Overall, the region has been transitioning from a merely technical view of EWS towards a more holistic view of EWS more aligned to disaster risk reduction.

The desk review indicates that the Caribbean is at a turning point towards addressing MHEWS in a comprehensive and sustainable manner, particularly with the establishment of the REWSC; 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 strategy on MHEWS; and, strengthened capacity for assessing MHEWS through the application and systematization of the national MHEWS checklists. The international investments on MHEWS have also experienced significant increase from 2015 forward, in comparison to the investments prior to 2015.

Community level EWS investments are, however, lagging behind, which is not in line with the region's growing need for a people-centered MHEWS. Connected to this notion, it also appears that the Caribbean is at a turning point when it comes to the inclusion of gender considerations in the strengthening of EWS. In this perspective, improving the understanding of why individual, communities and institutions take action (or not), is an area of interest that is now increasingly being addressed by different research, programmes and policies. It is envisaged, for example, that the

regional MHEWS strategy will support the mainstreaming of gender considerations and vulnerable groups within the MHEWS, therefore improving the MHEWS access to people most at risk.

The summary results of the regional MHEWS consultation are the following:

	2015 to date	Context changes	To 2030 and beyond (needs)
Progress of MHEWS	-Least progress in pillar 1 -Most progress in pillar 2 -Pillar 3 needs development -Pillar 4 is under disaster management strategy -Increasing focus on multi-hazard -No EWS in each country -Hazard experience and build back better exists	-Climate change and related events have increased -COVID-19, realization of systemic risk, and, compound and cascade hazards triggering disasters, impacted the region, but also created new thinking of MHEWS	-MHIEWS to respond to the real needs and focus on impact -Data needed & disaggregated -Technology development at institutional level and with public
Access of MHEWS to people	-Diversification of communication channels has happened - There is progress in reaching people	-Beach ecosystems are affected -Geomorphology challenges (e.g. How to be a tsunami ready in a flat island?)	-More people centred approach and messaging -Needs to strengthen the last mile - MHEWS that are gender responsive and transformative -Public engagement and participation
Investments	-National investments limited -International investments increased due to major hazards -Private sector role emerging -Dependency on international cooperation	-Climate change and related events will increase -Social hazards, such as regional and sub-regional migration and displacement on the rise	-Budget and skilled HR needed -Further access to climate financing and need for establishing focus resilience and DRR financing. -Public-private partnership to be strengthened
Governance	-Legislation, plans and policies in some countries -Inter-office collaboration has increased in regional and national levels	-Increasing negative effects to tourism and livelihoods -Sea level rise	-Legislation needed to ensure clear mandates, operational capacities, monitoring & evaluation and budget. -Systemic thinking and governance needed -Strengthened inter-island cooperation, and inter-institutional roles and responsibilities

It is evident that the exposure to multiple hazards in the region is posing a major challenge to the MHIEWS in the future, particularly considering the climate change. The increased understanding of the systemic nature of risk is also shaping the future priorities. Cooperation among institutions, islands and with international partners is needed to enable to keep up with the ongoing process, including a more integrated role of the private sector. The future recommendations are to focus increasingly, through a common strategy, to multi-hazards, systemic risk and transitioning towards an impact-based forecasting. There is a need for a more even progress among the four pillars. Focus is needed also on data and technology, capacity strengthening, community involvement and gender to enable a truly people-centered, needs-based MHIEWS. Similarly, it is important to continue strengthening the governance mechanisms at national and regional levels.

1. CONTEXT AND BACKGROUND

Hazard context

Different and multiple hazards, such as severe weather conditions in land and at sea, droughts, hurricanes, floods, epidemics, pandemics, volcanoes and earthquakes, pose a serious threat to the Caribbean, which is one of the most disaster-prone regions in the world. Geological and hydro-meteorological hazards have affected more than 100 million people in the region, causing significant economic losses and casualties.

As disclosed in the Regional Assessment Report (RAR) on Disaster Risk in Latin America and the Caribbean, published in 2021: “In the short and medium term the occurrence of new mega-disasters in the region is almost inevitable given the extreme risk embedded there. It is therefore urgent to strengthen corrective and reactive management capabilities, especially early warning systems (EWS), preparedness and response.”

Multi-hazard early warning systems

The development of EWS has been identified by the Sendai Framework for Disaster Risk Reduction 2015–2030, the 2030 Agenda for Sustainable Development, and the Paris Agreement as a key pathway to prevent disasters and reduce the negative impacts of single, cluster or multiple hazards.

According to the United Nations (UN, 2017) “Multi-hazard early warning systems (MHEWS) address several hazards and/or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, cascading or cumulatively over time, and taking into account the potential interrelated effects. A MHEWS with the ability to warn of one or more hazards increases the efficiency and consistency of warnings through coordinated and compatible mechanisms and capacities, involving multiple disciplines for updated and accurate hazards identification and monitoring for multiple hazards.”

Globally it is accepted that effective EWS shall reflect the following four pillars:

1. disaster risk knowledge based on the 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 warnings and associated information on likelihood and impact; and
4. preparedness at all levels to respond to the warnings received.

These four pillars, when properly implemented, enable a “end-to-end” and “people-centered” early warning systems. These four interrelated pillars need to be coordinated within and across sectors and multiple levels for the system to work effectively and to include a feedback mechanism for continuous improvement. Failure in one pillar or a lack of coordination across them could lead to the failure of the whole system. Effective MHEWS also require governance with clear mandates, implementation capacities, budget allocation and constant monitoring and learning.



Figure 1: MHEWS takes into account all four EWS pillars and their interconnections.

Ensuring access to MHEWS in the Caribbean is regarded as an approach that enables individuals, communities, governments, businesses, and other stakeholders to take timely action to reduce disaster risk in advance of hazardous events.

Methodology and the thematic focus of the case view

The Caribbean thematic case of MHEWS has been built based on three sources of information. First, a desk review of relevant documents being published recently, such as the *“Desk Review of EWS in the Caribbean: An Examination of the Level of Investment Established to Strengthen the four Pillars of EWS”* (Rahat 2020). Second, on the regional MTR SF MHEWS consultation with the Caribbean countries, organized on 12 May 2022 in Trinidad and Tobago, in which 13 country or OT EWS delegations participated and provided their written inputs. Lastly, the case view benefited of the knowledge and insight of some of the key regional and international MHEWS actors and experts through key informant interviews.

As the MHEWS topic is broad, with several large situation analysis developed in the region recently, this case view looks into the four-pillar MHEWS overall progress, including governance, the related investment development since 2015, and the access of MHEWS to people. It focuses mainly on the regional perspectives, but connects it also to the national and community level as relevant.

“MHEWS saves lives. The main challenge as a region, is to ensure all countries are brought up to speed on giving people adequate warning to save lives.”

Andria Grosvenor, Deputy Executive Director of the Caribbean Disaster Emergency Management Agency (REWSC, 2022)

2. PAST ACTIONS

In regard to the MHEWS there has been parallel development of the different systems and actors. The region is coming together; while a lot remains to be done, the 2015 – 2022 progress is described to be the right direction by the consultation participants and key MHEWS experts in the region. The progress on regional integration is very important in the Caribbean, where larger islands are supporting the smaller ones in the design, development, implementation, sustainability and monitoring of MHEWS, and in each of its pillars.

Progress in the availability of MHEWS

Institutional basis

Several governance mechanisms for MHEWS have taken place during 2015-2022. Already prior to the Sendai Framework, the Caribbean Regional Strategy on **Comprehensive Disaster Management (CDM) 2014-2024** requires countries to establish end-to-end, integrated, and fully functional EWS to warn the population of impending danger and take appropriate actions (Priority Action 4.3 of the CDM Strategy).

