Community early warning systems: guiding principles

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Guided by *Strategy 2020* – our collective plan of action to tackle the major humanitarian and development challenges of this decade – we are committed to 'saving lives and changing minds'.

Our strength lies in our volunteer network, our community-based expertise and our independence and neutrality. We work to improve humanitarian standards, as partners in development and in response to disasters. We persuade decision-makers to act at all times in the interests of vulnerable people. The result: we enable healthy and safe communities, reduce vulnerabilities, strengthen resilience and foster a culture of peace around the world.

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Strategy 2020 voices the collective determination of the IFRC to move forward in tackling the major challenges that confront humanity in the next decade. Informed by the needs and vulnerabilities of the diverse communities with whom we work, as well as the basic rights and freedoms to which all are entitled, this strategy seeks to benefit all who look to Red Cross Red Crescent to help to build a more humane, dignified, and peaceful world.

Over the next ten years, the collective focus of the IFRC will be on achieving the following strategic aims:

1. **Save lives, protect livelihoods, and strengthen recovery from disasters and crises**
2. **Enable healthy and safe living**
3. **Promote social inclusion and a culture of non-violence and peace**

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Acknowledgments

Community early warning systems: guiding principles is the result of extensive consultation and valuable contributions from the National Societies, Red Cross Red Crescent Reference Centres and the International Federation of Red Cross and Red Crescent Societies. In addition, a number of lessons learned and good practices were contributed by international and national partners across the globe; this has enabled the guidelines to reflect a more holistic perspective on community early warning systems. This document benefited greatly from the recommendations provided by the World Meteorological Organization. The guiding principles were made possible through the financial support received from the Norwegian Red Cross.

Foreword

The decline in human and material losses from disasters over the past 30 years is partly due to improved early-warning systems, many of them 'high-tech'. Scientific advances have revolutionized forecasting and the communications technology used for warnings. The International Federation of the Red Cross and Red Crescent Societies advocates, however, for a more people-centred approach that is essential to ensure information and warnings captured by satellites, computer modelling and other technologies reach the most vulnerable communities, who can then act on them. Early warnings alone do not keep hazards from turning into disasters.

Early action, covering all time scales, is also essential. It is an investment in the future, and has been proven effective at attenuating the effects of disasters. Across the world, significant efforts are being invested in empowering volunteers to take an active role in monitoring risks that influence their communities. As they do so, they learn to both issue, and respond to, warnings that arise from the monitoring. Where and when national early warning systems are active, these community early warning systems complement governmental mandates to protect lives and livelihoods. Where they do not yet exist, community early warning systems also serve to catalyze dialogue about what national systems are required and how the National Red Cross and Red Crescent Societies, as auxiliary to governments, may play a role in supporting them.

The people-centred approach to early warning, promoted by the Hyogo Framework for Action, focuses on how communities must understand threats in order to avoid them. Disasters are partly caused by external hazards, but they also stem from vulnerability: people being in the wrong place, at the wrong time, or without adequate protection or resources to respond to a warning.

There is a consensus that communities must, at the very least, be active receivers of information, while some may even need to be engaged in monitoring so as to facilitate their adoption of protective actions. However, factors as diverse as knowledge, power, culture, environment, lifestyle and personality often determine whether people heed warnings. By engaging communities in the development of the early warning systems from the beginning many of these challenges can be addressed.

The present guiding principles of community early warning systems is a living document that launches a process to compile and capitalize on a rich and growing body of evidence and effort. It gains value by highlighting efforts underway from more than 50 countries across the world, both inside the International Red Cross and Red Crescent Movement and alongside it, through key partners. It is meant as a starting point from which to catalyze a community of practice in community early warning systems. It is our hope that readers will contribute to this dialogue, actively sharing additional examples of good practice and lessons learned.

