MULTI-HAZARD EARLY WARNING SYSTEMS: A CHECKLIST

PRIOR KNOWLEDGE AND IDENTIFICATION OF RISK

MONITORING AND WARNING SYSTEMS

DISSEMINATION AND COMMUNICATION

RESPONSE CAPACITY

MULTI-HAZARD
EARLY WARNING SYSTEMS: A CHECKLIST

The Multi-Hazard Early Warning System (MHEWS) Checklist is a practical tool consisting of major components and actions that national governments, community organizations and partners within and across all sectors can refer when developing or evaluating early warning systems.

This document is based on the draft version presented by the World Meteorological Organization in 2017 at the Multi-hazard Early Warning Conference in Mexico. The review and update has been led by CDEMA in coordination with UNDP and IFRC in February, 2018.

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The contents of this publication do not necessarily reflect the position or opinion of the European Commission.

UNDP
United Nations Development Programme

CDEMA
Caribbean Disaster Emergency Management Agency

IFRC
International Federation of the Red Cross and Red Crescent Societies

ECHO
European Civil Protection and Humanitarian Aid Operations

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CONTENTS

1. GUIDANCE DOCUMENT FOR THE APPLICATION OF THE EARLY WARNING SYSTEMS CHECKLIST IN THE CARIBBEAN

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1.1 PURPOSE OF GUIDANCE DOCUMENT

The purpose of this guidance document is to provide national stakeholders supporting Early Warning System implementation in the Caribbean countries with guidance on how the EWS Checklist should be applied including the data collection process, reporting and validation of the results. It highlights information sources that should be used to validate data and information provided as well as expected outputs of the checklist application. The document should be used as a guide but allows for flexibility based on national preferences particularly as it relates to the mode of data collection.

1.2 OVERVIEW

The Project entitled 'Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer' is an initiative aimed strengthening integrated Early Warning Systems (EWS) in Antigua and Barbuda, Saint Vincent and the Grenadines (SVG), Dominica, Dominican Republic, Saint Lucia and Cuba through the effective leveraging of tools and knowledge. The Project is being implemented by UNDP in close collaboration with IFRC, CDEMA, DIPECHO partners and national counterparts.

The objective of the Project is to improve EWS for more effective Disaster Risk Reduction (DRR) in the Caribbean, and to move toward the realization of a more integrated system, through concrete actions addressing existing gaps. This initiative seeks to emphasize the 4 components of EWS - and close priority gaps - at a national level, contributing to the integration of national and community EWS and addressing sustainability and national ownership of EWS through 4 expected results:

R1: Increase access to existing tools and knowledge of EWS at a national and regional level;

R2: Provide integrated EWS solutions in five target countries through knowledge sharing;

R3: Increase EWS effectiveness in five target countries through concrete priority actions;

R4: Ensure EWS knowledge transfer, documentation and communication.

Until 2003 there was no comprehensive regional framework for assessing the status of EWS in the region. The Report on EWS in the Caribbean undertaken as part of the sub-region's preparation for the Global Second Early Conference in Bonn embraced the emerging principles and components of EWS (Villagran et al 2003; UNISDR 1997)[1] as a standard. Emanating from this work came the EWS Checklist in 2006 by the secretariat of the Third International Conference on Early Warning. The EWS Checklist was developed based on information gathered during the two and a half days of the conference and significant inputs from organizations and individuals involved in early warning and disaster risk reduction in the United Nations international system and beyond. A revised Checklist was prepared for the Multi-Hazard Early Warning Systems Conference held as a special event of the Global Platform in Mexico in May 2017. It was recommended that the checklist be widely disseminated for use by countries.

The Checklist, which is structured around the four key elements of effective early warning systems, aims to be a simple list of the main elements and actions that national governments or community organizations can refer to when developing or evaluating early warning systems, or simply checking that crucial procedures are in place. It is not intended to be a comprehensive design manual, but instead a practical, non-technical reference tool to ensure that the major elements of a good early warning system are in place[2].

1. Early Warning Systems in The Caribbean: A Desk Review

2. Developing Early Warning Systems: A Checklist

1.3 PROPOSED APPLICATION IN THE CARIBBEAN

The application of the EWS Checklist at the national level will require inputs from a wide range of stakeholders from local to international levels[3]. It is recommended that the checklist be applied once every three years to coincide with the CDM Audit tool as a means of review and evaluation to inform the updating of the national EWS roadmap, which is an output of the first application of the checklist. Where technical support is being utilized for administering the checklist, discussions should be held with the National Disaster Management Office in order to identify all the key actors to be included in the process, guaranteeing that gender-based organizations and people that live in vulnerable conditions are involved.

The tool may be administered electronically via SurveyMonkey as four surveys representing the four key elements of the People-centred EWS[4]. Four surveys were conceptualized rather than one tool to allow respondents to focus on areas of the EWS that are central to the mandates of their agency. Four surveys aligned to the elements of an EWS also makes the process of completing the surveys more manageable particularly for persons with limited availability.

Further, respondents will be asked to conduct an initial document review, using the tool as a guide, and to collect and cite relevant documentation in support of their responses. Interviews will be conducted with individual institutions and in focal groups where appropriate to allow for the completion of the survey in SurveyMonkey. Once the survey is completed, there will be gap filling which will require follow up with partners in order to have a complete EWS review. A report will then be prepared based on the data from the interviews and document review.

During the application of the tool, respondents will be required to address the following:

1. Respond to the key actions of the checklist by selecting from the attainment levels specified in the checklist.

2. Support responses to the key actions regardless of the attainment level selected by providing evidence where feasible.

3. Highlight gaps based on their experience and the documentation.

3. See EWS Checklist for types of actors and those expected to be involved in each element of the checklist, including organizations that focus on women and people living in vulnerable conditions,

4. Ensuring that a diverse group of stakeholders can provide information for the survey, including gender experts and gender-based organizations by determining if all stakeholders have access to survey monkey. In those cases where groups or organizations do not have access to technology surveys will be conducted in person.

4. Share experiences regarding the identification and implementation of gender considerations relevant to the checklists

The overall process of implementation will be guided by a national coordination mechanism (NCM).

1.4 INFORMATION SOURCES

In applying the checklist, it is important that respondents refer to the relevant documentation to support their response to the practical actions. Relevant document will include laws, regulations, policies and plans as well as reports such as after-action reports (AARs) and the Disaster Risk Reduction Country Document among others (see table below). The project will encourage that gender, age and culturally differentiated data is provided when available and promote collection where data it is not available. The survey instrument will be shared with national stakeholders prior to administering the tool. It is expected that during the validation exercise, any discrepancies will be addressed and additional information will be garnered in support of the designation given to any practical action identified in the EWS Checklist.

KEY VERIFICATION SOURCES
Population censuses
DRR country documents
National Development Plan
Plan of National investment and portfolio projects
Response plans
Contingent plans
Evacuation plans
Institutional response plans
Institutional Diagnostics
Agreements, collaboration agreements

KEY VERIFICATION SOURCES
Meetings of the national DRR, lists of participants
Manuals and protocols
Inventory of resources
Printed maps
Digital databases
Reports of meetings, courses, simulations, simulations, joint actions, etc.
Training plans/programs, lists of qualified personnel
Awareness-raising materials, dissemination
Reports of meetings, courses, simulations, joint actions, etc.
Training plans/programs, lists of qualified personnel
areness-raising materials, dissemination
Community vulnerability and capacity assessments

1.5 EWS CHECKLIST REPORTING

A report of the results of the EWS Checklist will be drafted by the respective Project partner or consultant based on the inputs from stakeholders. A workshop will be held with stakeholders to validate the report and an initial set of EWS gaps identified. Prioritisation of these gaps will follow at the juncture determined by the country. Support will be garnered through south-south cooperation with Cuba and the IFRC to provide fit-for-purpose tools and solutions to fill these gaps. The selected tools and solutions will be detailed within a national roadmap for improving EWS in the country. They will also be included in the list of elements for the handover at the national and regional levels. The workshop will reflect on gender considerations of the checklist and how ensure gender and vulnerable persons are appropriately captured in the reports.