The Caribbean Disaster Emergency Management Agency (CDEMA) Council of Ministers' formal adoption of the **Model National MHEWS Policy and Adaptation Guide** in July 2020 sets the stage for mainstreaming EWS into the resilient development pathway through national participation in implementing the roadmap. CDEMA Participating States (PS:s) are to apply the **EWS Checklists**, adjusted for the region by CDEMA, as a monitoring mechanism every three years to capture EWS achievements and gaps, establish a national roadmap and inform a regional MHEWS road mapping process. As of 2022, seven countries have conducted the checklists and roadmaps¹.

The main EWS coordination structure is the **Regional Early Warning Systems Consortium (REWSC)**, in which CDEMA Coordinating Unit (CU) serves as Secretariat of the REWSC. The REWSC will comprises of representatives of institutions which have a mandate to support EWS in the region and comprise the agencies:

- i. Caribbean Agricultural Research and Development Institute (CARDI)
- ii. Caribbean Community Climate Change Centre (CCCCC)
- iii. Caribbean Community Secretariat (CARISEC)
- iv. CDEMA (Chair)
- v. Caribbean Institute for Meteorology and Hydrology (CIMH)
- vi. Caribbean Meteorological Organization (CMO)
- vii. Caribbean Public Health Agency (CARPHA)
- viii. Caribbean Telecommunications Union (CTU)
- ix. Faculty of Earth and Environmental Sciences (FEES), University of Guyana (UG)
- x. Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC)-led Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS)

¹ As of 2022, MHEWS checklists and roadmaps have been completed for Antigua & Barbuda, Barbados, Dominica, Guyana, Saint Lucia, St. Vincent & the Grenadines, and Trinidad & Tobago.

- xi. National Emergency Management Office (NEMO) – St. Vincent and the Grenadines
- xii. National Meteorological Service (NMS) – Jamaica
- xiii. Office of Disaster Preparedness and Emergency Management (ODPEM) - Jamaica
- xiv. The University of the West Indies (UWI)

REWSC was formally established at the 11th Caribbean CDM Conference on 5 December 2019. It has held regional meetings in 2017, 2019 and 2022. The role of the REWSC, according to its Terms of Reference, is to serve as a strategic and advisory body for the advancement and strengthened coordination of EWS within the Caribbean Region taking into consideration the realities of a changing climate. Whilst it is recognized that early warning systems can apply to natural, social and socio-natural hazards, the initial focus of the EWS Consortium has been on natural hazards. Other social and socio-natural hazards are also in the process of being integrated.

“Regional coordination becomes a must in order to strengthen regional, national and local capacities for early warning-early actions and local resilience. The REWSC has been identified as a good study case on how regional organizations are coordinating and supporting countries on ensuring a multi hazard approach to EWS”

Raúl Salazar, Chief of the United Nations Office for Disaster Risk Reduction - Regional office for the Americas and the Caribbean (REWSC, 2022)

The REWSC is therefore an excellent example of governance mechanisms from the Caribbean on how different entities coordinate actions aiming to increase the efficiency of EWS with a multi-hazard approach in the context of systemic risk and complexity.

In addition to the REWSC meetings, the other coordination mechanisms have included several **EWS Workshops**, which since 2015 include, but is not limited to:

- CDEMA, United Nations Development Programme (UNDP), Organization of Eastern Caribbean States (OECS), International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Office for Disaster Risk Reduction (UNDRR), European Civil Protection and Humanitarian Aid Operations (ECHO) (April 2016). Caribbean Early Warning System Workshop, focusing on institutionalization and harmonization of EWS with an emphasis on integrating vulnerable groups in all processes related to EWS.
- CDEMA, DEM, IFRC, UNDP, UNDRR, ECHO (November 2016). Updated on DRR Priorities for the Caribbean -The CDM Signature Event, where countries reviewed their national DRR priorities and come up with their top three national priorities.
- UNDP, CDEMA, IFRC ECHO (February 2019). Multi-Hazard Early Warning Systems in the Caribbean: Achievements and Strategic Path Forward High-Level Handover Meeting, which provided a forum for discussions on key regional strategic, planning and programming actions that require regional leadership in MHEWS.
- UNDP, CDEMA, IFRC, ECHO. Greater than the sum of its parts: Strengthening Multi-hazard Early Warning Systems in the Caribbean, which showcased the progress on EWS as well as engaged key actors in defining next steps in the region.
- UNDRR (May 2022). Caribbean Regional Workshop on Measuring Effectiveness of EWS through Sendai Framework Target (g) and Custom Indicators. The workshop aimed to

strengthen the capacities of Caribbean countries to monitor and evaluate the progress of MHEWS and identified areas where further progress can be made.

The region has also benefited of EWS situation assessments, which include the following **key EWS Diagnostic** undertaken since 2015:

- Collymore, J (2016). EWS in the Caribbean: A Desk Review.
- UNDP (2017). Stocktaking of Early Warning Systems in the Caribbean Region.
- World Meteorological Organization (WMO, 2018). The Caribbean 2017 Hurricane Seasons – An Evidence-Based Assessment of the EWS.
- CREWS Diagnostic - A Situation Analysis of the Caribbean Multi-Hazard End-to-End Early Warning System (2020).

International structures and initiatives support the regional MHEWS institutional process. Particularly ECHO, UNDP and IFRC have traditionally supported the Caribbean EWS and CDEMA in the above-mentioned steps and achievements. From 2018 there has also been support received from the global **Climate Risk and Early Warning Systems Initiative (CREWS)**, which is a mechanism that provides financial support to Least Developed Countries (LDCs) and Small Island Developing States (SIDS) to establish risk-informed early warning services, implemented by three partners (World Bank, WMO and UNDRR). The Caribbean CREWS Project on **Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean** (2018 forward) has aimed to strengthen EWS in the Caribbean and to articulate the response capacity of individuals, institutions, and communities. This includes Component 1, which developed a situational analysis in 2018-2020, based on which a draft MHEWS Strategic Roadmap² was developed in 2020-2021, with appropriate approaches to risk-informed decision-making for EWS and MHEWS strategic initiatives. This component has also examined opportunities for building partnerships with the private sector and assess socio-economic benefits to ensure the sustainability of investments and activities. Component 2 focuses on Institutional Strengthening and Streamlining of Early Warning and Hydromet Services, while Component 3 has a focus on piloting high priority national activities, including impact-based forecasting (IBF).

Four-pillar MHEWS

From 2015 the Caribbean has made efforts to shift towards ensuring the four-pillar MHEWS model, with a people centred and end-to-end approach.