Bekele Geleta
Secretary General
International Federation of Red Cross
and Red Crescent Societies

Acronyms

CEWS	Community early warning system
DREF	Disaster Relief Emergency Fund
DRR	Disaster risk reduction
EWS	Early warning system
IFRC	International Federation of Red Cross and Red Crescent Societies
IGA	Income generating activity
NGO	Non-governmental organization
RATS	Response across time scales
VCA	Vulnerability and capacity assessment

Glossary

Disaster – A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts that exceed the ability of the affected community or society to cope using its own resources.

Disaster risk reduction – The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, reduced vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Hazard – A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Early warning system – The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Mitigation – The lessening or limitation of the adverse impacts of hazards and related disasters.

Preparedness – The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions.

Prevention – The outright avoidance of adverse impacts of hazards and related disasters.

Public awareness – The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken, individually and collectively, to reduce exposure and vulnerability to hazards.

Resilience – The ability of a system, community or society exposed to hazards to resist, absorb, adapt to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions; the positive side of vulnerability.

Risk – The probability of an event and its negative consequences.

Vulnerability – The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

The definitions in this section are adapted from the UNISDR *publication Terminology of Disaster Risk Reduction*.

Introduction to community early warning system: guiding principles

1. Background and aims

The Community early warning systems: guiding principles is one of a set of guides prepared by the International Federation of Red Cross and Red Crescent Societies (IFRC), along with the guides for vulnerability and capacity assessment (VCA) and public awareness and public education. It also joins the *Disaster response and contingency planning guide* to provide a solid toolkit for the disaster risk reduction/management practitioner.

In contrast to disaster response mechanisms, early warning is one of many important tools that contribute to the prevention of disasters and preparedness for hazards and threats, of any kind. It greatly enhances disaster risk reduction (DRR). A well-prepared National Society or non-governmental organization (NGO) will understand and promote the role of people-centred early warning systems (EWS) in reducing risk. The policy for disaster preparedness highlights the role of the IFRC and National Red Cross and Red Crescent Societies in advocating for knowledge from "early warning systems [that are] accessed, understood and acted upon by local communities" as part of their contribution to the Hyogo Framework for Action.

Strategic aim 1 ("save lives, protect livelihoods, and strengthen recovery from disasters and crises") of the IFRC's *Strategy 2020*, highlights the importance of a reliable EWS which is instrumental in saving the maximum number of lives, as well as protecting assets and livelihoods.

This guide aims to provide an overview of successful practice from the field for the disaster risk reduction/management practitioner interested in EWS. It presents *guiding principles* that will build a strong foundation for the design or strengthening of EWS at any level. It is not an operational, but a strategic, guide that insists on asking the right questions and exploring all perspectives prior even to deciding whether or not early warning is the appropriate tool for a given

context. The companion piece to the *Guiding Principles*, a community-early warning system (CEWS) toolkit (in the form of a training of trainers field guide) will be published in 2013.

Wherever EWS is the option of choice, the guiding principles will help prepare the foundation by motivating practitioners to explore the building blocks of an EWS — some may already be underway in existing DRR programming. Overall, this guide aims to inspire readers to take simple integrated steps towards sustainable EWS that make clear contributions to community-level risk reduction and saving lives and livelihoods.

2. Audience: for whom is the guide written?

This guide has been developed to highlight principles of successful EWS efforts and to showcase good community level practice across the globe that rarely gets published. The guide has been designed with a focus on National Red Cross and Red Crescent Societies (i.e., in their auxiliary role), Red Cross Red Crescent staff and volunteers as well as NGO partners and practitioners at any level that are preparing to support governments that choose to build or strengthen EWS closely connected to at-risk communities—at the local, national, regional or global levels.

3. Methodology

The research for this guide was drawn from three parallel efforts that have each produced working products:

- An extensive literature review was carried out with more than 450 documents consulted. The full bibliography can be found at FedNet.
- All identified initiatives related to EWS projects or components of EWS projects by different actors/organizations were entered into a database. Interviews to project leaders of identified projects were carried out to understand the scope, experience and impact of each effort.
- The different techniques and approaches employed for each EWS initiative were inventoried and good practices and lessons learned were identified. Throughout the guiding principles, good practices are featured in green shaded text boxes and lessons learned in shaded red text boxes.