Key outputs from the process will include 1) a national EWS report that includes EWS gaps and 2) a national roadmap for improving EWS benefitting from horizontal cooperation.

1.6 SUSTAINABILITY OF NATIONAL EWS AGENDA

EWS requires sustained efforts over time and space in order to achieve effectiveness. It is critically important that the results of this initiative be institutionalized both in terms of process and outputs for further improvements. As such, national arrangements for institutionalizing the EWS agenda need consideration and by the end of the project these arrangements should be understood, documented and pursued. Institutionalization at both technical and political levels requires commitment from stakeholders from local to international levels.

Another aspect that is essential to the sustainability of the national EWS agenda will be to address key crosscutting issues, intergenerational equity and diversity.

2. FOREWORD

2.1 Acknowledgements

2. FOREWORD

Early warning is a major element of disaster risk reduction. It can prevent loss of life and reduces the economic and material impacts of hazardous events including disasters. To be effective, early warning systems need to actively involve the people and communities at risk from a range of hazards, facilitate public education on and awareness of risks, effectively disseminate messages and warnings and ensure there is a constant state of preparedness.

Early warning systems are integrated systems of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities and processes that enable individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events. As multi-hazard early warning systems they address a range of hazards, vulnerabilities, exposures, capacities and impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, in a cascading or cumulatively over time, and taking into account the potential interrelated effects. A multi-hazard early warning system 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.[5]

The Sendai Framework for Disaster Risk Reduction 2015-2030 – the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters – recognizes the benefits of multi-hazard early warnings systems and enshrines them in one of its seven

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

global targets, notably target (g): *"Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030."*[6]

The Sendai Framework urges a paradigm shift in the way risk information is developed, assessed and utilized in multi-hazard early warning systems, disaster planning as well as government policies. It states that it is "*critical to anticipate, plan for and reduce disaster risk in order to more effectively protect persons, communities and countries, their livelihoods, health, cultural heritage, socioeconomic assets and ecosystems, and thus strengthen their resilience.*" It further calls for "*enhanced work to reduce exposure and vulnerability, thus preventing the creation of new disaster risks, and accountability for disaster risk creation are needed at all levels.*"

"Against this background, and in order to reduce disaster risk, there is a need to address existing challenges and prepare for future ones by focusing on monitoring, assessing and understanding disaster risk and sharing such information and on how it is created; strengthening disaster risk governance and coordination across relevant institutions and sectors and the full and meaningful participation of relevant stakeholders at appropriate levels" (Figure 1).

This Checklist is a key outcome of the Multi-Hazard Early Warning Conference (MHEWC) held from 22 to 23 May 2017 in Cancún, Mexico. It updates the original 2006 document *Developing Early Warning Systems: A Checklist* which was developed as an outcome of the Third International Conference on Early Warning: From concept to action (EWC III) held from 27 to 29 March 2006 in Bonn, Germany[7]. Through the lens of the Sendai Framework, it incorporates the acknowledged benefits of multi-hazard early warnings systems, disaster risk information and enhanced risk assessments.

This version of the checklist was adapted for use in the Caribbean in 2018 under the project "Strengthening integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer'. The revision was led by the Caribbean Disaster Emergency Management Agency (CDEMA) with support from the United Nations Development Program (UNDP) and the International Federation of the Red Cross and the Red Crescent Societies (IFRC). This Project was funded through the DIPECHO Action Plan for the Caribbean (2017) by the General Directorate of Civil Protection and Humanitarian Aid of the European Union (ECHO)[8]. The checklist will be applied in five countries in 2018 in order to define the way forward towards improved MHEWS in the Caribbean[9].1.1

6. UN 2015 (A/RES/69/283): *Sendai Framework for Disaster Risk Reduction 2015-2030* .

7. UNISDR 2006: Developing Early Warning Systems: A Checklist. Outcome of the Third International Conference on Early Warning (EWC III) hosted by the Government of Germany under the auspices of the United Nations, from 27 to 29 March 2006 in Bonn, Germany. Available at: http://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf.

8. This document was produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union.

9. The national Disaster Management Offices involved in the project, Antigua and Barbuda, Dominica, the Dominican Republic, Saint Lucia, Saint Vincent and the Grenadines and Cuba as well as the project partners, collaborated and implemented the tool.

2.1 ACKNOWLEDGEMENTS

The Checklist, which is structured around the four key elements of early warning systems, aims to be a simple list of the main components and actions to which national governments, community organizations and partners within and across all sectors can refer when developing or evaluating early warning systems. It is not intended to be a comprehensive design manual, but instead a practical, non-technical reference tool to ensure that the major elements of an effective early warning system are in place.

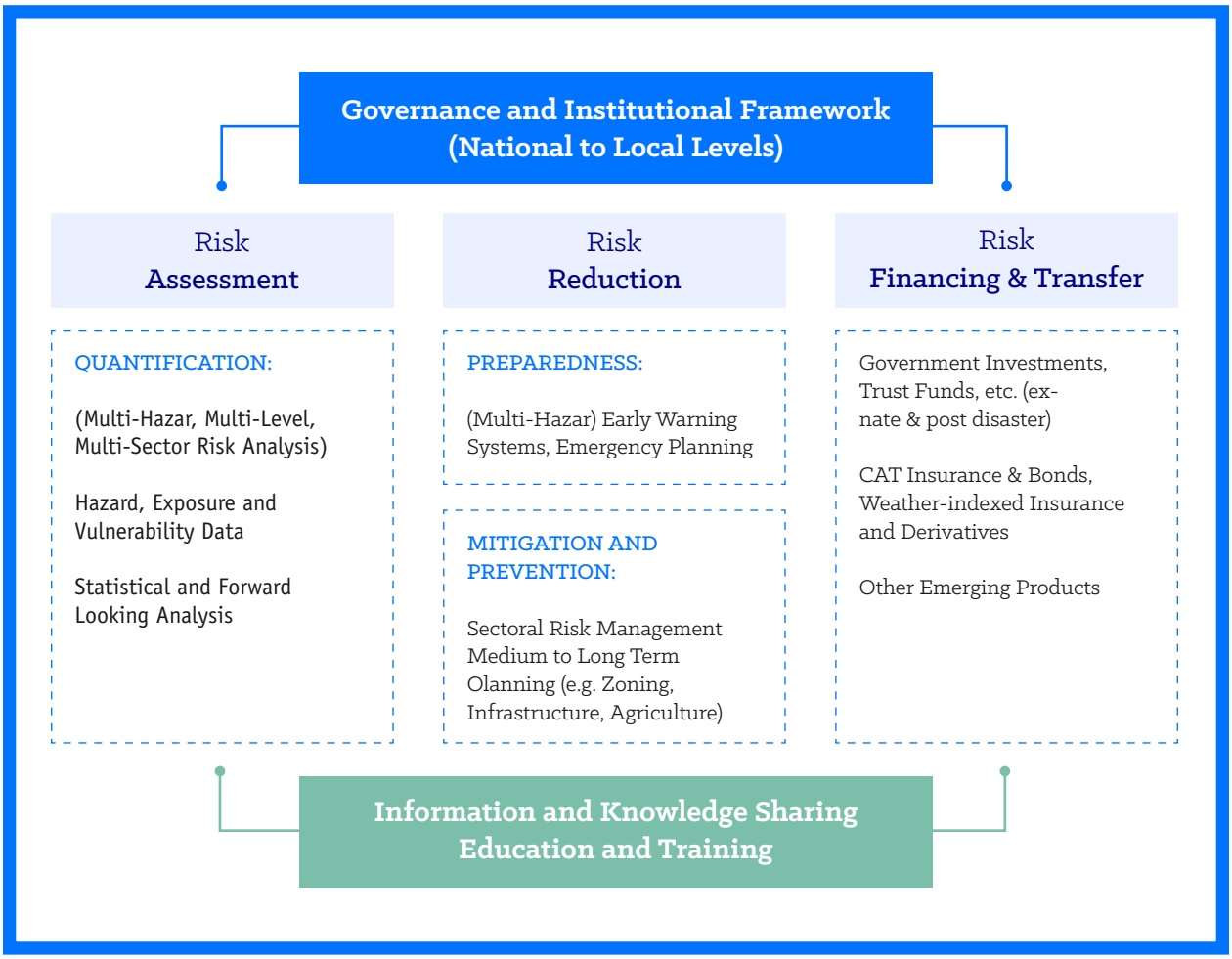


Figure 2: *The Sendai Framework for Disaster Risk Reduction 2015-2030 encourages institutional arrangements for the development of impact and risk information to identify, inform and warm specific at-risk groups with specific vulnerabilities*

