Synthesis of previous WMO meetings on MHEWS

(as of 18 April 2016)

1 Introduction

Since the founding of the WMO Disaster Risk Reduction (DRR) Programme in 2003, the programme has worked to strengthen NMHS capacities to support national Multi-Hazard Early Warning Systems (MHEWS). The DRR Programme developed and utilized a structured approach to identify capacities, needs and gaps at the national and regional levels. This approach was developed by the first and second Multi-Hazard Early Warning System Symposia and refined through a number of training workshops (Pula, Croatia in 2009, San Jose, Costa Rica (2010 &2013), Christ Church, Barbados (2010)) where the heads of disaster risk management (DRM) agencies worked together with the directors of National Meteorological and Hydrological Services (NMHSs) to document capacities, needs and gaps related to weather, water and climate services within their national systems. The approach was also utilized to develop and implement two successful DRR projects including South East European Project through the South Eastern Europe Disaster Risk Mitigation and Adaptation Programme (SEEDRMAP) and the Costa Rica Early Warning System for Hydro-Meteorological Hazards Project). Below are summaries of the major meetings conducted from 2006 – 2015.
The International Expert Symposium on Multi-hazard Early Warning Systems and Service Delivery, WMO Side Event at the Third United Nations World Conference on Disaster Risk Reduction (WCDRR) (Sendai, Japan, 14-18 March 2015)

WMO’s main contribution to the Public Forum at WCDRR was the full-day WMO International Symposium on Multi-Hazard Early Warning Systems (MHEWS) and Service Delivery, which saw more than 120 participants in attendance, including 18 Permanent Representatives with WMO. The Symposium was held at a very opportune time to revisit the collective work of the global community in early warning over the ten years of implementing the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA) (of which the second Priority for Action was the identification, assessment and monitoring of disaster risk and the enhancement of early warning), and to rethink how to shape a more resilient and sustainable future with the help of MHEWS. The main focus of the Symposium was to look forward at how the hydrometeorological community and its partners envision the future of DRR and continued and emerging roles and challenges to NMHSs in this area. It discussed the next generation of early warning and how multi-stakeholder partnerships could help realize the vision for MHEWS, as a main contribution of NMHSs to building a more resilient society.

The Symposium agreed that a new challenge was a shift from the existing the single-hazard early warning systems (EWS) approach to a MHEWS approach. In order to do so, the hydrometeorological community needs to take stock of advances in EWS over the last decade in order to identify strategies and actions that will promote more multi-hazard, end-to-end, and people-centred EWS.

As EWS for specific hazards and consequences have many common elements, a MHEWS approach can increase the effectiveness, efficiency, consistency, and enhanced utility of warning services. Since hazards and their effects are often interrelated, a MHEWS also ensures that information about hazards which occur together or sequentially are addressed in a shared system using common capacities and procedures to prepare for and respond to several hazards. It uses risk information from multiple sources and integrates technical, social and financial capacities through coordination mechanisms among multi-disciplinary stakeholders, including effective feedback mechanisms for continuous improvement. In this way, a multi-hazard approach to EWS can provide economies of scale and, eventually, sustainability of the system as a whole.

The presentations and discussions identified a number of achievements but also issues and gaps. A major issue related to the fact that while scientific advances in weather forecasting have been made in terms of the ability to provide reliable warnings of meteorological and hydrological events at a high level of accuracy and increasing lead time, there have not been significant improvements in the response to these warnings. The example of Typhoon Haiyan, which struck the Philippines in 2013 and killed more than 6000 people, was given. Participants noted that many of the deaths were caused by the storm surge whose specific nature and potential impacts were not understood by some communities despite the fact that accurate and timely rain and wind warnings were issued by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). Thus the issue of multi-hazard and impact-based forecasts and risk-based warnings formed an important point of discussion for the Symposium, which noted the need for an all-encompassing approach to observing, modelling, and predicting severe hydrometeorological events and the consequent cascade of hazards through to their impacts. The participants agreed that tackling this problem would require a multi-disciplinary and highly integrated and focussed endeavour, to ensure access to the best possible science, and the optimum services for managing multi-hazard events.
The participants discussed a three-prong approach to DRR. Catastrophe risk insurance, for example, can provide financial resources to speed up recovery, while helping to avoid subsequent disasters, such as social, water and food insecurity. This works best if lives and livelihoods are protected from the initial hazard, which requires access to both resistant and resilient infrastructure – homes, schools and other public buildings, roads and bridges, communication, water, electricity, and food. Ensuring the safety of people also requires that they be well prepared to take appropriate action to secure their livelihoods and their own safety, for which effective early warning is key. These three components which contribute to the overall resilience of society are often treated as independent pillars. However, it is essential that all three are treated as part of a holistic approach to building a resilient society. The three should be intimately linked through a focus on quantifying and conveying information of the impact of hazards on people and assets.