4. Organization

The remainder of this guide is organized into three parts (see Figure 1): understanding, guiding and practising.

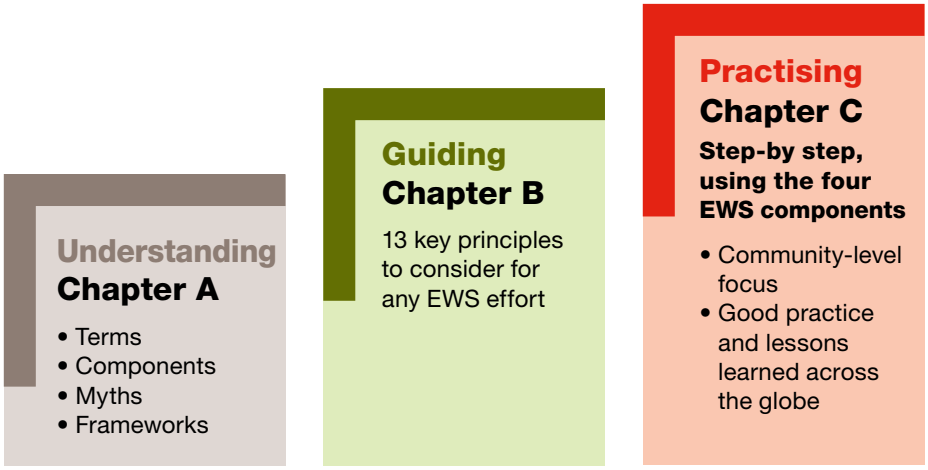
- Chapter A, *Understanding*, focuses on definitions, core components, EWS myths and political and institutional frameworks.
- Chapter B, *Guiding*, illustrates key principles that should be carefully considered when embarking on any EWS design or support effort, regardless of the hazard(s) or level(s) targeted.

- Chapter C, *Practising*, breaks down the four core components of EWS to provide more specific guidance on community-level EWS and to demonstrate good practice and lessons learned locally from across the globe.

How to use this guide:

The DRR practitioner who is new to early warning is advised to go through the guide in the order presented, in order to be familiar with the terms and foundations. The more experienced reader may wish to read the list of guiding principles (chapter B) and jump ahead to practical specifics and country examples per component found in chapter C.

Figure 1: Organization of this guide



A. Understanding early warning systems

This section of the guiding principles aims to make sure that we have a common understanding of the concept of early warning and the components of an EWS. This understanding will be the foundation upon which we later explore the guiding principles and concrete examples of community practice. We first need to understand the terminology and the building blocks, followed by the existing political, legal and institutional frameworks that are involved in EWS. It is equally important to dispel a number of myths that often cripple EWS efforts.

1. Definitions and concepts

To fully grasp the definition of a CEWS it is useful to start by defining the terms *'EWS,' 'early,' 'warning,' 'system,' 'end-to-end system'* and *'community' in that order.*

An **EWS** represents the set of capacities needed to generate and disseminate timely and meaningful warning information that enables at-risk individuals, communities and organizations to prepare and act appropriately and in sufficient time to reduce harm or loss (adapted from UNISDR 2009 and others).

Early signifies prior to the arrival of a hazard or threat — while there is still time to reduce potential harm or loss, or prevent a disaster. A **warning** is the message (using signs, words, sounds or images) that announces an imminent danger.

A **system** is an ordered and standardized compilation of elements that remain in constant fluctuation with movement in multiple directions. An **end-to-end warning system** is a complete set of components that connects those who need to hear messages to others who compile and track the hazard information of which messages are composed.

