

**DRAFT FOR CONSULTATION**

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**MULTI-HAZARD EARLY WARNING  
CONFERENCE**

22 TO 23 MAY 2017  
CANCÚN, MEXICO

**CONSULTATION DOCUMENT ON  
MEASURING EARLY WARNING  
ACCESS AND EFFECTIVENESS**

*Draft as of 12 May 2017*

# **[Draft] Consultation Document on Measuring Early Warning Access and Effectiveness**

## **Why do we need to measure the effectiveness of early warning systems?**

Early warning systems are a tool for local, national and regional institutions in managing disaster risks, by substantially reducing loss of life, the possibility of personal injury and damage to property, infrastructure and the environment from hazard events. By reducing loss and damage, early warning systems contribute to sustainable development, climate change adaptation, and national security.

Given the significance of early warning systems to social and economic security well-being, and the associated resource demands to operate them, it is clearly desirable to continually monitor and improve their efficiency and effectiveness.

To this end, the present consultation document aims to identify a set of metrics to provide guidance on how the effectiveness of, and access to, early warning systems can be measured, encompassing a conceptual framework of key elements, including sources of data and information and methodologies.

The main reasons national to local authorities, regional and international institutions need to systematically measure their early warning systems are as follows.

1. Regular review of early warning systems can identify strengths and opportunities, as well as weaknesses and constraints for improvement in regional, national and local systems and can guide priorities for programming, institutional capacity development and related resources allocation.
2. Increasing the effectiveness of international aid, being provided through multiple channels, to strengthen early warning systems: measurement and the monitoring of the effectiveness of such programmes and projects from inception to completion will enhance the overall outcome of these development investments.
3. Measures of early warning system effectiveness will assist national, local and regional institutions in meeting their global commitments to support early warning capabilities such as in the Sustainable Development Goals, the Sendai Framework and the Paris Climate Change Agreements.
4. A framework of metrics will provide an essential basis for post-disaster reviews of the effectiveness of an early warning systems by national and local authorities.

## **The main features of the present guidance**

A key principle adopted here is that effective early warning systems are 'people-centred' and impact-based, in addition to being technically sound, and therefore must comprise or address the following four elements:

- Risk-informed system design
- Monitoring and warning service
- Communication and dissemination
- Public access and ability to respond to the warning

The proposed metrics cover each of these elements and aims to reflect the system's ability to provide warning and risk information for the different hazard types.

From a development perspective, it is important that early warning systems be measured on their capacity to support:

- Targets for the reduction of loss of life, injury, and the loss of livelihoods;
- Objectives for sustainable development, vulnerability reduction and resilience building;
- Penetration of accurate and timely warnings; and,
- The ability of people to use warnings, respond appropriately and to provide feedback to the designated warning authority.

Early warning metrics, therefore, relate to three main international agreements, the Sustainable Development Goals (SDGs), the Paris Climate Change Agreements and the Sendai Framework for Disaster Risk Reduction, and, in particular, the indicators under Target G of the Sendai Framework. Target G calls on countries to “*substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030*”. Member States, through the United Nations, have identified indicators against which this target will be measured. The present guidelines are expected to provide a methodology to assist countries achieve this.

Given the contribution that effective early warning systems can make in reducing the loss of lives and livelihoods, these metrics will also be ultimately measured through Sendai Targets A and B – loss of life and economic losses.

A substantive body of literature exists on measuring early warning effectiveness. Prior to the Indian Ocean Tsunami in 2004, the task was primarily developed around reviews of specific disaster events and the effectiveness of the warning systems. Since then, a number of important global and regional reviews have been undertaken. These are being compiled and the methodologies analysed as part of this consultation.

The present consultations are being carried out by the Climate Risk and Early Warning (CREWS) initiative, the World Meteorological Organization (WMO), the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR) and UNISDR, in the context of the preparations for the Multi-Hazard Early Warning Conference, 22-23 May 2017, Cancun, Mexico. The initial consultations also drew on and in-person consultations with international experts<sup>1</sup>.

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## Proposed Set of Metrics for Measuring Access and Effectiveness of Early Warning Systems

### 1 Risk-informed system design

The design of the system is based on a documented understanding of hazards, and the exposure and vulnerability of people and property to the hazards,

Proposed metric	Relevance	Measurability	Data requirement
1a. Is standardized and updated information available on potential hazards, as well as the people and property exposed and vulnerable to these?	High	Low - High	Mapping of the occurrences, characteristics and emerging trends of hazards Probabilistic multi-hazard risk models and maps Local, sub-national and national socio-economic exposure and vulnerability assessments Information on past losses, tied with changes and projected trends of exposed people and property
1b. Is the hazard and risk information provided in an accessible format to guide the design of the systems?	High	Medium	Graphic representations and spatial assessments of 1a.
1c. Are target groups regularly identified along with their specific information needs?	High	Medium - Low	Target groups can be ascertained using the models/assessments in 1a.
1d. Has the system been designed and is it regularly assessed based on needs and priorities of the target groups?	Medium	Low	tbd
<p>Comments:</p> <p>1b: Measurability is dependent on the methodology and models used for conducting the risk assessments. The exclusion and weighting of variables or the models used will have varying results and attached uncertainty. That uncertainty will affect the ability to guide the development of an early warning system. The measurability towards effectiveness can range from low-high depending on the definition of risk assessment that is used. The generality of the statement in its current form is highly relevant as a metric, but its accuracy in measuring effectiveness of early warning systems is obscured for this reason.</p>			

## 2 Monitoring and warning service

Appropriately resourced, scientifically-based operational systems exist that provide monitoring services and authoritative public warnings of circumstances for all hazards.