Since the majority of disasters are related to weather, water and climate hazards and because of the capabilities mostly available 24/7 of the NMHSs and WMO’s operational and research networks, logically, WMO is in a position where it should take on an active role in providing multi-hazard, impact-based forecasts and warnings. In this regard, the Symposium affirmed the key message that meteorologists and hydrologists can no longer work on their own – they need to work in partnership with other sectors (such as health, transport, energy) and with other government agencies (e.g., disaster response and management) which hold information on exposure, vulnerability and the impacts of past events.

The Symposium concluded that effective MHEWS have their root in sound science and technology, and that respective advancements could help reduce the risks related to weather, water, and climate hazards and their impacts, and should be utilized to support preparedness. It stressed that all users needed actionable information and that for this reason impact-based meteorological and hydrological services over varying time-scales are needed to reduce disaster risk in a changing climate and world.

3 Workshop on Multi-Hazard Early Warning Systems for Urban Areas (San José, Costa Rica, 10-12 December 2013)

During this Workshop, high-level representatives from national DRM agencies, NMHSs, and municipal governments in Central and South America, Cuba, and Mexico shared their experiences with the development of MHEWS at different levels. They provided an overview of the status of EWS in their cities, countries and respective regions and discussed policy, institutional, operational, and technical needs and challenges as well as opportunities for strengthening MHEWS and for cooperation and coordination. These discussions were to contribute to a consolidated Central American regional vision on how to develop or improve MHEWS for urban and rural areas that are embedded in activities at the national level.

By sharing and reflecting on own experiences, participating countries and cities were able to see where they stand in the region and in the world. The presentations and discussions revealed that there is clear evidence of a lack of development of EWS in Central America, with critical needs for (a) the development of national policy & legislation on EWS to clarify roles & responsibilities and for (b) institutional capacity development & operational cooperation of NMHSs, DRM agencies, and local authorities in urban and rural areas, supported by regional and international organizations. It needs to be pointed out that there is still a disconnect between the many community-driven systems for early warning (often supported by bi- and multi-lateral development agencies/donors) and the respective national EWS, contributing to gaps in
coordination and limited sustainability of these systems. In addition, feedback mechanisms from the communities back to the national level are often absent.

During the meeting countries in Central America expressed a strong interest in creating and/or improving EWS at all levels, both for rural and urban locations, with the engagement of WMO over the long term. They would like to see documentation of good practices from Central America similar to that in the book on Institutional Partnerships in MHEWS. This would be a significant resource for countries in Latin America for strengthening their EWS. In addition, participating countries from South America requested holding similar workshops to this one in their region to facilitate dialogue and knowledge transfer among them.

4 Technical Cooperation Workshop for the Development of the Caribbean Regional Cooperation Programme in Multi-Hazard Early Warning Systems, (Christ Church, Barbados, 2-5 November 2010)

Building on the outcomes of the MHEWS workshop in San Jose, Costa Rica (March 2010) and follow up consultations, a road map for the design of a Caribbean MHEWS initiative to strengthen MHEWS in the region with national capacity development was initiated, to:

i. Strengthen national and regional institutional capacities and cooperation among the National Meteorological and Hydrological Services (NMHSs) and DRM agencies through development/strengthening of components of EWS with a multi-hazard approach for hydro-meteorological hazards;

ii. Enhance coordination among hydro-meteorological warning systems (building on the existing regional coordination for tropical cyclones) and other hazards (e.g., tsunamis).

The participants of the Barbados MHEWS workshop included national and technical experts from the Meteorological and Hydrological Services as well as the DRM agencies from 27 countries/territories of the Caribbean region and from other countries of good practices and representatives from development agencies and bi-lateral donors.

The Workshop reviewed the draft Caribbean Assessment (Strengthening of Risk Assessment and MHEWS for Meteorological, Hydrological and Climate Hazards in the Caribbean) and provided further comments prior to its publication in 2015. The Workshop also made a number of recommendations that should be considered when designing a project to strengthen risk assessment and MHEWS in the region.

5 Training Workshop on Multi-Hazard Early Warning Systems with focus on Institutional Partnerships and Coordination (San Jose, Costa Rica, 22-26 March 2010)

The objectives of the training workshop were to:

i. Share experiences and lessons learnt from five good practices (Cuba, France, Italy, China/Shanghai and USA) with senior officials from DRM Agencies and NMHSs from the participating countries;

ii. Discuss the existing regional initiatives in support of DRR and particularly EWS;

iii. Assess national capacities and gaps related to planning, legislative, institutional and operational aspects of EWS and identify national priorities for strengthening of EWS capacities;
iv. Identify and prioritize concrete areas of regional cooperation to support national EWS.

The participants of the MHEWS workshop included directors or other high level representatives from NMHS and National DRM Agencies of 36 countries in Central America and the Caribbean, eight regional agencies and six international organizations, and representatives from development partners.