Community in this guide represents a network of social interaction that may be exposed to multiple social and/or physical impacts from one or more hazards/threats, often, but not exclusively, related by place (i.e., village, neighbourhood, watershed, etc.).

Based on the terms above, a **CEWS** is understood to be an effort by or with, but not for, a community to systematically collect, compile and/or analyse information that enables the dissemination of warning messages that when actionable can help the community (or others 'downstream') reduce harm or loss from a hazard (or threat) event (or process).

Table 1: Community involvement in EWS

Key elements	COMMUNITY	
	Based EWS	Driven EWS
Orientation	With the people	By the people
Character	Democratic	Empowering
Goals	Evocative, consultative	Based on needs, participatory
Outlook	Community as partners	Community as managers
Views	Community is organized	Community is empowered
Values	Development of peoples abilities	Trust in people's capacities
Result/impact	Initiates social reform	Restructures social fabric
Key players	Social entrepreneurs, community workers and leaders	Everyone in the community
Methodology	Coordinated with technical support	Self-managed
Active early warning components (out of the four)	At least one is active (e.g., response capability)	All are active, especially the monitoring of indicators

More commonly known by the term community-based EWS, the generic adaptation 'CEWS' permits a useful distinction between community-based and community-driven systems. An EWS can be based in a community without being owned or driven by that community. The most lasting impact, however, occurs when a community has a strong understanding of the EWS. Table 1 (adapted from international development training materials) outlines the main differences between a community-based and a community-driven EWS.

Another common distinction is between **national** and **CEWS**. The main characteristics and advantages of each are found in Table 2. An ideal EWS is an integrated one, capitalizing on the strengths of both without confused signals or competition. The ideal is a local government mandated to work with communities, with information flowing in both directions.

EWS are only as good as the actions they catalyse; action is an essential part of any warning system. If a warning is sounded, and no one takes the action that the warning was intended to trigger, then the warning system failed. Just as warning systems are called 'EWS,' we can refer to this action as 'Early Action.' 'Early Warning, Early Action,' however, is a separate term, which refers to "taking action before a disaster or health emergency occurs, making full use of available scientific information on all timescales (IFRC, 2008)." The distinction is that Early Warning, Early Action accompanies and is appropriate across timescales (spanning century, decades, years, months, weeks, days and hours) and builds on the concept of traditional EWS to produce a climate risk management strategy.

Table 2: Aiming for seamless integration of national and community EWS

Key factors	National EWS	Community EWS
Design	Deliberate, based on legal mandate by government or other agencies	Flexible design based on need and adapted by trial-and-error
Human resources	Technicians, specialists	Ad hoc volunteers to individuals appointed by local leaders
Characteristics	Formal staged warning	Ad hoc to staged warning
Documented	Legislation, policies, standard operating procedures, MoUs, diagrammatic representations of information flow, etc.	Informal and rarely documented
Technology	High-tech to telephone, VHF, HF radios	Telephone to traditional (none)
Trigger	Indicators, prediction, technology	Personal local detection of a hazard or receipt of a warning from outside the community
Warning process	Cascading or fanned (in phases) in systematic manner	Ad hoc, but may be naturally well organized and cascading/fanned
Messages	Impersonal	Personal
Timing	Not always the first to be received by community; produced to share with official systems at all levels	Rapid (when message created at community level) or when there are good linkages between all levels
Primary needs targeted	Reduce economic and other loss	Safety, reduce stress, emotional support
Evaluation criteria	Hazard details; lead-time provided; proportion of false warnings	Timeliness of receipt of warning, actionable message in warning

2. Introduction to the four core early warning system components

Building on the foundation of the definitions above, an EWS has four interlocking parts: risk knowledge, monitoring, response capability and warning communication. Each part must function efficiently for the system to be successful:

- **Risk knowledge** builds the baseline understanding about risks (hazards and vulnerabilities) and priorities at a given level.
- **Monitoring** is the logical follow-on activity to keep up-to-date on how those risks and vulnerabilities change through time.
- **Response capability** insists on each level being able to reduce risk once trends are spotted and announced — this may be through pre-season mitigation activities, evacuation or duck-and-cover reflexes, depending on the lead-time of a warning.
- **Warning communication** packages the monitoring information into actionable messages understood by those that need, and are prepared, to hear them.