The **country-level MHEWS assessments**³ have been implemented in 10 countries. They identify the country status in terms of 27 hazards, divided to the following hazard groups:

1. geological hazards;
2. hydro-meteorological hazards;
3. environmental hazards;
4. biological hazards;
5. chemical hazards, and;

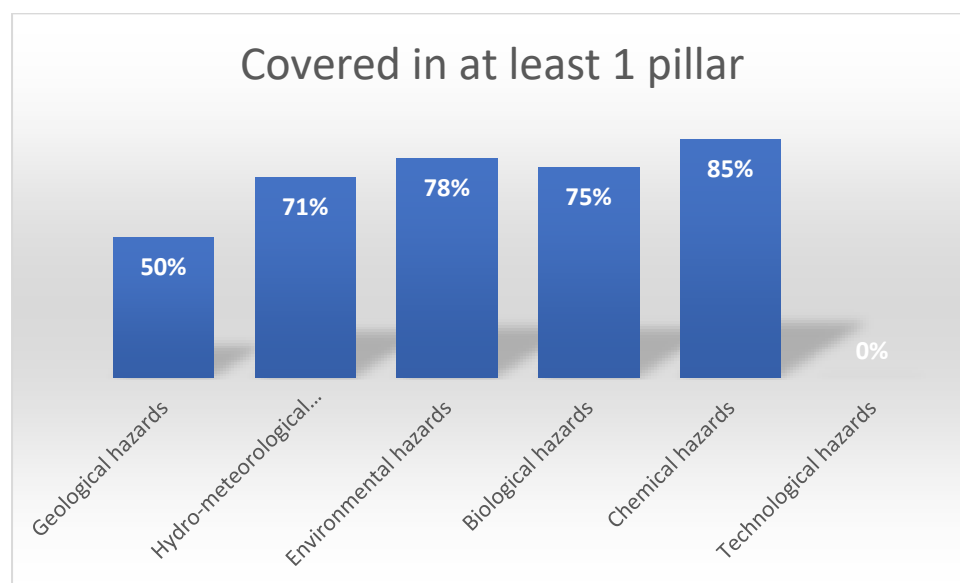
² Geographic scope of the Strategic Roadmap for Advancing MHEWS in the Caribbean 2020–2030 includes the CARICOM's 15 member states and five associate states and territories.

³ Implemented in Bahamas, Antigua and Barbuda, Dominica, Grenada, Saint Lucia, Saint Vincent and the Grenadines, Saint Kitts and Nevis, Trinidad and Tobago, Suriname and Guyana.

6. technological hazards.

In the systematization of the results it can be seen that there is a clear multi-hazard approach within the Caribbean countries. The figure 2 shows how majority of the 10 countries assessed have considered majority of the hazard groups at least in one of the four MHEWS pillars⁴.

This progress, however, has been uneven between the hazard groups, with best progress in the coverage of chemical hazards, environmental hazards, biological hazards and hydro-meteorological hazards. There are, however, clear gaps in technological hazards coverage and some gaps in geological hazard coverage.



*Figure 2: Groups of hazards represented in the country level MHEWS (percentage out of the 10 countries).
Source: Author, based on the country-level MHEWS assessments.*

This MHEWS country progress has been even more uneven between the MHEWS pillars. As seen in figure 3, the pillar 2 shows greatest progress, as it is extensively represented in the country level MHEWS, followed by pillar 3 and very modest progress in pillar 1.

⁴ This identification has been made particularly considering the country status on EWS pillars 1, 2 and 3. The 4th pillar is covered in the CDM Country Work Programmes and were not assessed.

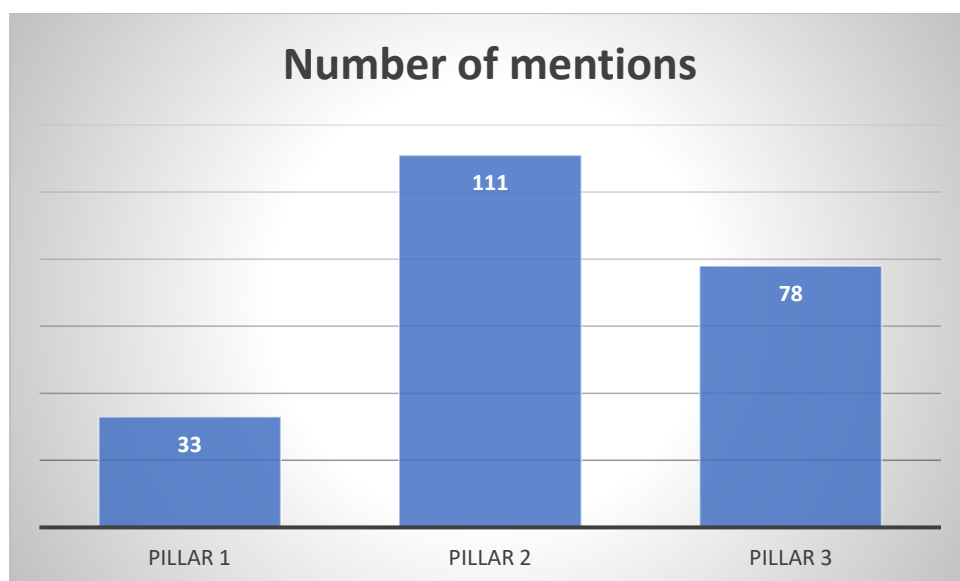


Figure 3: The pillars represented in the country level MHEWS. The 4th pillar is covered in the CWP. Source: Author, based on the country-level MHEWS assessments.

Progress in the investments in MHEWS

“Mitigation action is important, but we must also invest in prevention and in resilience in order to protect livelihood and assets”

Didier Trebucq, UN Resident Coordinator for Barbados and the Eastern Caribbean (REWSC, 2022)

The Caribbean region, consisting of SIDS and other countries and territories with similar risk vulnerability, cooperated with several partners to enable investments in the Caribbean MHEWS. The comprehensive *Desk review of the EWS in the Caribbean* (Rahat 2020), focused on 28 Caribbean projects implemented during 2015-2020, investigated 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 analyzed where future investments should be directed, taking into account the gaps identified. This section presents the main findings as relevant to the progress of EWS investments in the Caribbean.

The similar 2016 Desk Review of EWS in the Caribbean covers the period 2005-2015 (10 years), reported the total investments by donors in EWS in the Caribbean to be US\$57,234,991. In 2015-2020 (5 years) the level of investment by donor was found to be approximately US\$52,630,335. This suggests **a significant increase in donor support for EWS strengthening in the Caribbean between 2015-2020 in comparison to pre-2015 levels**, since the number represents investments is in half the time than the 2005-2015 figure.

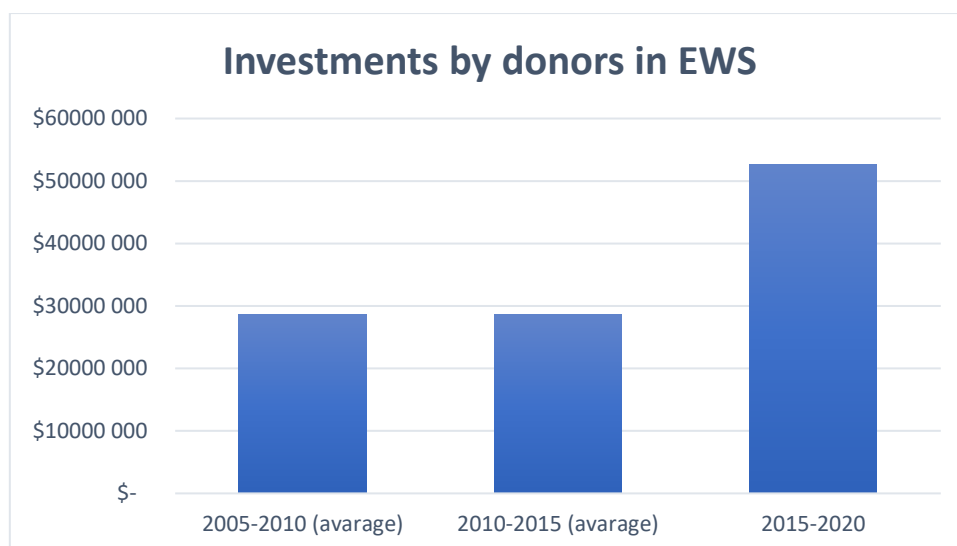


Figure 4: Estimations of MHEWS investments made by donors in the Caribbean before 2015 and after 2015. Source: Author, based on Rahat (2020).

The top donors investing in EWS in the Caribbean during 2015-2020 include CREWS (including the World Bank, WMO and UNDRR), United States Agency for International Development (USAID) and the European Union (EU; primarily through ECHO, European Development Fund and the Global Climate Change Alliance). The new players, although only making small contributions currently, include the Finnish and Dutch Governments.