The outcomes of this workshop included a number of recommendations for strengthening national MHEWS and regional coordination and cooperation. The recommendations were along six thematic areas, including:

a) Governance and Institutional Arrangements

It was highlighted that, in most countries of the region, there is a need for enhancement and/or development and enforcement, of clear EWS policies, planning, legal frameworks, and dedicated budget supporting EWS at national to local levels. In some countries, this is hampered by the lack of political will and/or complete absence or lack of institutional capacity of the NMHS or DRM agencies. The need to institutionalize the relationship between DRM agencies and NMHS from national to local levels through the documentation of plans, protocols and standard operating procedures was highlighted. Finally, need for further clarification of institutional arrangements and protocols for regional coordination and cooperation among countries and existing regional institutions was identified as a high priority area in both Central America and the Caribbean.

b) Utilization of Risk Information in Emergency Planning and Warnings

It was recognized the need to incorporate risk information, including potential impacts (e.g., potential loss of life, property and infrastructure destruction, crop losses) as well as behavioural advice, in warnings in a way that is understandable to all (engaging social science). Furthermore, the discussions concluded that risk mapping and analysis at national to local levels is the foundation for development of national to local emergency preparedness and response plans. In this respect, the discussion highlighted the critical need in both Central America and the Caribbean regions to monitor, archive and share hazard, vulnerability and exposure data as well as develop institutional capacities for risk modelling and analysis. The strengthening of cooperation among, and capacity development of NMHS, other technical agencies and line ministries, was identified as key for the development of risk assessment capacities.

c) Hazard Monitoring, Forecasting and Mandates for Warning Development

The strengthening and maintaining of observation and monitoring networks, their interoperability and sustainability as well as improvement of regional coordination and capacities for data collection, monitoring and storage were discussed as two high priorities in both Central America and the Caribbean. It was expressed that many countries in the region have inadequate technical capacities / infrastructure to utilize the latest technologies (e.g., satellite, real-time data and products, Internet, modelling, etc.). In fact, a number of islands in the Caribbean do not have a NMHS and, in this context, development and strengthening of the regional forecasting centres, which support those countries, was highlighted. It was also emphasized that the development of warning and advisory products should be based on user needs and that there needs to be coordination and information sharing among various technical agencies in providing forecasts and warnings. The importance of harmonization of watch and warning systems, particularly in the Caribbean, was highlighted as a high priority.

d) Warning Dissemination Mechanisms and NMHS Service Delivery
EWS dissemination mechanisms, public awareness and receptiveness as well as related feedback mechanisms were identified among significant weaknesses of EWS in most the countries in the region. A combination of channels (modern and traditional systems such as SMS to Fog Horn and volunteers) for dissemination of public information and warnings was recommended. It was noted that media plays a critical role in many countries in the region for dissemination of warnings and public education. Opportunities for strengthening relationships across agencies responsible to issue warnings and the media was highlighted. The development of public-private partnerships (e.g. with media and telecommunication sector) was also noted. Furthermore, the meeting discussed the need for enhanced public education and awareness as well as the need for communication of warnings through customized (adapted) dissemination mechanisms to specific needs (e.g. tourists, disabled, indigenous, women, child care, rural vs. urban).

e) Emergency Preparedness and Response Activities

The need for capacity development including training and drills in emergency preparedness and response was highlighted. It was expressed that drills should not only be demonstrative but also be used for systematic evaluation purposes to improve the system as well. The importance of strengthened collaboration between NMHS and DRM agencies for delivery of more effective public awareness and educational programmes was discussed. Additionally, during and post-event, in the response phase, the need for NMHS support to provide critical meteorological and hydrological information and forecasts to support the emergency operation centres (EOC) and relief and response operations on the ground was also highlighted. In this regard, the meeting noted in light of a potential event, that NMHS need to consider a spectrum of products and services from the detection of the hazard to post disaster response and relief phase.

f) Regional Cooperation Programmes in EWS to support National EWS Development

It was noted that while many regional activities relevant to DRR and EWS were reflected by the regional agencies participating in the workshop, there was need for a systematic review of specificities in Central America and the Caribbean with respect to needs, institutional capacities and coordination mechanisms. In addition, a systematic review of activities and initiatives through other regional agencies not represented at the workshop would be needed to determine scope of the regional cooperation programmes which would address the existing gaps and needs and realizes the opportunities for enhanced cooperation and capacity development.

As a result of the outcomes of this training workshop as well as requests by Members in the Caribbean region a comprehensive assessment of the capacities, needs, gaps in the Caribbean region was conducted.