These four parts are simplified and slightly adapted from those first published by UNISDR's Platform for the Promotion of Early Warning (online since the 2006 launch of the International Early Warning Program). From a purely practical point of view, it is useful to keep primary data collection and scientific analysis (monitoring and prediction/forecasting) separate from the warning communication component. Monitoring (instead of monitoring and warning[1]) is a continuous action that tracks indicators and thresholds to produce, with scientific rigor and local value, important information about pending conditions; *warning communication* takes that information, repackages it into an understandable message and sends it on a journey to reach the at-risk community. Because agents with very different skills and tools are required to manage these two tasks, it makes sense to make a clear break between the monitoring of information and the communication of a warning message. For the same reason, it is important to identify individuals who have pluri-disciplinary skills that help bridge the gap between the two components.

Another change from the original UNISDR schema is based on the premise that building response capability must precede warning reception at the community-level. Give that it is unfair to provide warnings to communities that are not equipped to act on them, it is best practice to prioritize *response capability* long before *warning communication* begins.

Each of the four components is explored in great detail throughout the rest of this guide.

3. Dispelling early warning myths

Cultural myths are grounded in people's core belief systems and perceptions across the globe — not only those of communities but also of disaster risk reduction/management professionals. These beliefs either provide a false sense of hope or cripple action in the face of danger. This section briefly explores a set of myths that, if not dispelled, will constrain the effectiveness of warning systems. National Societies and NGOs have the responsibility to work with national and local planners to counter or abandon these myths throughout the system.

The most common early warning myths fall into two separate categories: i.) information (timing, source or content of a warning message) and ii.) response to those warnings. They are described in Table 3. For each myth, text is provided to explain why it is false or unfounded. Finally, the last column provides guidance on EWS actions that will make sure it stays a myth.

1 *The original four components proposed by **UNISDR** are: risk knowledge, monitoring and warning, dissemination/ communication and response capability.*

Table 3: Abandoning early warning myths

Myth	Why the myth is unfounded	Early warning action to counter the myth
Information: timing, source and content of warning messages		
Myth: Public knowledge may make things worse	Officials are sometimes reluctant to communicate information to the public until the situation becomes clearer. Experience and research show that when there is a credible threat, it is better to get information to people who can do something about it. The economic, political, legal and moral costs and liabilities of not providing information when it could have been released are often very high. The challenge is to make sure that people are prepared to act on the information they receive.	Early warning action: Opening up an ongoing information flow as an incident unfolds — literally telling the story of the emergency as new facts disclose themselves — allows initial directives to be modified as circumstances change. No one would expect directives for protective action to remain static when the emergency itself does not remain static. The public will listen to the emergency story unfold and will modify their actions as facts become clear and situations change.
Myth: Information should be as succinct as possible	If information is accurate, it is unlikely to give the public too much information that applies directly to their safety. Fear of the known is better than fear of the unknown. A balanced dose of accurate information can cut down on speculation. Warning messages are not submitted to the 30-second rule for commercials; they must be concise but complete.	Early warning action: Provide information as it becomes available. Especially for uncertain events, warning is a dialogue that helps people deal constructively with uncertainty. In a free and information-rich society, people are used to processing information. They often assume someone is trying to hide information if it is not available.
Myth: Single source is best	Officials think that a single spokesperson (with technical authority) is a good practice to disseminate emergency information. Regardless of this logic, individuals and communities at risk will seek out information from a variety of sources. Multiple sources help people triangulate and confirm warnings leading to stronger belief in their credibility.	Early warning action: Even a singular or main early warning authority requires redundant sources to transmit key messages. Different spokespersons could deliver the same or similar messages.
Myth: Information is enough	People of this generation absorb so much information every day that it may be hard to know which to act on. But information, alone, will not lead to action.	Early warning action: Develop all four components of an EWS. Response capability — early action — must precede or at least accompany information.
Response to warning messages		
Myth: Cry wolf (after false alarms, the public will ignore warnings)	Research underlines that the effectiveness of public response to well-targeted warnings is not diminished when they are infrequent and carefully explained.	Early warning action: View false alarms as windows of opportunity: teach communities that false warnings arise from inherent uncertainty (see guiding principle below) rather than from poor professional practice.
Myth: Public panic	Public panic does occur but is rare. People generally engage in rational adaptive action even when they are very frightened. Research shows that panic only occurs when there is closed physical space, inadequate escape routes and an immediate and clear threat.	Early warning action: Insist on evacuation routes that are clearly marked to reach appropriately placed shelters. Practice drills and simulations regularly. Timely and effective public warnings can do much to diminish the risk of panic in an emergency situation. Effective leadership will also minimize panic.
Myth: Immediate action and obedience	People do not respond to first warnings — at least not immediately. The natural inclination is to crosscheck or triangulate information with neighbours, friends, colleagues and available media. Research shows people will not blindly follow instructions in a warning message, unless the basis for the instruction is given in the message. They will triangulate until that basis makes sense to them.	Early warning action: Calculate this delay into communication strategies. Insist on repeated messages —'redundancy,' as the more it is heard, the more likely a credible message will be believed and acted upon.