3. HOW TO USE THIS CHECKLIST

3.1 Key elements of an early warning system, cross-cutting issues and actors involved

3.2 A checklist of practical actions to assist in developing, evaluating or refining an early warning system

3. HOW TO USE THIS CHECKLIST

The document is broken into two inter-related parts that should be read in order. The first section provides useful background information and overarching issues important to early warning. The second part is a series of practical checklists of actions and initiatives that should be considered when developing or evaluating early warning systems.

3.1 KEY ELEMENTS OF AN EARLY WARNING SYSTEM, CROSS- CUTTING ISSUES AND ACTORS INVOLVED

A brief section on the four elements of early warning: (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 is included to emphasize the major components that comprise a people-centred early warning system, and why each is important.

In addition to the four elements, a number of cross–cutting issues that are critical to the development and sustainability of effective early warning systems have been outlined. These include effective governance and institutional arrangements, a multi-hazard approach to early warning, involvement of local communities and consideration of gender (see box 1), age and disability perspectives and cultural diversity.

An explanation of the main actors involved in early warning activities, and their roles and responsibilities, is included to provide some context and further background to the list of key actors presented at the beginning of each of the checklists. During the mapping of actors involved, special attention will be paid to the organizations that focus in the needs women, men, children and people in vulnerable situations that are usually disproportionately affected by disaster. Also, as highlighted in the Sendai framework women's involvement will be encouraged as their participation is critical to effectively managing disaster risk and designing, resourcing and implementing gender-sensitive disaster risk reduction policies, plans and programmes.

BOX 1.

WHY GENDER MATTERS IN EWS?

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 .

The Sendai Framework as well as the Caribbean Strategy on Comprehensive Disaster Management (the vehicle for implementation of the Sendai Framework in CDEMA Participating States) identify Gender as a cross cutting issue that needs to be recognized and taken into account in all process related to disaster risk management and early warning systems. This checklist takes into account inter alia that women and men have different levels of vulnerability and face different risks.

Women and men around the world have played a key role in their communities and have developed various capacities to adapt, prevent and mitigate impact of disasters.

Women are not helpless victims but powerful agents of change and critical leaders in disaster risk management.

3.2 A CHECKLIST OF PRACTICAL ACTIONS TO ASSIST IN DEVELOPING, EVALUATING OR REFINING AN EARLY WARNING SYSTEM

For ease of use and practicality, an individual checklist was developed for each of the four elements of early warning with elements of governance integrated, including institutional arrangements, due to the importance of these issues to the sustainability and cohesiveness of early warning systems.

Each of the checklists is grouped into a series of major themes and includes a simple list of actions or steps that, if followed, will provide a solid basis upon which to build or assess an early warning system.

For application in the Caribbean[10], the revised EWS Checklist includes metrics and sources of verification for each of the actions listed. Attainment of the actions or steps is measured according to the following levels.

ATTAINMENT LEVEL	ATTENTION REQUIRED	DEFINITION OF LEVELS
Minimal or no progress towards standard	Significant attention required	None or insufficient legislative, institutional and administrative arrangements to support action
Moderate progress towards standard	Considerable attention required	Legislative, institutional and administrative arrangements in place to support action. Initial steps have been taken towards achieving the standard
Major progress towards standard	Some attention required	Legislative, institutional and administrative arrangements in place to support action. There is concrete evidence that action has been taken to achieve the standard in the form of documentation and physical evidence of the standard
Complete attainment of standard	Little or no action required	Legislative, institutional and administrative arrangements in place to support action. There is concrete evidence that action has been taken to achieve the standard in the form of documentation and physical evidence of the standard. Reviews indicate that there is functionality based on specifications and needs
Unknown/Not Applicable		No information available/ Not aware of status

10. The EWS Checklist was further revised under the project 'Strengthen integrated early warning systems for more effective disaster risk reduction in the Caribbean through knowledge and tool transfer' funded through the *Humanitarian Implementation Plan (HIP)* 2017of the Disaster Preparedness ECHO programme (DIPECHO). The project is being managed by the UNDP Regional Hub, located in Panama and implemented in collaboration with CDEMA and IFRC.

4. END-TO-END, PEOPLE-CENTERED MULTI-HAZARD EARLY WARNING SYSTEMS

4.1 Four Elements

4.1.1 Disaster Risk knowledge

4.1.2 Detection, monitoring, analysis and forecasting of the hazards and possible consequences

4.1.3 Warning Dissemination and communication

4.1.4 Preparedness and Response Capabilities

4.2 Key Actors

4.3 Key Verification Sources

4. END-TO-END, PEOPLE-CENTERED MULTI-HAZARD EARLY WARNING SYSTEMS

According to the updated terminology relating to disaster risk reduction[11], an early warning system is defined as "an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events."

The respective annotation to the definition elaborates that "effective "end-to-end" and "people-centred" early warning systems may include four interrelated key elements: (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 interrelated components need to be coordinated within and across sectors and multiple levels for the system, particularly in vulnerable communities to work effectively and to include a feedback mechanism for continuous improvement. Failure in one component or a lack of coordination across them could lead to the failure of the whole system."

It further states that "multi-hazard early warning systems 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 multi-hazard early warning system 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."