6 Training Workshop on Multi-Hazard Early Warning Systems with focus on Institutional Coordination and Cooperation (Pula, Croatia, 1-3 October 2009)

The training workshop on “Multi-Hazard Early Warning System with focus on Institutional Coordination and Cooperation” (hereafter mentioned as MHEWS Training Workshop) held in Pula, Croatia (13 October 2009) was held as part of the World Meteorological Organization (WMO) project on "Regional Cooperation in South Eastern Europe for meteorological, hydrological and climate data management and exchange to support Disaster Risk Reduction". This project emerged from the South East Europe Disaster Risk Mitigation and Adaptation Programme (SEEDERMAP), initiated in 2007 by the World Bank, the WMO and the United Nations Strategy for Disaster Risk Reduction (UNISDR), to assist countries in reducing risks associated with natural hazards. SEEDERMAP aims at developing or strengthening national capacities in three areas:
i. DRM, institutional capacities and governance;  
ii. Hydrometeorological Services; and,  
iii. Financial risk transfer mechanisms.

During the first phase of the initiative, fact finding surveys and desktop studies were performed to obtain information needed for the development of relevant follow-up projects, and the results have been published in four reports. Following these assessments, WMO and the United Nations Development Program (UNDP) developed, in parallel, two complementary proposals that were funded by the European Commission (EC) Directorate General for Enlargement. The Beneficiary countries of these EC funded projects were Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic (FYR) of Macedonia, Montenegro, Serbia, Kosovo (as defined by UNSCR 1244/99) and Turkey.

As part of the project, WMO assisted governments with the development of their EWS as an integral part of their DRM strategies. As part of its strategy, WMO worked with its partners to link knowhow, derived from good practices in EWS, to national and regional development projects focused on strengthening institutional capacities and cooperation of the NMHS and DRM agencies. In this context, WMO utilized the systematic process for identifying and documenting good practices in EWS with focus on institutional coordination and cooperation. Based on the synthesis of the good practices and consultation with experts, WMO developed a training workshop package, which was used in this training workshop.

The workshop had the following goals:

- Train the participants on good practices in EWS from a number of countries in Europe and other regions;  
- Engage the participants in moderated discussions to assess EWS capacities, gaps and needs in South East Europe (SEE) countries; and  
- Identify priority areas of action for strengthening institutional cooperation and coordination in EWS among NMHS, DRM Agencies and other EWS stakeholders.

7 Second Experts’ Symposium on Multi-Hazard Early Warning Systems with Focus on the Role of National Meteorological and Hydrological Services (Toulouse, France, 5-7 May 2009)

The second experts symposium on MHEWS finalized the documentation methodology to systematically document good practices in EWS around the world and developed a series of recommendations on development of guidelines for WMO Members on MHEWS at the national to international levels (Doc 9 Annex I).

8 Expert Meeting on NMHSs’ Participation in Disaster Risk Reduction Coordination Mechanisms and Early Warning Systems (Geneva, Switzerland, 26-28 November 2007)

This expert meeting reviewed the role that NMHSs have in DRR mechanisms at the international to national levels. The meeting also developed a standard outline for documentation of good practices in MHEWS.

The Symposium stressed the importance of partnerships, supported by governance and legislation, as well as organizational coordination and operational frameworks, to address linkages needed along the four components of EWS and ensure warnings trigger appropriate response from the relevant authorities, stakeholders, and communities at-risk.

In this regard, the meeting recommended sharing knowledge and experience from institutionalised EWS in some countries. The Meeting proposed that case studies where EWS are established with a strong institutional basis be documented and demonstrated, with a modular approach. Modules would include:

1. Legal, organisational and operational frameworks for coordination and collaborations from international to local levels among various stakeholders involved in development of and response to early warnings;
2. Understanding of the utilization of resources (cost benefit) and capacities, for delivery of products and services to support early detection and warnings of hazards; assessment of the added value of coordination and collaborations;
3. Understanding of the concept of multi-hazard approach to EWS, and analysis of its viability, applications and benefits that may be achieved through such approach.

The following elements were identified as criteria for selection of good practices:

i. Political commitment to incorporation of EWS in the DRR strategies and development of organizational capacities;
ii. DRR plans and legislations, defining explicitly the roles and responsibilities of various stakeholders;
iii. Coordination mechanism among agencies at different levels and in different stages of EWS;
iv. Development of authoritative, understandable warnings, combining information about hazards, risks and recommendations for response, supported by reliable dissemination mechanisms;
v. Integration of warning information in emergency preparedness and response plans at local to national levels;
vi. EWS are developed within the context of national and local resources and culture;
vii. Community based emergency preparedness and training programmes;
viii. Feedback mechanisms to improve the system at all levels;
ix. Sustainability, interoperability, and reliability of the system.

Examples of good practices matching the abovementioned criteria were discussed including the:

i. Shanghai Emergency Preparedness Programme;
ii. “Vigilance” System in France;
iii. Tropical Cyclone EWS in Cuba; and,