4. Political and legal international frameworks for early warning

Early warning is a global political and legal imperative. It is an obligation inscribed in the 1992 Rio Declaration on Environment and Development, the 1994 Yokohama Strategy and the 2005 Hyogo Framework for Action (HFA). It is also implicit in the human rights obligations of most countries under both international and national law, including the rights to life, equality and health, among others. More specifically for the Red Cross Red Crescent, early warning is also highlighted by several key strategic documents.

The original Rio Declaration Principles 18 and 19 refer to states' "duty to inform" including: the immediate notification of any "disasters or other emergencies that are likely to produce sudden harmful effects on the environment" and "prior and timely notification and relevant information to potentially affected states on activities that may have a significant adverse transboundary environmental effect."[2] Most environmental hazards fall into this category, requiring early warning between states. More importantly, the Rio Declaration Principle 10 calls for participation of all concerned citizens in environmental issues and demands that individuals gain "appropriate access to information concerning the environment that is held by public authorities."

The Yokohama Strategy of 1994 insisted on improved early warning, cost-effective technology and even called for an International Decade for Natural Disaster Reduction-managed Trust Fund to finance "the establishment and strengthening of the early warning systems of disaster prone developing countries—particularly of the least developed, land-locked and small island developing states."

The HFA in 2005 added the human dimension to the political imperative for early warning — heightening the responsibility, not between states, but between national governments and at-risk communities. It generally calls for EWS "that are people centred… whose warnings are timely and understandable to those at risk, which take into account the demographic, gender, cultural and livelihood characteristics of the target audiences, including guidance on how to act upon warnings, and that support effective operations by disaster managers and other decision makers." The main focus here is on the *warning communication* component of EWS. The real meaning of "people centred" within the HFA, however, goes beyond the concept of the community as a receiver to include situations where the community may also need to be a producer of early warning information.

Although an effective EWS contributes actively to all five HFA priorities for action, early warning is specifically referred to in Priority 2: "Identify, assess and monitor disaster risks and enhance early warning." This priority focuses above all on the *risk knowledge* and *monitoring* components of EWS and it does not refer to the Response Capability component. HFA Priority 5: "Strengthen disaster preparedness for effective response at all levels" is equally important to effective early warning. Here, embodied in the EWS component *response capability*, is where the IFRC term *early warning > early action* comes alive at the community level.