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

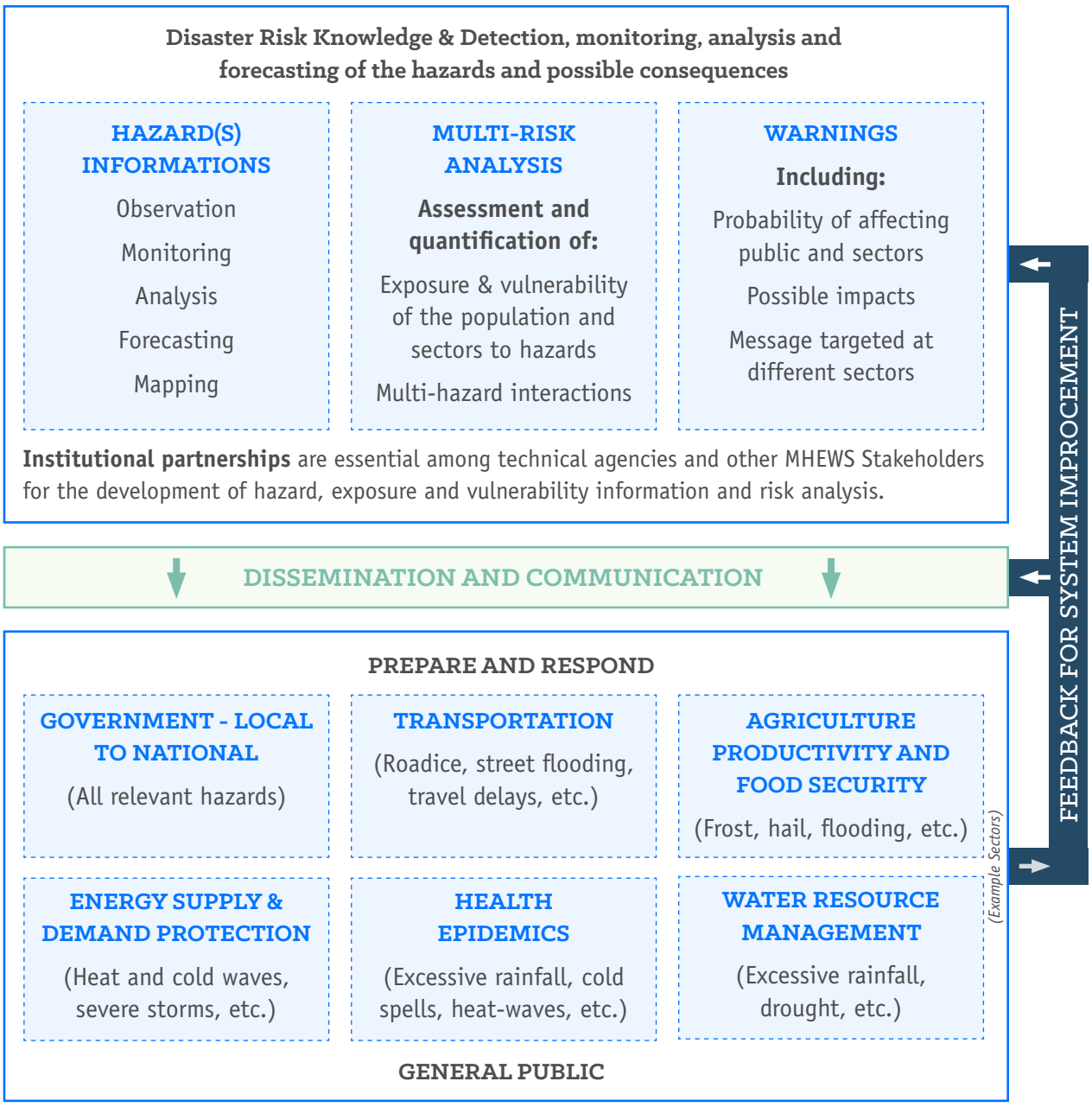


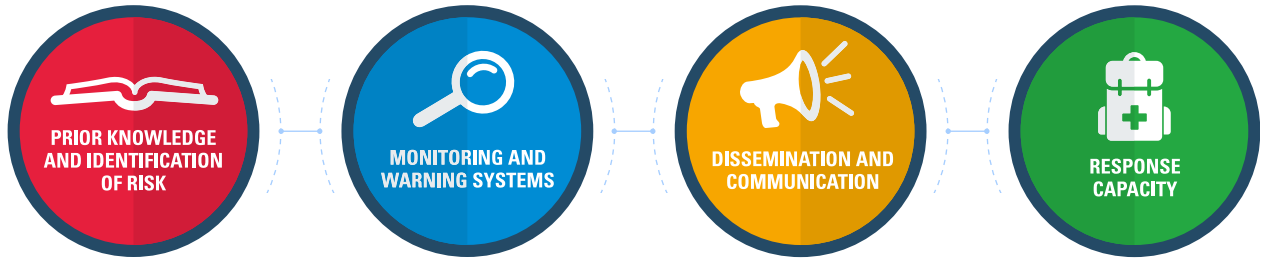
Figure 2: *Multi-Hazard Early Warning System*

Thus, such a "people-centred" multi-hazard early warning system requires a functioning framework built upon accepted basic principles which include the four key elements. The system must also reside in an enabling environment which incorporates good governance, has adequate operational capacities, has clearly defined roles and responsibilities for all stakeholders, is adequately resourced, has effective plans which are tested regularly and has a feedback process which enables continuous improvement of the system (Figure 2). The system should also be gender responsive so that gender, age, disability and cultural perspectives are integrated in all policies and practices, and women and youth leadership are promoted.[12]

12. Source: Sendai Framework for Disaster Risk Reduction 2015 – 2030.

The objective of people-centred multi-hazard early warning systems is to empower individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner to reduce the possibility of personal injury and illness, loss of life and damage to property and the environment. As part of the objective the systems will also address social and gender inequalities that increase individuals and communities vulnerabilities and prevent the effective implementation of early warning systems.

4.1 FOUR ELEMENTS



4.1.1 Disaster Risk knowledge

• Risks arise from the combination of hazards, exposure of people and assets to the hazards and their vulnerabilities and coping capacities at a particular location. Assessments of these risks require systematic collection and analysis of data and should consider the dynamics and compounding impacts of hazards coupled with vulnerabilities that arise from processes such as unplanned urbanization, rural land-use change, environmental degradation and climate change. Risk is also dependent on the resources and capacities available to manage the risk, the actual impacts and their consequences. Human interaction and behavioural study of reactions to different hazards can also provide insights to better manage the emergency in real-time. Risk is based also on gender differentiated roles and vulnerabilities and inequalities that create/increase vulnerabilities; which results in women and men facing different risks due to their different gender roles and social norms that determine their behavior. Therefore, the risk assessment must include an assessment of the community's gender differentiated coping and adaptive capacities. Risk assessments and related maps help to motivate people, prioritise needs and interventions and guide preparations for disaster risk management measures, including prevention, preparedness and response.

4.1.2 Detection, monitoring, analysis and forecasting of the hazards and possible consequences

Warning services lie at the core of an early warning system. There must be a sound scientific basis to the system and reliable technology for:

- Monitoring and detecting hazards in real-time or near-real-time;

- A forecasting and warning system that operates 24 hours a day, 365 days/year which is monitored and staffed by qualified people.

Continuous monitoring of hazard parameters and their precursors (when available for a particular hazard) is essential to generate accurate warnings in a timely fashion that allows sufficient time for the affected community or communities to enact their disaster management plans appropriate for that hazard. The systems used for detection and monitoring, which could be automated, should allow for strict quality control of the data under international standards when these are available, taking into consideration the different resources used and different activities carried out by men and women. Warning services should have a multi-hazard perspective (e.g. heavy rainfall may not only trigger flooding but may also trigger landslides, the warning for which may come from a separate authority) and coordinated where ever possible to gain the benefit of shared institutional, procedural and communication networks and capacities. Data, forecasts and warnings should be archived in a standardized way to support post event analysis and improvements of the system over time. Data, forecasts and warnings will be gender responsive and culturally appropriate[13].

13. Gender responsive data, forecasts and warnings recognize that men and women access, process, interpret and respond to information in different ways, due to the social and cultural organization of gender relations and the gender division of labour, lack of a gender perspective in dissemination and communication is proven to exacerbate the negative impacts that a disaster can have and women's involvement increases the number of people informed because they are connected to different social networks and often have specific and different communication strategies that take into consideration women's practices, concerns and needs and propose actions that take into account these gender considerations.

4.1.3 Warning Dissemination and communication

Warnings must reach those at risk, particularly people in vulnerable situations[14]. Messages should also reach everyone in the community equally. Clear messages containing simple, useful and usable information are critical to enable proper preparedness and response that will help safeguard lives and livelihoods by organizations and communities. Trust is a big part of effective risk communication. If the information source cannot be trusted, real communication is impossible—and it takes a long time to establish trust.[15] Regional, national and local level communication systems must be pre-identified and appropriate authoritative voices established. These communication systems will be gender responsive. The use of multiple communication channels is necessary to ensure as many people as possible are warned, to avoid failure of any one channel, and to reinforce the warning message.

4.1.4 Preparedness and Response Capabilities

It is essential that people understand their risks; respect the national warning service and understand how to react to the warning messages. Education and preparedness programmes play a key role. Gender responsive planning and preparation for early warning and response to a disaster is also essential as it can reduce mortality and morbidity rates as well as facilitate equitable distribution of emergency relief, improve safety conditions in relief shelters, and improve mitigation.