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 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 situation analysis by the CREWS Project (CREWS, 2020) highlighted that there had been 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. The matter is being currently addressed in the MHEWS Strategic Roadmap.

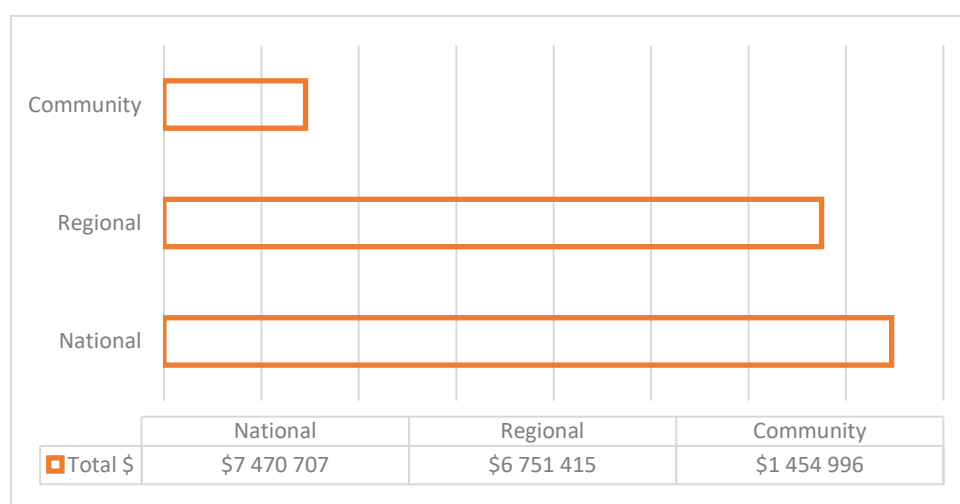


Figure 5: Investments (in USD) in Advancing EWS at the Regional, National and Community Levels. Source: Rahat (2020).

In terms of ***national focus***, the countries benefiting from majority of the EWS projects 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.

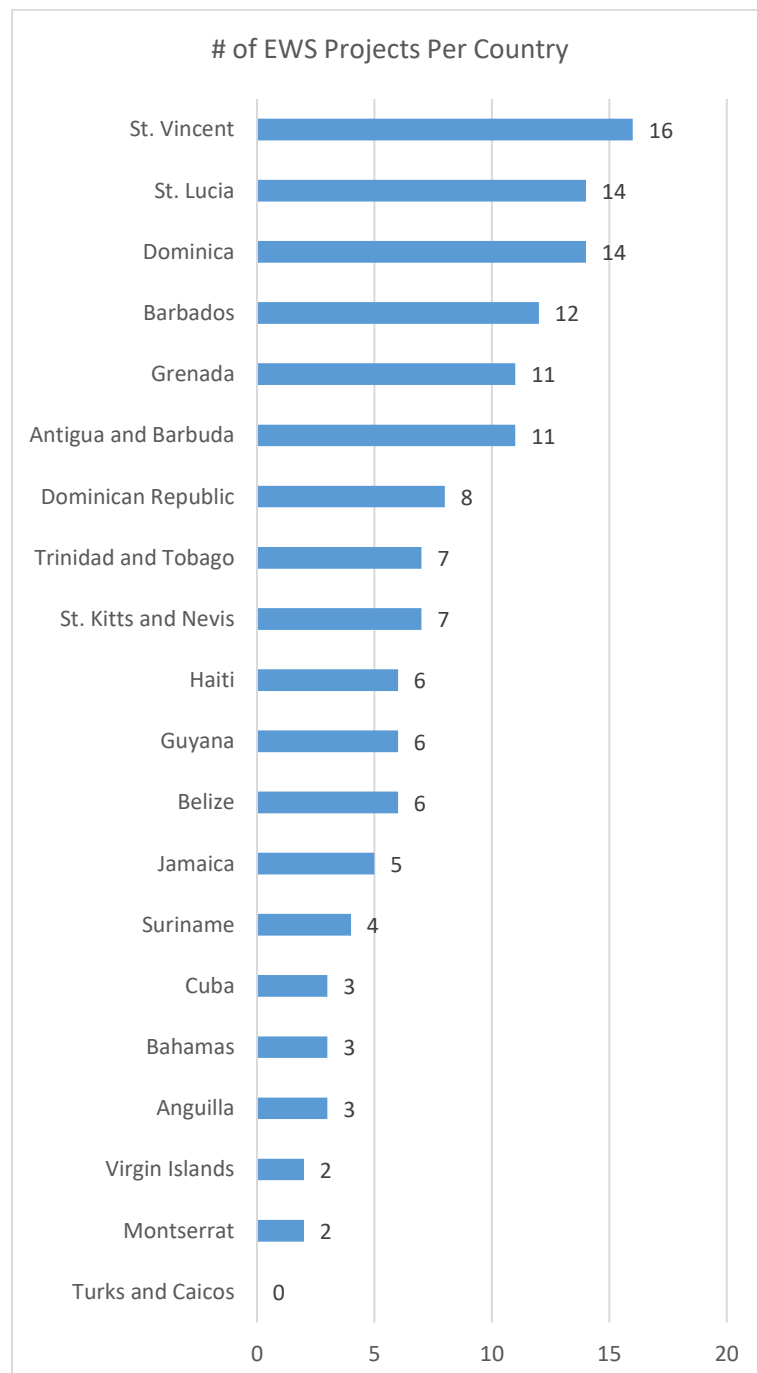


Figure 6: # of EWS Projects Per Country during the Period 2015-2020. Source: Rahat (2020).

In terms of **investment per EWS pillar**, the majority of the investments have been 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.

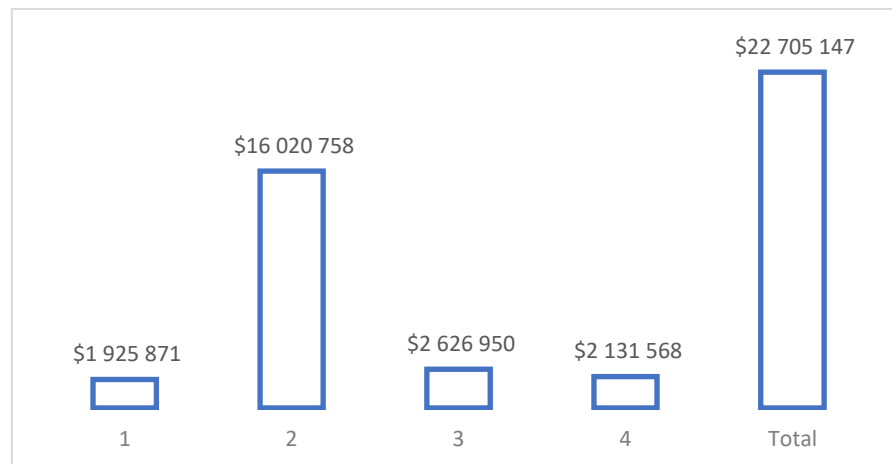


Figure 7: Investments (in USD) Per EWS Pillar during 2015-2020. Source: Rahat (2020).

During the 2000-2015 period, the **MHEWS** were still in its developmental stage and warning systems focus primarily on hurricanes and floods, and some work related to tsunamis and volcanic hazards. While in 2015-2020 the majority of the investments and projects address the weather and climate related hazards, there are at least seven projects addressing multi-hazards and these projects are among the medium-to-large size projects.