It is a national government's responsibility to create, maintain and update EWS at all appropriate levels. Priority Area 2 (part iii) calls for building "institutional capacities to ensure that early warning systems are well integrated into governmental policy and decision-making processes and emergency management

2 *Likewise, the Guidelines on the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance, adopted by the state parties to the Geneva Conventions in 2007, calls on states to "have procedures in place to facilitation the expeditious sharing of information about disasters, including emerging hazards that are likely to cause disasters, with other States and assisting humanitarian organizations as appropriate, including the United Nations Emergency Relief Coordinator."*

systems at both the national and the local levels, and are subject to regular system testing and performance assessments." While many countries have established in law the authority for issuing warnings, only in a few cases are the functions, roles and responsibilities of each actor in the monitoring and warning dissemination process comprehensively spelled out in legislation or government policy. Particular gap areas that National Societies may wish to look for from the point of view of advocacy have been identified in the IFRC's "Humanitarian diplomacy guidance series part 2: legislative issues in disaster management and health emergencies")[3].

Given that early warning is the imperative of national governments, National Societies, in their auxiliary role to support public authorities in risk reduction, turn to early warning as one tool to protect life, health and livelihoods. This focus is further supported by the IFRC's *Strategy 2020*, that states under strategic aim 1: "Reliable early warning systems are instrumental in saving the maximum number of lives, and protecting assets and livelihoods. Enabling action 2 of the same document (entitled "Pursue humanitarian diplomacy to prevent and reduce vulnerability in a globalized world," urges "action to address the underlying causes of suffering, and to prevent or reduce future vulnerabilities, conflicts and crises by providing early warning on emerging issues." Furthermore, the Final Goal 3.1 of the IFRC 28th International Conference (June 2003) highlighted that "…measures to minimize the impact of disasters include…the implementation of early warning systems." The Red Cross Red Crescent network is uniquely situated to contribute to community early warning through their auxiliary role, the volunteer network and their access to high-risk communities. National Societies, as auxiliaries to their public authorities in the humanitarian field, enjoy a specific partnership at all levels, to assist public authorities protect life and health. For some National Societies, early warning can play an important part of this support role. All NGOs focusing on disaster risk reduction/management may also consider early warning as one of many important elements of their work.

Good practice:
Ethiopia's draft National Disaster Risk Management policy specifically recognizes community-level EWS.

5. Institutional frameworks for early warning

Actors in early warning are numerous and a full inventory of them goes beyond the purposes of this guide. In this section, we will briefly explore key actors with mandates for EWS and the components of EWS to which they commonly contribute. The section ends with a focus on the varying roles for civil society entities at each level of EWS.

Although often referred to as the "last mile" in an end-to-end EWS, the **community** is better imagined as the "**first mile**," where warning information must at the very least reach and be acted upon. Well-informed communities are familiar with priority risks. Communities are the first responders in protecting their households and disadvantaged individuals. Many communities are motivated and able independently to drive EWS from the local level without waiting for information or warning from the outside. Other communities are prepared

3 *Available at https://fednet.ifrc.org/en/resources-and-services/idrl/legislative-advocacy-manual/.*

to receive monitoring or warning information and subsequently organize and implement a set of appropriate responses. National Societies and other volunteers are one entry point into the at-risk community.

Civil society, is made up of many entities and groups including the International Red Cross and Red Crescent Movement,[4] international and national NGOs, and community-based organizations. These are institutions whose mandates include supporting governments to protect residents of their country. In EWS, civil society organizations are an important bridge between technical scientific agencies or national governments, and the community, including the all-important volunteer base on which the community depends. They have the distinct advantage of knowing particular communities well and also of having the capacity to interpret early warning information compiled outside the community. Across the globe, civil society actors are managing project efforts in EWS, many fitting neatly inside larger DRR programmes.