It is also essential that disaster management plans are in place, well-practiced and tested. People should be well informed on options for safe behaviour to reduce risks and protect their health, know available escape

14. As recognized by the Sendai Framework

15. World Bank (Shaw, Rajib; Takeuchi, Yukiko; Matsuura, Shohei; Saito, Keiko) 2013: Risk Communication. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/16147/800720drm0kn5030Box0377295B00PUBLIC0.pdf?sequence=1&isAllowed=y.

routes, and how best to avoid damage and loss to property. Knowledge, acceptance and consideration of strong social and gender norms are also necessary when promoting safe behaviour[16].

Figure 3: *Four Elements of End-to-end and People-centred Early Warning Systems. Note: UNISDR and UNDP have identified multiple gender considerations for each of the four elements of people-centred Early Warning Systems*

16. These actions are particularly important for the region because in the Caribbean it has been reported that during a disaster men tend to place themselves at higher risk, as reported by UNDP 2012. Integrating Gender in Disaster Management in Small Island Developing States: A Guide

4.2 KEY ACTORS

For a (multi-hazard) early warning system to operate effectively, national, provincial and local governments should create an integrated and comprehensive framework which clarifies roles, responsibilities and relationships of all stakeholders within the system. Therefore, the first is the identification of all stakeholders within the (multi-hazard) early warning system. The principal stakeholders should include the disaster management authorities at the national, provincial and local levels, scientific and technical agencies responsible for issuance of early alert or advisories (e.g., national meteorological and hydrological services, health authorities, geological services, ocean observing organizations) and public and private communication entities. Other stakeholders include agencies responsible for various sectors such as transportation, agriculture and food security, energy supply and demand, health and epidemics, water resource management, telecommunications organizations and education (e.g. schools, universities, and informal education).

• Local

Communities, particularly those most vulnerable, are fundamental to people-centred multi-hazard early warning systems. They should be actively involved in all aspects of the establishment and operation of early warning systems; be aware of the hazards and potential impacts to which they are exposed; and be able to take actions to minimize the threat of loss or damage. They should take ownership of these systems. *Local governments*, like communities and individuals, are at the centre of effective early warning systems. They should be empowered by national governments, have considerable knowledge of the hazards to which their communities are exposed and be actively involved in the design and maintenance of early warning systems.

They must understand advisory information received and be able to advise, instruct and engage the local population in a manner that increases public safety and reduces the possible loss of resources on which the community depends. This engagement must be conducted therefore in a gender responsive manner to guarantee the differentiated needs and level of risk of local population.

• National

National governments are responsible for high-level policies and frameworks that facilitate early warning and for the technical systems that predict and issue national alerts. National governments should interact with regional and international governments and agencies to strengthen early warning capacities and ensure that warnings and related responses are directed towards the most vulnerable populations. The provision of support to local communities and governments to develop operational capabilities is also an essential function.

• Regional

Regional institutions and organizations play a role in providing specialized knowledge and advice which supports national efforts to develop and sustain early warning capabilities in countries that share a common geographical environment. In addition, they encourage linkages with international organizations and facilitate effective early warning practices among adjacent countries.

• International

International bodies can provide international coordination, standardization, and support for national early warning activities and foster the exchange of data and knowledge between individual countries and regions. Support may include the provision of advisory information, technical assistance, and policy and organizational support necessary to aid the development and operational capabilities of national authorities or agencies.

• Other Key Actors

Non-governmental organizations play a role in raising awareness among individuals and organizations particularly at the community level. They can also assist with implementing early warning systems and in preparing communities for natural disasters and response. In addition, they can play an important advocacy role to help ensure that early warning stays on the agenda of government policy makers.

The private sector has a diverse role to play in early warning, including developing early warning capabilities in their own organizations. The media plays a vital role in improving the disaster consciousness of the general population and disseminating early warnings. The private sector also has significant potential to help provide skilled services in form of technical manpower, know-how or donations (in-kind and cash) of goods or services.

The science and academic community has a critical role in providing specialized scientific and technical input to assist governments and communities in developing early warning systems. Their expertise is central to analyzing natural hazard risks facing communities, supporting the design of scientific and systematic monitoring and warning services, supporting data exchange, translating scientific or technical information into comprehensible messages, and to the dissemination of understandable warnings to those at risk.

Major social groups and other stakeholders. During the first United Nations Conference on Environment and Development in Brazil (Earth Summit), it was recognized that achieving sustainable development would require the active participation of all sectors of society and all types of people. Women, children and youth, Indigenous Peoples, farmers, and persons with disabilities organizations are some of the major groups recognized by the Sendai Framework that should be engaged when designing and implementing a people-centred preventive approach to disaster risk.

4.3 KEY VERIFICATION SOURCES

The key sources of information for completing the checklist include preparedness and response plans as well as development plans. Noting that an EWS function based on a network of actors, agreements between these actors can also provide useful information on the system. A list of documents that should be referenced in the application of the checklist is provided below. Gender, age and ethnicity differentiated data should be provided when available and encouraged where data is not available.

DOCUMENTS USED IN APPLICATION OF CHECKLIST	PLEASE TICK
Population censuses	
DRR country documents	
National Development Plan	
Plan of National investment and portfolio projects	
Response plans	
Contingent plans	
Evacuation plans	
Institutional response plans	
Institutional Diagnostics	
Agreements, collaboration agreements	
Meetings of the national DRR, lists of participants	
Manuals and protocols	
Inventory of resources	

DOCUMENTS USED IN APPLICATION OF CHECKLIST	PLEASE TICK
Risk assessment report	
Printed map	
Digital databases	
Reports of meetings, courses, simulations, simulations, joint actions, etc.	
Training plans/programs, lists of qualified personnel	
Awareness-raising materials, dissemination	

5. THE CHECKLIST

5.1 Disaster Risk Knowledge

5.2 Detection, Monitoring, Analysis And Forecasting Of The Hazards And Possible Consequences

5.3 Warning Dissemination and Communication

5.4 Preparedness And Response Capabilities

5. THE CHECKLIST

General Information

Name of Country:			
Total Population:			
Total Population Breakdown			
Urban Population Total:		Rural Population Total:	
Women:		Women:	
Men:		Men:	
Children:		Children:	
Girls:		Girls:	
Boys:		Boys:	
Elderly: W ( ) M ( )		Elderly: W ( ) M ( )	
Total number of communities:			
Total number of districts of the main urban center:			

5.1 DISASTER RISK KNOWLEDGE

Comprehensive information on all dimensions of disaster risk, including hazards, exposure, vulnerability and capacity, related to persons, communities, organizations and countries and their assets.

Key actors: National, sub-national and local disaster management agencies; scientific and technical agencies such as meteorological and hydrological organizations, health authorities, and geophysical agencies; engineers; land use and urban planners; researchers and academics (including from social science and gender experts); organizations and community representatives involved in disaster/emergency and disaster risk management.