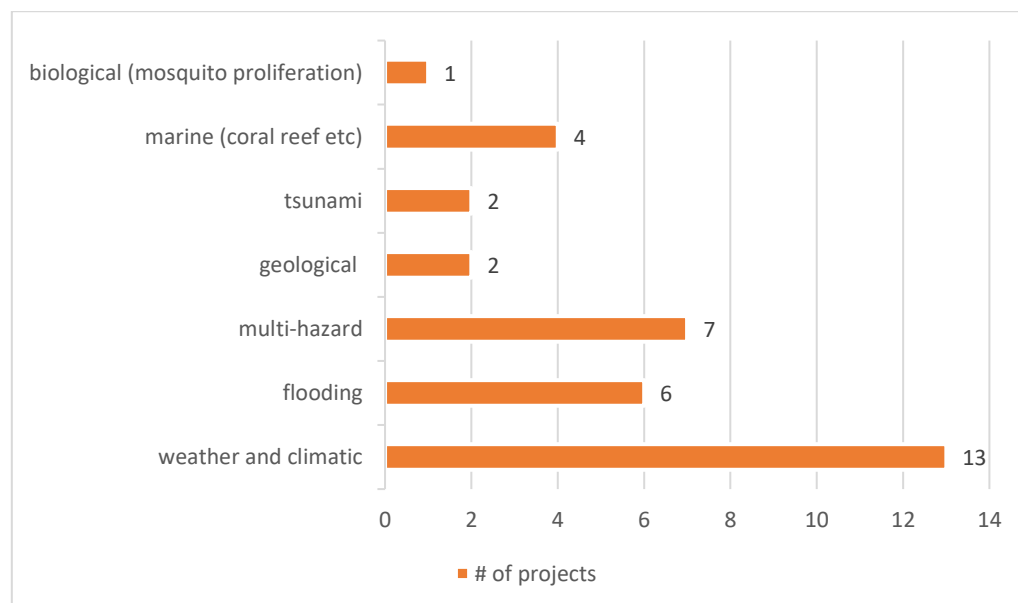


Figure 8: Hazards of Focus for EWS Projects Reviewed for 2015-2020. Source: Rahat (2020).

Another key dimension explored is whether the EWS projects are promoting **IBF**⁵. The 2015-2020 projects demonstrate the inclusion of IBF; for example the CREWS Caribbean Project; The Weather and Climate Ready National Project; The Enhancing Weather and Climate EWS and IBF 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 increasing investments in IBF in the 2015-2020 period.

Private sector engagement was not extensively featured in majority of the EWS projects. In addition, the private sector representation was not explicitly mentioned in the Terms of Reference of the REWSC, although it does state that one of their key role and function is to “(v) Articulate strategies for public-private partnerships in support of early warning systems”. However, there is a growing trend towards the private sector involvement in MHEWS in the Caribbean, as it has formed part of the CREWS Caribbean project and there have been several public-private EWS symposiums organized from 2019 forward. 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. For example, the 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”*.

Progress in the access to people, including gender and vulnerable groups in MHEWS

It appears that the region is at a turning point when it comes to the inclusion of gender considerations in the strengthening of EWS. In the Caribbean region, there are Gender Bureaux in each country, that also often cover other vulnerable groups and intersectionality⁶. There are also gender considerations in the CDM Strategy that guide the regional MHEWS. However, the national gender bureaux, NEMO:s and national Hydromet organizations have not interacted much with each other to create meaningful connections. The need to bring gender, vulnerable groups and MHEWS together, however, has been recognized in the region and some steps have been taken in the past years.

“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

In the 28 projects reviewed in the EWS Desk Review (Rahat, 2020), only eight projects were verified to be including gender considerations in MHEWS. These include, among others, CREWS Caribbean

⁵ Meaning, whether the EWS observing/modelling, monitoring and predicting hazards and the consequent effects of hazards.

⁶ Intersectionality refers to the ways in which systems of inequality based on gender, race, ethnicity, sexual orientation, gender identity, disability, class and other forms of discrimination “intersect” to create unique discrimination dynamics and effects.

Project, the CCAP Project and the UNDP ECHO disaster preparedness programme (DIPECHO) Projects I and II.

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”. Having a tool, the MHEWS Checklist, to systematically guide the mainstreaming of gender considerations into EWS has been one of the key driving factors for this development.

The **DIPECHO II** Project 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.

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.

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 situational analysis and MHEWS Strategic Roadmap. Within the project, four national level trainings and consultations have been conducted on gender and vulnerable group inclusion in EWS, as well as one regional training and consultation, to map the region’s capacity and priorities, as well as to bring the Gender Bureaus and EWS actors together.

3. CONTEXT CHANGE

The growing concerns of climate change, COVID-19 with its mitigation and response measures, the occurrence of the related effects in the Caribbean and the interconnectedness of hazards has affected the perceptions on EWS in the region. In the Caribbean, when reacting to one hazard, the MHEWS actors have to already plan and react to the upcoming one. It is no longer linear hazards and the EWS can no longer be addressed without this acknowledge.

As a consequence, the need to work together as a region and as multiple actors has been strengthening even further. The pandemic reinforced the systemic nature of risk and the concepts of going beyond traditional hazards. The region is growingly interested in developing the multi-hazard approach and IBF, while continuing to strengthen all the four pillars of its MHEWS.

Best practice – Multiple hazards and the EWS governance mechanism

In 2020-2022 Saint Vincent and the Grenadines NEMO used its governance mechanisms and activated multiple EWS:s for different hazards happening cascading and consequently. These hazards included dengue, COVID19, hurricane seasons, La Suffreire volcano eruption, and social hazards. This best practice set the tone on the importance of the work of Regional EWS Consortium in its 2022 meeting, and to the support that it can provide to Caribbean countries.

Presentation at the CREWS meeting, September 2022

4. FUTURE ACTIONS

MHIEWS recommendations from different main sources and strategies

There are a variety of recommendation provided within the Caribbean region as a result to various consultations and reviews conducted in 2015-2020.

Recommendations from the desk review (Rahat 2020) include:

- Develop 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.
- Whilst there is significant investment in Pillar 2 at the regional and national levels, there is still need for continued support to this pillar.
- Investments should be heavily directed towards advancing Pillars 1, 3 and 4 at all levels (regional, national and community).
- Continue to invest in the strengthening of IBF.
- Continue investments in multi-hazard and sector specific EWS.
- Need for an aggregate report on the EWS gaps and national roadmaps completed by 5 countries.
- 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.
- Update this EWS desk review including all CDEMA PS through the National Disaster Office and National Met Offices.

The forward-looking CREWS Caribbean Roadmap and its Strategic Initiatives (SI) are based to an extensive situational analysis of the region's MHEWS. The Roadmap recommends the region to focus on the following aspects:

- SI1: Supporting the transition to IBF and warning services.
- SI2: Towards a Caribbean geospatial platform.
- SI3: Towards a regional multisensory precipitation grid.
- SI4: An integrated approach to flooding.
- SI5: Integrating health impacts into the MHEWS.
- SI6: Towards a Caribbean multi-hazard operational plan.
- SI7: Regional emergency alert system.
- SI8: Community-based action planning.
- SI9: Sectoral MHEWS, the private sector and BCP.

Next steps in the Caribbean MHEWS

Based on many of the recommendations, the REWSC and its members continue to cooperate for the finalization of the MHEWS Strategic Roadmap and the different EWS actions in the region with an aim to establish and strengthen all the four pillars of the EWS, with focus on multiple hazards and

considering the systemic risk, including the needed elements for IBF, for an end-to-end MHIEWS in the region. CREWS Caribbean Project has been extended from the original 2018-2021 schedule; it will reinforce national institutions and community response capacities by promoting a “systemic risk multi-sectorial and multi-stakeholder dialogue” and by “creating the necessary enabling environment for IBF and effective MHEWS”.