Proposed metric	Relevance	Measurability	Data requirement
2a. Do relevant hazards have monitoring and forecasting systems?	High	Varied	This metrics will be relatively straight forward to measure for certain hazards through existing institutional set-ups (i.e. WMO for hydromet hazards, UNESCO/IOC for tsunamis)
2b. Does the forecasting system include predefined, localized thresholds and impacts for warning issuance?	High	Varied	Hazard impact and relation to responses to warnings is needed
2c. Is there cross-institutional cooperation and harmonization for relevant hazards?	Medium	High	Yes or no
2d. Are warning authorities clearly identified and operational 24/7?	High	High	Are warning authorities in the county formally identified
2e. Is the warning authority able to receive advisories from external service providers?	Medium	Low	tbd
2f. For slow-onset hazards, is there a mechanism for the relevant authorities to meet and prepare ahead of the hazard event?	High	Medium	tbd

### 3 Communication and dissemination

Communication and dissemination systems are in place and are used to convey accurate, timely warnings to all those who may be at risk from a hazard event, including relevant authorities and enterprises.

Proposed metric	Relevance	Measurability	Data requirement
3b. Are there Common Alerting Protocols, or similar, in place for warning dissemination?	High	Medium - High	What is the time delay between breach of threshold and the issuance of a warning? Is the time delay consistent with all relevant hazards or is it hazard-specific? What is the average time between issuing a warning and the occurrence of an event – minutes, hours, days?
3c. Is the warning message accurate?	Medium	Low	tbd
3d. Is the warning message understandable and actionable for different audiences?	High	Medium	tbd
3d. Are multiple dissemination channels available (e.g. for cross-verification)? Including local media	Medium	Low	tbd
3e. Does the dissemination mechanism reach/cover all of the at risk exposed/population	High	Medium with some uncertainty attached	ICT data (ITU)
<p>Message needs to be simple, trustful and actionable. Balance needs to be struck between a simple message and one that is informative that conveys risk, potential impact loss and damage, thresholds etc. but runs the risk of being too complex. Warnings should be simplistic in that all audiences should be able to understand the warning. Having warnings tailored to different groups complicates the design of an early warning system and can reduce effectiveness in its delivery. A simple message/warning tailored to all audiences in an affected area optimizes the early warning system's effectiveness. Additional metric: Are the warning message pathways tailored for different audiences and locations?</p>			

#### 4 Ability to respond [Response capacity]

All those who receive the warnings understand them and are equipped with the knowledge and capacities to effectively respond to reduce human and material losses and injury.

Proposed metric	Relevance	Measurability	Data requirement
4a. Are there standard operation procedures for responding to early warning in existing preparedness and response plans and strategies?	High	Medium - High	Local, sub-national and national emergency management plans depending on country and severity of impending hazards.
4b. Are mechanisms available to transfer knowledge to people and institutions in the exposed areas on the nature and functions of the system; types and form of warnings messages and; how to act on them?	High	Low	tbd
4c. Are mechanisms available to transfer knowledge to people and institutions in the exposed areas on hazards and understanding risks?	High	Low	Education curriculum and requirements of relevant institutions transfer knowledge on hazards and warning response.
<p>Any other proposed metrics and comments</p> <p><u>Regarding 4a.:</u> The definition of standard procedures will vary with different parts of society – for example, public education, private sector, etc. The standard procedures will vary with education – 4c – so there needs to be connections in terms of these metrics.</p> <p><u>Regarding 4b.:</u> Does this include pre-disaster/warning preparedness? There is an important relationship between pre-disaster preparedness at the household level and the effectiveness of an early warning system in terms of the ability to respond when a warning is issued. There needs to be greater emphasis as to the role of the individual in responding to a warning in this set of metrics.</p> <p><u>Regarding Measurability of 4b.:</u> Whether or not the education system being evaluated includes warning response is not necessarily a complete assessment as to evaluating the effectiveness of the people’s ability to respond. It certainly is a necessary metric that is measurable if using the existence of educating response to warning, but it does not capture the receptiveness of the education provided – usually this is only captured post-event. As such, measurability was indicated as being low. A survey of household preparedness and knowledge of responding to a warning should be considered in terms of data requirement for this receptiveness.</p> <p>Additional metric is needed on measuring behavioral change</p>			

**Points to be considered:**

- a) A more careful consideration of the term “effectiveness”. Thus, the metrics that have been discussed to date are more a consideration for measuring the “performance” of EWS.
- b) Another approach that may be considered, that takes into account issues i) and ii) mentioned above, would be using a “monitoring and evaluation” framework to assess EWS. This would then measure EWS against the i) relevance and fulfillment of objectives, ii) efficiency, iii) effectiveness, vi) impact and v) sustainability.
- c) Use of the term metric implying a quantified measure versus the more appropriate term indicator
- d) The inclusion of metrics on governance and institutional arrangements should be considered (e.g. sustainability of the system, resources required to maintain and upgrade the system)
- e) Under the current metrics developed to date, access to early warning is a driving goal of the dissemination process and thus metrics relevant to access should be covered under Key Element 3
- f) Clarity on the target audience for the guidance note