Information about threats and vulnerabilities

Most important threats of the country

Floods	
Slope instability	
Earthquakes	
Tsunamis	
Tropical cyclones (depressions, hurricanes)	
Other (specify)	

Intense winds	
Drought	
Volcanic threat	
Forest fires	
Chemical substances	
Other (specify)	

Attainment level / Colour indication
1. Minimal or no progress towards standard
2. Moderate progress towards standard
3. Major progress towards standard
4. Complete attainment of standard

Endpoints (Key actions)	1	2	3	4	Sources of Verification
1. Are key hazards and related threats identified?					
[] Characteristics of key hazards (e.g., intensity, disease transmissibility, frequency, probability) analysed, historical data evaluated and potential future risks assessed.					• Printed maps • Studies of threats • Digital databases • Gender specific vulnerabilities identified
[] Hazard maps (dynamic when possible) developed that identify the geographical areas/people that could be affected by hazards and include gender differentiated vulnerability data.					• Hazard maps • Digital databases • Hazard maps include gender differentiated vulnerability data
[] Women and men and organizations from major groups involved equally in the development of hazard and risk maps.					• Risk Assessments and hazard maps perspectives
2. Are exposure, vulnerabilities, capacities and Risks Assessed?					
[] Assessment and quantification of exposed people (include gender considerations), services (e.g. hospitals) and critical infrastructure (e.g. electricity and water works, quality of building stock) conducted and mapped for all relevant hazards as well as of any compounding risks at local level in both rural and urban areas and coastlines.					• Risk assessments • Tables, documents, and maps of critical sites or vulnerability • Inventory or register of property/ infrastructure • Digital records • Response plans • Contingency plans • Environmental management plans • Assessment and quantification of exposed people and services disaggregated by sex, age and ethnicity
[] Impacts to critical infrastructure and secondary risks associated to these impacts should be evaluated and risk management solutions considered for increasing resilience.					• Official assessment methodologies (if any) of infrastructure, or other reference. • National budgets • Preparedness and response plan • Conventions and agreements

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] Vulnerability factors such as gender, disability, access to infrastructure, economic diversity, societal inequalities and environmental sensitivities considered.					• Risk assessments • Tables, documents, and maps of critical sites or vulnerability • Inventory or register of property/ infrastructure • Women and men's traditional knowledge and perceptions included in the analysis and evaluation of the characteristics of key natural hazards. • Digital records • Response plans • Contingency plans • Environmental management plans • Institutional reviews/EWS reviews • After-action reviews
[] Vulnerabilities of key economic sectors at national level to local levels assessed.					
[] Integration of historical and indigenous knowledge into risk assessments.					
[] Activities of people that increase or compound risks identified and evaluated in a gender differentiated manner[17].					
[] Results of risks assessment integrated into local risk management plans and warning messages in a clear and easy to understand language					
[] Legislation assessed to identify gaps that may increase vulnerability.					
[] Cultural norms and gender inequalities assessed to identify gaps that may increase vulnerability.					
[] Communication channels and early warning system hardware resilience evaluated in advance to reduce the impact of events over the infrastructure and determine if warnings will reach people equally.					• Records and reports of simulation exercises and drills. • Gender responsive evaluation of warning dissemination and communication systems
[] Communication channels coverage and multiple channel evaluation to identify gaps and possible points of failure that may increase vulnerability or prevent people in vulnerable conditions from receiving messages.					

17. Gender differentiated identification and evaluation of activities that can be disaggregated by sex in order to determine gender specific hazards and vulnerabilities to determine the risks faced by men and women in each region or community

Endpoints (Key actions)	1	2	3	4	Sources of Verification
3. Are roles and responsibilities of stakeholders identified?					
[] Key national government agencies and organizations from major groups[18] involved in risk assessments (including hazard, vulnerability, and capacity assessments) are identified and roles defined.					• Legislation • Existing protocols and policies. • Agreements or agreements of collaboration between institutions and organizations. • Bilateral interviews and/or focus groups with leaders/coordinators of each institution and NGOs/CBOs • Equal opportunity for men and women to be part of the scientific and technical expert groups assessing and reviewing the accuracy of risk data and information developed
[] Legislation or government policy mandating the preparation of hazard, vulnerability and capacity assessments for all areas in place.					
[] Responsibility for coordinating hazard identification and risk information (exposure, social and physical vulnerability and capacity) assigned to one national organization with a view to consolidating approaches and monitoring of linkages and cascading impacts.					
[] Process for scientific and technical experts (Including social and gender experts) to assess and review the accuracy of risk data and information developed.					
[] Process to actively engage rural and urban communities in local hazard and risk assessments taking into consideration the needs of all people (women, men[19], children, older people, people with disabilities, etc.).					

18. Including women, children and youth, indigenous peoples, people with disabilities and farmer organizations.

19. A gender responsive process will include actions to ensure that: women and men involved equally in the development of hazard and risk maps and in the process to review and update risk data each year and include information on any new or emerging vulnerabilities and hazards established. To do so, the initiative will hire a gender expert to develop a strategy to actively engage women and men from the communities in local hazard and vulnerability analyses.

Endpoints (Key actions)	1	2	3	4	Sources of Verification
4. Is risk information consolidated?					
[] Central standardized repository (including but not limited to a Geographic Information System (GIS) enabled) established to store all event/ disaster and risk information.					• Digital databases • Bilateral interviews with key officials of the country and institutions in charge. • Protocols for data collection, storage and access • Funded data collection programme • Organizations from major groups involved in the design of national standards and in the process to review and update risk data
[] National standards (where possible following international standards) established for the systematic collection, sharing and assessment of risk information and data, related to hazards, exposures, vulnerabilities and capacities (utilising a gender responsive process when possible[20]).					
[] Standardized vulnerability data and information disaggregated by sex, age and disability.					
[] Process for maintenance, regular review and updating of risk data including information on any new or emerging vulnerabilities and hazards established with roles and responsibilities of stakeholders identified with appropriate funding.					

20. A gender responsive process would involve women and men's organizations in the development of national standards for the systematic collection, sharing and assessment of hazard and vulnerability data development

LINKAGES WITH OTHER ELEMENTS

Understanding the risk profile of the country provides critical information for the other MHEWS elements such as:

- **Detection, monitoring, analysis and forecasting: Identification of what hazards to monitor where to monitor and identification of how to optimize the observing and monitoring network. It is critical that warnings include risk and impact information.**
- **Warning communication and dissemination: evaluation of gender responsive communication strategies to ensure messages are reaching the population, particularly women and people in vulnerable conditions) and whether the equipment are able to withstand an extreme event.**
- **Preparedness and response capabilities: Development of disaster preparedness and response plans, development of exercises to test and optimize the effectiveness of dissemination mechanisms, emergency protocols for evacuation and disaster response, public awareness and education.**

5.2 DETECTION, MONITORING, ANALYSIS AND FORECASTING OF THE HAZARDS AND POSSIBLE CONSEQUENCES

Multi-hazard monitoring and forecasting service with a sound scientific and technological basis

KEY ACTORS: National and local disaster management agencies; Scientific and technical agencies such as meteorological and hydrological organizations, health authorities, ocean observing organizations and geophysical agencies; universities and research institutes; private sector equipment suppliers; telecommunications authorities; security experts; military authorities; quality management experts; regional technical centres.

Attainment level / Colour indication
1. Minimal or no progress towards standard
2. Moderate progress towards standard
3. Major progress towards standard
4. Complete attainment of standard

Endpoints (Key actions)	1	2	3	4	Sources of Verification
1. Are there monitoring systems in place?					
[] Monitoring network established that monitors hazards that impact your country.					• Equal involvement of women and men in the committee that sets up technical warning systems for all hazards • Direct observation of existing mechanisms and systems • Documentation related to the mechanisms of alert. • Protocols, agreements and agreements in reference to systems • Interviews with key people associated with both political profile as technical mechanisms • Women and men can have access and control of technical equipment and have the capacities for them
[] Measurement parameters and specifications documented for each relevant hazard.					
[] Technical equipment, suited to local conditions, circumstances and gender differentiated needs, in place and personnel trained[21] in its use and maintenance.					
[] Monitoring data received, processed and available in an interoperable format in real time, or near-real time.					
[] Monitoring data and metadata routinely curated with quality controls, archived and accessible for verification, research purposes and other applications.					• Protocols for data collection, storage and access • Gender-differentiated data and analysis from regional networks, adjacent territories, and international sources accessible.