Many of the recommendations based on the consultations from 2015 to date, as well as the forward-looking strategies have shared elements. Therefore, it can be concluded that the forward-looking recommendations as well as the direction of the region in relation to MHEWS progress are focusing on the following main elements:

- Enabling a more even progress among the four pillars of MHEWS;
- Focus on impact and IBF;
- Access to people most at risk;
- Enabled by strengthened MHEWS governance arrangements (enabled by REWSC and the Roadmap) and strengthened cooperation among institutions, islands and partners, including the integrated role of the private sector.

The key crosscutting priorities to enable these steps are considered to be⁷:

- Strengthening the data, the quality of the data and the access and use of the available data;
- Strengthening the institutional capacity and skills,
- Strengthening the investments towards the Caribbean MHEWS, and;
- Improving coordination and communication channels for MHIEWS.

⁷ Based on the interviews with CDEMA, World Bank and UNDRR.

5. THE CARIBBEAN REGIONAL MTR SF MHEWS CONSULTATION

The Caribbean Regional Consultation for the Caribbean thematic case of the Multi-Hazard Early Warning Systems was implemented on 12 May 2022 on-site in Port of Spain, Trinidad, Trinidad & Tobago. This case study is based on the Sendai Framework global target G: Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

The **objective was to** conduct the Caribbean thematic consultation of the Multi-Hazard Early Warning Systems (MHEWS) for the Caribbean process of the Mid-Term Review of the Implementation of the Sendai Framework (MTR SF).

The SF target G aims to substantially increase the availability of and access to MHEWS and disaster risk information and assessments to people by 2030. For its high importance to small island developing states, as well as existing and prospective progress, MHEWS has been selected to be the thematic case study within the Caribbean MTR SF. The MHEWC-III, part of the GPDRR 2022, also highlighted the importance of MHEWS in several aspects, and in the MHEWS MTR plenary 1 emphasized the need to enable financing on MHEWS to the SIDS.

The participants of the consultation consisted of the National Disaster Management Offices, Regional and National Meteorological and Hydrological Services, regional institutions in charge of other non-climate related EWS, and National Offices of Statistics of the Caribbean countries/overseas territories, as well as other related agencies. 22 countries and territories were invited, of which the countries that participated included: Barbados, Saint Vincent and the Grenadines, Anguilla, Saint Lucia, Dominica, Dominican Republic, Curacao, Suriname, Guyana, Grenada, Saint Kitts and Nevis, Saint Maarten, Cayman Islands, Turks and Caicos Islands.

Methodology and instructions to the participants: During 10-11 May 2022, participants were invited to think of the questions from your country perspective and prepare the answers (for regional organizations think about the Caribbean perspective). As different points of view are needed, participants were requested to consider the questions from the perspective of their own office/expertise. Participants submitted their answers at the consultation taking place on 12 May.

MHEWS are complex structures, with many details. The consultation focused on the big picture, and within it to the following themes:

1. The four pillar of MHEWS (figure 1);
2. People-centred approach;
3. Governance (clear mandates, implementation capacities, budget allocation and monitoring and learning), collaboration and investments.

Summary of the consultation results

Retrospective Review 2015 – to date

The most relevant pillar progress since 2015 in the Caribbean for improving the elements of MHEWS

Several countries report that all four pillars have made progress, however, there is difference in progress made in each pillar. Pillar I has experienced least progress as its priority progress was reported only by one country.

Several countries have, however, conducted assessment of this pillar, either through national baseline assessment or MHEWS gap analysis. Other countries report on implementing international systems that georeferenced risk information and maps and hazard impacts and vulnerability information. Risk Knowledge is also reported being focused with the assistance of CDEMA, UNDRR and the World Bank.

The strongest pillar is widely described to be the pillar II, with six countries clearly stating this to be the main progress pillar since 2015. As it was reported by one country, “monitoring through the work of Hydromet has constantly been improving, with increasing and improving the existing Hydrometeorological network, and with additional stations being established”. Most budgetary allocations and training was also reported having gone into monitoring and warning services than in the other sectors. This pillar has also been reported most collaboration among islands. However, gaps reported including interim island warning systems (in contrast to coastal) and room for improvement when it comes to the monitoring for tsunamis in the Caribbean (focus being more in the hydromet than in multi-hazard).

Pillar III on Dissemination & Communication received only one voice in favor for being among the top pillars in its development since 2015. It was considered that dissemination and communication is not our strong point and requires some work to improvement. Some training on population was reported, which was described to give hydromets credibility among the public and thus possibly help in getting reliable information to persons in a timely manner. Social media and influencers, launch of alert apps, radio system to interrupt all other radio programs for emergency messaging, community-based communication mechanisms, partnership with schools and youth parliament/ambassadors to couch the message to young people, were described as activities that have enabled to bring the message to a personal level. These are also considered beneficial for post impact damage assessment, first aid and light search and rescue operations. However, there is a need to strengthen communication infrastructure and means of communication using redundancy and attempting to reach 100% of the population especially the most vulnerable, particularly for improvement in the effectiveness of the existing models. Dissemination and communication is now being focused with the assistance of CDEMA and the World Bank.

Pillar IV is particularly reported to have progress by two countries. It is worth mentioning, that this pillar falls under the NEMOs and is therefore not fully represented by hydromet offices in the consultation. Capacity and training are mentioned as crucial elements to be improved.

Overall, it is considered that to enable to achieve the target G of the SF with all the four pillars, there is a need for increase/intensification of training for citizens in order to raise awareness among the population, creation of municipal committees through which the aid and actions can be taken in the event of possible damage, use of television channels to inform the population regularly to create a culture of participation and safety, and to enable continuous and expansive collaboration of international organizations on the topic in the Caribbean

The progress in improving the access of MHEWS to people

The Caribbean countries report progress in the access of MHEWS to people since 2015. Data on population is considered to be more available through multiples sources and there has been an installation of new hydro-met stations which increase the area of coverage and therefore increase the coverage of number of people. In terms of access to information and alerts, there has been a significant shift away from paper-based information products towards "all-media", using multiple media sources and technologies, such as sirens, cell phones, faxes, radio, television, agencies websites and various social media platforms. This has enabled the reach of different population groups. The focus has increasingly started to be designed for all-hazards.

An increase in public education and awareness is also reported, to react to the alerts. The increase of number of national disaster plans is also in line to serve the MHEWS access to people. There have also been efforts and actions towards community engagement focused on early warning systems, to allow for the establishment of community-based systems, using existing communication methods for specific vulnerable communities that may not have continued/sufficient access to modern methods of communication. Tools have been developed for gender consideration at the community level, involving women in these plans, and mapping how the hazards, affect households and individuals. This is also considered for vulnerable groups such as the elderly and disabled, as the development of the responses at the community level allow the for the community to identify the location of these individuals and map emergency paths should hazards occur. Feedback and interaction mechanisms have been created to interact directly with the population through social media and other channels. It has increased transparency and openness and forced the disaster management office to evolve to keep pace with the changes in the way people receive and interpret information.

Communication between the hydromets and the national emergency management has improved, as well as cooperation with community-based groups such as Red Cross and liaison officers at the responsible Ministries. Cooperation with donors is also mentioned to be essential in this aspect.

While these steps are important, they are reported by individual countries and a lot remains to be done for them to be mainstreamed for the region. Not all the countries have an Early Warning system yet, and for some overseas territories (OT) there is still some of full dependency on their constituent part in Europe. However, this is changing.

The trend of investments (public, private, international, combination) in MHEWS towards the availability of and access to multi-hazard early warning systems to people

Government investments are reported on individual aspects of MHEWS particularly on pillar 2 and some also on pillar 3. Overall, the public sector national investments are considered rather limited when it comes to financial investments. In terms of manpower, a lot has been done to work with all the pillars.

Private entities have contributed in one way or another to enhance MHEWS in the island. Private investments focused on response and recovery efforts rather than in allocation or preparation of MHEWS, or national priorities.

However, international and regional investments have increased following Hurricane Maria and data and information is anticipated to increase for improve access to MHEWS. Overall, investments have been more through regional or international donor agencies, and SIDS are heavily dependent on international assistance for investments via projects. Yet there are limitations in their scope as well. OTs often do not receive the same attention on investments from the donors as the countries do, however, partnerships with the host country on investments do exist.

The progress on Governance and the inter-pillar/inter-island cooperation since 2015

Limited amount of progress in the governance side is reported by the countries. Legislation for the Met Service has been developed by some, with regional CMO under WMO sponsorship, which addresses collaboration and partnerships and clearly points out roles and responsibility. However, countries also highlight the need that there needs to be formalization of governance aspects and updating of plans and policies where it doesn't exist yet.

Cooperation is reported to having been increased over the years with CDEMA, CIMH and other regional stakeholders, with existing synergies. Through CDEMA, partnerships were also strengthened with international organizations. OT:s report cooperation also with the host country. Capacity was built in-country as a result of the strengthened partnerships.

National collaboration with other government departments is also reported, for example, as it relates to ensuring access to hurricane shelters. In this aspect, there is a trend on BBB – the countries report having learned a lot on cooperation during the pandemic, as larger coordinating was critical when the pandemic cut cross across every sector.

Context Shifts, New and Emerging Issues

The most significant context changes in comparison to 2015, going beyond the traditional hazards and looking at the new forms of hazards

The significant context change for Caribbean is reported to be the climate change and related events. There has been more frequent issuing of weather-related statements due to increased weather activity and extreme flooding events. High temperatures, strong winds and excess rainfall are also mentioned, as well as prolonged La Niña with several sever consequences, and beach erosion, which eliminates the buffer zone to protect buildings from storms, but also is important for tourism. The new normal is described to be the more powerful and more frequent tropical cyclones.

The COVID-19 pandemic was considered a turning point for the region, along with the rest of the world. It was considered a new hazard and required dynamic development and adaptation of plans, SOP's, etc. The health hazard matter affected all sectors and caused double disaster scenarios, as the region continued to go through the pandemic parallel to hydrometeorological and endemic hazards, most notably, the massive eruption of the La Soufriere Volcano, which caused evacuations in a social distancing scenario.

Several countries mention traditional hazards, such as the progress and increased attention to tsunamis, as some islands have become Tsunami Ready recognized by UNESCO. The Caribbean Tsunami Warning Centre in Puerto Rico is considered useful for the role it plays in the well-produced Caribe Wave Exercise and the Pacific Tsunami Warning Center provides alert and notification products – however the messages from the PTWC do not realistically portray likely coastal impacts. So, the result is the warnings provide only a very general idea of what 'might' occur immediately offshore and not what is 'going to happen.' This also raised concern on the lack of impact-based forecasting on tsunamis, and a question of how "tsunami ready" can a low-lying flat island really be, despite the official recognition and effort. There is also concern that the University of the West Indies Seismic Research Centre covers the Eastern Caribbean only. There is a lack of coverage and very little research occurring for the English-speaking western Caribbean region.

The pandemic caused also a larger consideration of new threats. Chemicals and increased establishment of medical scanning and imaging laboratories resulting in increased radiological materials and waste were mentioned. These were partially considered in a threat of war (Ukraine) where the risks relating to the use of nuclear warheads was considered increasing, but also about its implications on food security.

All of this is making more clear the systemic nature of risk, and the need to have a multi-hazard approach for EWS, that goes beyond single hazards, institutions working on silos, and promote a systemic governance for EWS, and in general for DRM.

The trend to react to this new understanding of parallel hazards and system risk in MHEWS, considering the systemic nature of risk, the experiences from the COVID-19 pandemic and the increasing effects of the climate change for SIDS

While the region recognizes that they were not fully prepared to a pandemic, the COVID-19 also brought consideration of parallel hazards to the Caribbean countries, with new thinking of how to organize hurricane shelters during the pandemic. Overall, there has been an increasing trend to react to another hazard together with the COVID-19 pandemic in mind and to understand the systemic risk. However, many external matters also changed during the pandemic, as for example, it was not possible to receive the usual support from the traditional partners, as they were handling with the same hazard themselves. Greater coordination among agencies was reported, including the Ministries of Health and with the integration of the private sector.

The region battles with some other factors as well. There is a need for scientific and evidence-based risk analysis which almost without exception is fairly inadequate. For example, for a lack of human resource assets with the necessary scientific specialist skills, and resource constraints such as a lack of computer models. The resulting lack of data is considered one of the key constraints. No accurate information about changes in sea level is available to many islands. The result is that development continues to occur too close to the sea, and more vulnerability is added. Work and investment are reported on risk analysis, but the results are also considered very limited.

The budget is needed for other immediate things, not for “what-ifs”, which is one of the main struggles to invest in systemic risk. Further, the Caribbean Catastrophic Risk Insurance Facility (CCRIF) the Cayman Islands is now looking at losses of 5 % of GDP annually from one aspect of the threat landscape alone (namely storm surge). This information can be linked to MHEWS. As a development trend, however, it is described as completely unsustainable and a major hurricane impact may present an existential threat to the economic viability of some of the islands. It is almost certain that over the coming years, the region is looking at the likely prospect of insurance products becoming increasingly unattainable, due to rising premiums, especially in the context of the rising seas and a new normal of more frequent and more intense tropical cyclones. Detailed evidence of risk is what is needed – with that it may be possible for the disaster management offices to begin appropriately informing the planning and development process.

It can be stated that even in the absence of good scientific data, the effects of climate change are becoming clear in the Caribbean region with beaches eroding away and coastal properties suffering more frequent damage. Early warning needs to adapt to the constantly changing environment, particularly in its risk knowledge pillar and in impact-based forecasting, as environment degradation affects these areas. Over the past few years there has been an increased focus on nature-based solutions, and while these may help, it has to be conceded that many of these nature-based solutions may require major Government investment to purchase land areas and / or legislative unpinning (for example, to protect mangrove wetland areas, which provide value as drainage areas for reducing inland flooding impacts, as well as a store for carbon dioxide).

Major changes / emerging issues / topics of concern anticipated in the period to 2030 and beyond, in regard to the MHEWS and in prioritising and amplifying MHEWS action

Hazards are estimated to be increasing in the Caribbean region. For example, frequency and strength of tropical cyclones, excess rainfall and drought as well as temperature variations. Similarly, we have seen two decades of very active geological activity that might continue to pose threats to the region.

This is estimated to trigger other effects. Immigration and internal migration are considered to increase due to these events. Tourism, essential for the region’s livelihoods, is also considered to be affected. Rising sea levels and more frequent and devastating hurricane impacts will create systemic shocks to the economy.

The region continues to struggle with financing the early warning systems. This is particularly evident for the overseas territories that often are not eligible to the financing of the SIDS and depend on their host government overseas (as stated by one territory: “We will plod along unless the British Government perceives a threat and holds our government’s hand to the fire”).

Several countries report that the early warning and related information would need to become more people centered. Finding a way to disseminate and communicate warnings to the disadvantaged population such as the visually and hearing impaired, remote residences and locations. Gender-sensitive approach is also mentioned among the topics to be prioritized.

Systemic risk considerations are estimated to be increasing. The systemic risk is mentioned from finance to mental health and job losses. It is generally accepted that the effectiveness of an NMHS cannot be analyzed in isolation from the actions of a broader set of national actors and development sectors. For example, the responsibility for issuing warnings and ensuring public safety generally rests with the civil protection authority, not with the NMHS.