21. Both women and men trained how to forecast hazards using different technical resources.

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] Monitoring hardware and software maintenance is addressed routinely and costs and resources are considered from the beginning to ensure the optimal operation of the system over time.					• Documents of agreements and conventions between actors • Visits and direct observation of the places where measuring equipment are installed and monitoring • Bilateral interviews with people who handle the equipment and instruments • Documented evidence of funds for maintenance
[] The system is able to combine and benefit from new and older technology allowing for exchange of data among countries with different technical capabilities.					
2. Are there forecasting and warning services in place?					
[] Data analysis and processing, modelling, prediction and warning products generation based on accepted scientific and technical methodologies and disseminated within international standards and protocols.					• Internationally accepted scientific and technical methodologies • Appropriate international standards and protocols in use for warnings • Documentation related to the mechanisms of alert. • Protocols, agreements and agreements in reference to system
[] New data analysis and processing, modelling, prediction and warning products can be integrated easily in the system as science and technology evolve.					
[] Warning centres are operational at all times (24 hours/day, seven days/week) and staffed by trained personnel, following appropriate national and international standards.					• Bilateral interviews with authorities of the municipality, other key actors and people who handle the equipment and instruments • Protocols of activation of the alert (if any) • List of trained personnel • Women and men equally involved in the process to review and update risk data each year, and include information on any new or emerging vulnerabilities and hazards established.
[] Warning messages are clear, consistent, gender sensitive and include risk and impact information and are designed so they reach everyone, with consideration for linking threat levels to emergency preparedness and response actions.					• Gender responsive Protocols of activation of the alert (if any) • Records and reports of simulation exercises and drills.

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] Software and data analysis for the received data updated periodically and to high security standards					• Bilateral interviews with authorities of the country, other key actors and people who handle data • Reports of data analysis
[] The monitoring and data analysis systems health is continuously monitored for any data gaps, connection issues or processing issues.					
[] Warning messages provide clear guidance to trigger reactions (e.g. evacuation).					• Gender responsive protocols for activation of the alert (if any) • Records and reports of simulation exercises and drills. • Bilateral interviews with authorities of the municipality, other key actors and people • Two-way and interactive communication system allows for verification, so it can be determined that women and men have received and understand warnings.
[] Warnings generated and disseminated in an efficient, timely manner for each type of hazard.					
[] Warning system(s) subjected to regular system-wide tests and exercises.					
[] Process established to verify that warnings have reached the principal stakeholders, particularly women and people in vulnerable conditions.					
[] Mechanisms in place to inform people when the threat and its impacts have ended.					
[] Operational processes, including data quality and warning performance are routinely monitored and evaluated.					
[] Fail-safe systems in place, such as power back-up, equipment redundancy and on-call personnel systems.					
[] Strategies to build credibility and trust in warnings developed (e.g., understanding difference between forecasts and warnings) without prejudice to who delivers the warning.					
[] False alarms minimised and improvements communicated to maintain trust in the warning system.					
[] Warning and forecast archival processes and systems in place?					

Endpoints (Key actions)	1	2	3	4	Sources of Verification
3. Are there institutional mechanisms in place?					
[] Plans and documents for monitoring networks available and agreed with experts and relevant authorities.					• Legislative documents and bylaws. • Protocols • Agreements between institutions • Multi-hazard policy • Regional cooperation arrangements • Bi-lateral agreements
[] Standardized process, and roles and responsibilities of all organizations generating and issuing warnings established and mandated by legislation or other authoritative instrument (e.g., MoU, SOP).					
[] Agreements and interagency protocols within country established for data exchange of monitoring systems and baseline data necessary to produce data products (e.g. bathymetric and topographic data for tsunami modelling).					
[] Agreements and interagency protocols established to ensure consistency of warning language and communication responsibilities where different hazards are handled by different agencies.					
[] A multi-hazard coordination strategy to obtain mutual efficiencies and effectiveness among different warning systems established.					
[] Warning system partners, including local authorities and the media, are aware of and respect which organizations are responsible for generation and issuance of warnings.					
[] Cross-border exchange of warnings and observation data with neighbouring countries realized through bilateral/ multilateral agreements especially for concerns such as tropical cyclones, floods, diseases, in shared basins, data exchange, and technical capacity building.					

LINKAGES WITH OTHER ELEMENTS

Understanding the risk profile of the country provides critical information for the other MHEWS elements such as:

- **Risk knowledge: Monitoring and forecasting data and information provide the basis for quantifying hazard and exposure of risk.**
- **Warning communication and dissemination: Warnings are the trigger for communication mechanisms and begin the processes for decision making and enacting emergency plans.**
- **Preparedness and response capabilities: Risk informed warnings provide the necessary information for people, particularly those in vulnerable conditions, to protect themselves and their property and start emergency response processes.**

5.3 WARNING DISSEMINATION AND COMMUNICATION

Communication and dissemination systems to ensure people and communities, particularly people in vulnerable conditions, are warned in advance of impending hazard events, facilitating national and regional coordination and information exchange.

KEY ACTORS: National and local disaster management agencies; Scientific and technical agencies such as meteorological and hydrological organizations, health authorities, and geophysical agencies; military and civil authorities; media organizations (e.g., television, radio and social media); businesses in vulnerable sectors (e.g., tourism, care facilities for older people, marine vessels); community- based and grassroots organizations; international and UN agencies, women and men from local communities.

Attainment level / Colour indication
1. Minimal or no progress towards standard
2. Moderate progress towards standard
3. Major progress towards standard
4. Complete attainment of standard

Endpoints (Key actions)	1	2	3	4	Sources of Verification
1. Are organizational and decision-making processes in place and operational?					
[] Functions, roles and responsibilities of each actor in the warning dissemination process enforced through government policy or legislation at all levels.					• Direct observation of existing mechanisms and systems Documentation related to the mechanisms of alert. • Protocols for activation of the warning (if any) • Interviews with key people associated with both political profile as technical mechanisms • Interviews with key people associated to organizations of major groups (including women, children and youth, people with disabilities, farmers)
[] Warning communication strategies at the national, sub-national and local levels in place that ensure coordination across warning issuers and dissemination channels.					• Protocols for activation of the warning (if any) • Records and reports of simulation exercises and drills. • Women and men are both part of volunteer network trained and empowered to receive and widely disseminate early alerts to remote households and communities • Two-way and interactive communication system allows for verification, so it can be determined that women and men have received warnings.
[] Regular coordination, planning and review meetings between the warning issuers and the media.					
[] Professional and volunteer network established to receive and widely disseminate warnings.					
[] Feedback mechanisms in place to verify that warnings have been received and correct potential failures in dissemination and communication.					
[] Mechanisms to update the information are in place and are resilient to the event.					

Endpoints (Key actions)	1	2	3	4	Sources of Verification
2. Are communication systems and equipment in place and operational?					
[] Trust among and between stakeholders established.					• Surveys
[] Communication and dissemination systems tailored to the different needs of specific groups (urban and rural populations, women and men, older people and youth, people with disabilities, etc.).					• Protocols for activation of the warning (if any). • Records and reports of simulation exercises and drills. • Gender experts or women's groups are consulted to assist with identification of gender considerations to tailor the communication and dissemination systems to the needs of women
[] Warning communication and dissemination systems reach the entire population, including people in vulnerable conditions, seasonal populations and remote locations through multiple communication channels (e.g., social media, flags, sirens, bells, public address systems, door-to-door visits, community meetings).					• Interviews with relevant institutions/NGOs/CBOs • Reviews on communication strategies • Two-way and interactive communication system allows for verification, so it can be determined that women and men have received warnings.
[] Evaluation of communication strategies to ensure messages are reaching the population, particularly people in vulnerable conditions.					• Records and reports of simulation exercises and drills. • Reviews on communication strategies • Reviews to determine if Warning communication strategies are accessible and reach women and men equally.
[] Agreements developed to utilize private sector resources where appropriate (e.g., television, amateur radios, social media) to disseminate warnings.					• Agreements with private sector entities • Multiple communication mediums for warning dissemination are used, encompassing those used or preferred by women.
[] Equipment is maintained and upgraded to utilize new technologies (when appropriate) to ensure inter-operability.					• Schedule of equipment maintenance including upgrading • Women and men trained and employed to maintain equipment and upgrade programmes of back-up systems in the event of failure
[] Backup systems are in place in the event of failure.					• Record of communications systems including redundancies