Effective legislation is estimated to be needed to respond to many of these matters.

Prospective Review (to 2030 and beyond)

The most essential opportunities and challenges for transiting from traditional early warning systems to impact-based forecasting in the future

Some countries report having already transitioned to impact based forecasting in the last two years. The move from traditional early warning system to IBF is something that is currently being reviewed by many other islands as well.

The challenges include lack of funding and public investment, new technologies and knowledge exchange, lack of data for IBF, the need to cope with new approaches and resistance to adapt to new changes, achieving the standardization of early warning systems, attendance from the public to EWS, lack of human capacity and of best practices from the region to use for replicating.

The opportunities include political will and strong relationships with external partners. Prior experiences with major hurricanes provide an opportunity for more serious public buy-in for support to transition to IBF as it would make people safer and protect property better. The lack of many types of data and its usage is also posing a considerable challenge to transitioning to IBF.

The most essential opportunities and challenges in improving the access of MHEWS to people

The opportunities in improving the access of MHEWS to people include providing a more thorough and detailed forecast for the public along with indicating that the NMHS are the official sources of the information to be distributed to the public. The multi-hazard system is also considered an opportunity for the future⁸, as

⁸ One of the biggest opportunities of MHEWS, is to create a governance mechanism that face systemic risk with a systemic governance approach. That means, that having a MH approach to EWS, brings cooperation and silos breaking among different institutions supporting single and cluster EWS. Similar, it brings organizations that work in different pillars of the EWS to work together.

more than one hazard can threaten simultaneously, which would provide a better sense of safety to the public.

Opportunity is also not being in an isolated environment and having neighboring islands to reflect and develop the system with. There is a regional impetus to develop the MHEWS driven by CDEMA and new programs to ramp up EWS for critical sectors (agriculture, health, etc.) and tsunami awareness. There also is a very good relation between the government, the private sector, NGO and District Commissioners, the NSO and also the village leaders. Good collaboration exists also between the international organizations in the region.

Development of technology and equipment is an opportunity for the future, and further integration of the community as key actors, as people are generally proactive in the region in protecting themselves, businesses, and property given the history of the past 15 years; therefore, there would be more receptive/ appreciative of MHEWS.

The challenges in improving the access of MHEWS to people include that the public needs to be better sensitized well before any transition of early warning systems takes place; careful planning needs to take place, including simplification of scientific messages to the general public, having the messages distributed on all sort of medium such as AM/FM radio, TV, social media such as Whatsapp, FB, Instagram, Twitter, Instagram, SMS (to be established again), CAP via the smart phone and e-mail, providing messages also for the visual and hearing impaired. Access to technology (such as smartphones) by the public is not yet ensured. There also needs to be a better buy in by the public.

Real-time information is needed, as well as alternative ideas and access to information that may currently not even be the accurate information. It is important to consider traditional methods and systems of warning, as self-evacuation starts from the capacity to recognize signs of danger and leads up to evacuating immediately without waiting for an official evacuation order.

Overall, availability of resources especially in rural and impoverished communities is a challenge, as well as inadequate legislative support (e.g., legislation to mandate radio and tv stations to broadcast disaster and hazard information as a part of the licensing process). There is limited funding to promote access to EWS overall and lack of adequate human resources, and more buy-in from the governments is needed.

Needs, opportunities or threats in regard to the investments in MHEWS towards 2030 and beyond

There is a need to create specific funding related to disaster risk reduction financing as it exists for the climate action agenda. This financing mechanism could provide resources specifically for improving MHEWS. The opportunities in investments, besides the already existing ones, therefore include the access to climate financing. Training from regional institutions and inter-island cooperation opportunities are also considered considerable opportunities.

The needs in investments include need for funding for implementation of MHEWS for any foreseen changes or upgrades, need for evaluation / review as DRM, investment in disaggregating information that meets the needs of the various vulnerable groups, finance to produce disaster information/messages in different forms and need for more research on hazards and cascading hazards.

Threats in investments include that the region is very vulnerable to sea level rise, because most of the population lives in the coastal area and investment needs are therefore quite extensive. Budgeting may be an issue by some governments, as SIDS so not having capacity to properly invest and are considered to have a heavy reliance on international agency and projects. There is reporting of a lack of investment from regional governments.

The key actions needed to improve governance and cooperation between different responsible offices and actors of each EWS' pillars and inter-island cooperation, in accelerating and amplifying action towards a functional MHEWS

The key actions reported include:

- Legislations need to be put in place, as well as MOUs between and/or among entities outlining their roles and responsibilities clearly and incorporation into the institutional strategic plans as a line of action.
- Political champions for DRR to be recognized at country level.
- The integration of the roles & responsibilities into the job descriptions of the responsible offices is also essential. Structuring a multidisciplinary team for MHEWS formulation.
- More investment is needed in building MHEWS from international donor organizations and funding agencies, as well as resource allocation at the local government level to prioritize the importance of MHEWS.
- Increase in PPP in the country is considered important.
- It is needed to have a document that contains the parameters on which multiple early warning systems should be designed, as well as creation of interoperability systems between institutions or regions.
- Design of MHEWS must be done from the bottom up to have the community ownership.
- Improving collaboration between relevant agencies through regular meetings and dialogue is needed. Backing in high level regional meetings at the CARICOM level is important, to emphasize the importance of MHEWS need for inter-island corporation and sharing country experiences. The centers of excellence (and regional warning centers) such as the National Hurricane Centre, the Caribbean Tsunami Warning Centre, etc. could cooperate and offer more support based on needs.

Additional considerations relevant for the region to build resilience through *the availability of and access to multi-hazard early warning systems to people*

The additional key information reported by the countries and territories, besides the previously mentioned points, include:

- The Caribbean faces challenges in topography, remoteness, locations and communication, which need to be recognized.
- There is a need to leverage oil producing states, from emerging risks from disaster management point to management issues. Bilateral arrangements could be agreed to help with oil spills.
- On people-centered approach, there is a need to adapt the contents of the messages to the needs of the population and the sectors. Room for improvement is reported in the sensitization, public awareness and education, particularly for vulnerable groups. Creative and participatory target audience-focused methodologies are needed (e.g. giving persons ownership of Disaster Risk Reduction within their own communities/ a community involved based approach), as well as to take into consideration the different languages.
- Education and awareness is needed with an emphasis on youth, possibly also incorporated in curriculum development, thereby resulting in a generation of “resilient” and “awareness” people.

Greater agency is needed by decision-makers; Each ministry should produce annual DRR actions and Priorities.

6. SOURCES

The MHEWS Thematic Case View of the MTR SF is based on the following sources:

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Consultations:

Delegations that participated to the MTR SF MHEWS Case Views consultation on 12 May 2022:

- EWS delegation of St. Vincent and the Grenadines
- EWS delegation of Dominica
- EWS delegation of Curacao
- EWS delegation of Guyana
- EWS delegation of Anguilla
- EWS delegation of Grenada
- EWS delegation of St. Kitts and Nevis
- EWS delegation of Dominican Republic
- EWS delegation of St. Maarten
- EWS delegation of Cayman Islands
- EWS delegation of St. Lucia
- EWS delegation of Suriname

Persons interviewed:

- Elizabeth Riley, Executive Director, CDEMA
- Anna-Maria Bogdanova, Caribbean CREWS Programme Manager, The World Bank Group
- Melanie Kappes, previous Caribbean CREWS Programme Manager, The World Bank Group
- Jair Torres, DRR Advisor for the Caribbean, UNDRR Regional Office for the Americas and the Caribbean (ROAC)
- Carlos Uribe, Programme Officer, NDRR ROAC