Endpoints (Key actions)	1	2	3	4	Sources of Verification
3. Are impact-based early warnings communicated effectively to prompt action by target groups?					
[] Impact-based early warning messages should communicate risk clearly and provide advice on actions that can be taken to reduce risks and understood by everyone, particularly people in vulnerable conditions.					• Records of early warning messages • Records and reports of simulation exercises and drills. • Interviews with key technical officers, NGOs/CBOs • After action reviews • Studies to determine how women and men access and interpret early warning messages
[] In the case of events with a short time-frame for reaction (e.g. earthquake early warning), automated systems should be in place to mitigate impacts (e.g. automatic stop of transport, red lights activations in tunnels, stop elevators in closest floor, open fire-truck gates, etc.).					
[] Early warnings should take account of different risks of sub-populations, including groups with vulnerabilities (urban and rural, women and men, older people and youth, people with disabilities, etc.).					
[] Public and other stakeholders understand whose authority it is to issue the warnings and trust their message.					

LINKAGES WITH OTHER ELEMENTS

Understanding the risk profile of the country provides critical information for the other MHEWS elements such as:

• Risk knowledge: Information on weaknesses and strengths of communication channels and early warning system hardware resilience is required.

• Detection, monitoring, analysis and forecasting: Agreements and interagency protocols to ensure authoritativeness and consistency of warning language and communication responsibilities for each hazard. Cross boarder exchange of warnings and observation data with neighbouring countries.

• Preparedness and response capabilities: Inclusion of communications channels and protocols into disaster preparedness and response plans. Protocols established to reach emergency and health services that need to be ready to respond to events promptly.

5.4 PREPAREDNESS AND RESPONSE CAPABILITIES

Institutions and people, particularly people in vulnerable conditions, able to respond to a warning through enhanced education on hazards and risks.

KEY ACTORS: National and local disaster management agencies; Scientific and technical agencies such as meteorological and hydrological organizations, health authorities, ocean observing organizations and geophysical agencies; military and civil authorities; schools; universities; informal education sector; media organizations (e.g. television, radio and social media); businesses in vulnerable sectors (e.g. tourism, aged care facilities, marine vessels); NGO's, community- based and grassroots organizations; international and UN agencies. Women and men from communities

Attainment level / Colour indication
1. Minimal or no progress towards standard
2. Moderate progress towards standard
3. Major progress towards standard
4. Complete attainment of standard

Endpoints (Key actions)	1	2	3	4	Sources of Verification
1. Are key hazards and related threats identified?					
[] Disaster preparedness, including response plans, developed in a participatory manner, disseminated to the community, practiced and underpinned by legislation where appropriate.					• Gender responsive Response plans • Contingency plans • Legislation • Gender differentiated Risk scenarios • Gender-sensitive up-to-date emergency preparedness and response plans are disseminated to women and men

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] Disaster preparedness measures, including response plans account for the needs of people with vulnerabilities.					
[] Multi-hazard risk assessments utilized to develop and update disaster preparedness including response plans					
[] Community ability to respond effectively to early warnings assessed, particularly women and people in vulnerable conditions.					
[] Contingency planning is developed in a scenario-based manner following forecasts or likely scenarios across time-scale and informed by climate projections and scientific research.					
[] Response actions at all levels are linked to sustainable funding.					
[] Strategies implemented to maintain preparedness for longer return period and cascading hazard events.					
[] Protocols established for emergency and health services that need to be ready to respond to events promptly.					• Manuals and protocols • Documentation related to the mechanisms of alert.
[] Protocols established to evacuate last mile operators (e.g. local police, firefighters, volunteers, health services) who disseminate warnings to the public and decide public measures, including issuing orders for evacuation or shelter-in-place.					• Manuals and protocols

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] Regular exercises undertaken to test and optimize the effectiveness of the early warning dissemination processes, preparedness and response.					• Documented evidence of drills carried out • Record or report of the simulation • Interviews with women and men who have participated in the organization of drills • Feedback from regular tests and drills are undertaken to test if the early warning and dissemination process and responses reach women and men equally • Women's ability to respond effectively to early warnings is assessed. • Gender-differentiated response to previous disasters analyzed and gender-sensitive lessons earned are incorporated into future capacity building strategies.
2. Is public awareness and education conducted?					
[] Public awareness and education on hazards, vulnerabilities, exposure and how to reduce disaster impacts built into school curricula from primary through university.					• Gender sensitive PAE materials and Plans of study • Existence of methodological guides in the school • Interviews with teaching and managerial staff of schools • Interviews with Min-local addresses. Education • Interviews and research in/ near universities: • Range of careers and plans of studies of them • Records of extracurricular activities
[] Public education provided to recognise hydro-meteorological and geophysical hazard signals and disease signs and symptoms in order to contribute to community surveillance and to allow and promote robust no-regret response measures.					• Plans and/or awareness programs • Interviews with technical/professional facilitators or responsible outreach • Radio spots, material from visibility campaigns, among others.

Endpoints (Key actions)	1	2	3	4	Sources of Verification
[] People educated on how warnings will be disseminated, which sources are reliable and how to respond.					
[] Utilization of most effective media (e.g., established media, social networks, alternative media) to improve public awareness.					
[] On-going public awareness and education campaigns tailored to the specific needs of target groups (e.g., women, children, older people and people with disabilities).					
3. Is public awareness and response tested and evaluated?					
[] Previous emergency and disaster events and responses analysed, and lessons learnt incorporated into preparedness and response plans and into capacity building strategies.					• Post-impact analyses • Preparedness and response plans • Reports of reviews • Reports of drills and exercises • Public awareness strategies and programs are evaluated at least once per year to determine if men and women are effectively involved in the response process
[] Public awareness strategies and programmes evaluated regularly and updated as required.					
[] Drills and exercises conducted with first responders and community					

LINKAGES WITH OTHER ELEMENTS

Understanding the risk profile of the country provides critical information for the other MHEWS elements such as:

• Risk knowledge: Feedback from lessons learned and exercises undertaken to test and optimize the effectiveness of the early warning system should be considered/incorporated when developing risk assessments.

• Detection, monitoring, analysis and forecasting: Feedback from lessons learned and exercises to test and optimize the effectiveness of the early warning system should considered when developing/improving warning messages and operational forecasting processes

• Warning communication and dissemination: Feedback from lessons learned and exercises to test and optimize the effectiveness of the early warning system should considered when developing/improving communication dissemination agreements and protocols among agencies, institutions and the public.

6. ACRONYMS LIST

CREWS -	Climate Risk and Early Warning Systems
ECHO -	Climate Risk and Early Warning Systems
FAO -	Food and Agriculture Organization
IFRC -	International Federation of Red Cross and Red Crescent Societies
ITU -	International Telecommunication Union
MHEWS -	Multi-Hazard Early Warning System
NDMO -	National Disaster Management Office
NGO -	Non-Governmental Organization
OCHA -	Office for the Coordination of Humanitarian Affairs of the United Nations Secretariat
UN -	United Nations
UNEP -	United Nations Environment Programme
UNDP -	United Nations Development Programme
UNESCO -	United Nations Educational, Scientific and Cultural Organization
UNISDR -	United Nations International Strategy for Disaster Reduction
UNOSAT -	United Nations initiative to provide the humanitarian community with access to satellite imagery and Geographic Information System service
UNU-EHS -	United Nations University Institute for Environment and Human Security
WMO -	World Meteorological Organization