National and local **governments**, as described above, have an obligation to protect all residents from risk to life and health. National EWS are multi-hazard tools that governments can use to meet these obligations. National EWS take many shapes and sizes; they may be autonomous, specific units or individual officers housed in different line ministries or agencies. National, provincial and local laws should ensure that government institutions have clear mandates for EWS at all levels, that they have sufficient resources to carry out their obligations, and that they are required to incorporate the voices of communities and civil society in their planning and implementation processes at all levels. Governmental institutions must be held accountable for ensuring that EWS reach the entire at-risk population, and are acted upon in a timely fashion. Entities most often engaged in early warning are the national disaster risk reduction/management agencies/units as well as the meteorological, hydrological and health services. National EWS and/or these services most often have representatives at sub-national level, especially in areas exposed to the greatest risk.

There is a vast and ever changing number of **global or regional specialized scientific agencies**[5] with a mandate to monitor environmental, health and social conditions and/or provide timely forecasts and warnings. Many of these technical agencies are directly linked to research institutions, international and regional bodies and United Nations entities. Many have services tailored to the requirements of humanitarian appeals. Although they may adopt various audiences for ad hoc efforts (including valuable technical assistance and equipment to National Societies, NGOs or even communities), some of them are perceived as serving the needs of decision-makers of their donor countries, or of those in which they work. Regardless, most provide useful and accessible internet-based top-down technical information that should be integrated with national and local EWS efforts. Only a handful of these efforts are tallied in Table 4, by main hazard monitored.

4 *Although the National Red Cross and Red Crescent Societies are auxiliaries to their respective governments and the IFRC is an international organization, the Movement is included here since civil society is at the heart of their mandate.*

5 *For a more complete inventory of global, regional and national EWS, the reader is referred to UNEP's EWS: State of the Art Analysis and Future Directions by V. Grasso. http://na.unep.net/siouxfalls/publications/Early_Warning.pdf*

Table 4: Examples of agencies that engage in global or regional early warning monitoring

Hazard	Global entities active in EWS monitoring
Severe weather/ storms	• **World Meteorological Organization** WMO provides their respective countries (189 member countries / territories) with hydro-meteorological hazard observing, monitoring, forecasting and warning capabilities, including regional specialized centres. http://severe.worldweather.org/; www.wmo.int • **University of Hawaii** www.solar.ifa.hawaii.edu/Tropical/tropical.html • **IFRC in partnership with International Research Institute for Climate and Society** http://iridl.ldeo.columbia.edu/maproom/.IFRC/.Forecasts/
Flooding and landslides	• **Dartmouth** www.dartmouth.edu/~floods • **Ifnet** www.internationalfloodnetwork.org/03_f_info.html • **International Consortium of Landslides** http://icl.dpri.kyoto- u.ac.jp/Landslides%20Alert.html
Drought	• **Humanitarian Early Warning Service** www.hewsweb.org/drought/ • **Global Information and Early Warning System** www.fao.org/giews/english/i ndex.htm • **Benfield Hazard Research Center** http://drought.mssl.ucl.ac.uk/droug ht.html • **Famine Early Warning System** www.fews.net/
Wildland Fire	• **Experimental Climate Prediction Center** • **Global Fire Monitoring Center** www.fire.uni-freiburg.de • **Webfire Mapper (U. Maryland)** http://maps.geog.umd.edu/default.asp
Earthquakes, volcanoes, tsunamis	• **US Geological Survey and Global Volcanism Program** http://earthquake.usgs.gov/eqcenter/recenteqsww/catalo gs/caprss1days2.5.xml www.volcano.si.edu/reports/usgs/ • **Geofon** www.gfz- potsdam.de/geofon/new/rt.html • **UNESCO/Intergovernmental Oceanic Commission** http://ioc3.unesco.org/indotsunami/ • **Pacific Tsunami WS** www.prh.noaa.gov/ptwc/
Epidemics/health	• **World Health Organization** www.who.int/csr/outb reaknetwork/en/
Conflict	• African Union's Continental EWS for conflict

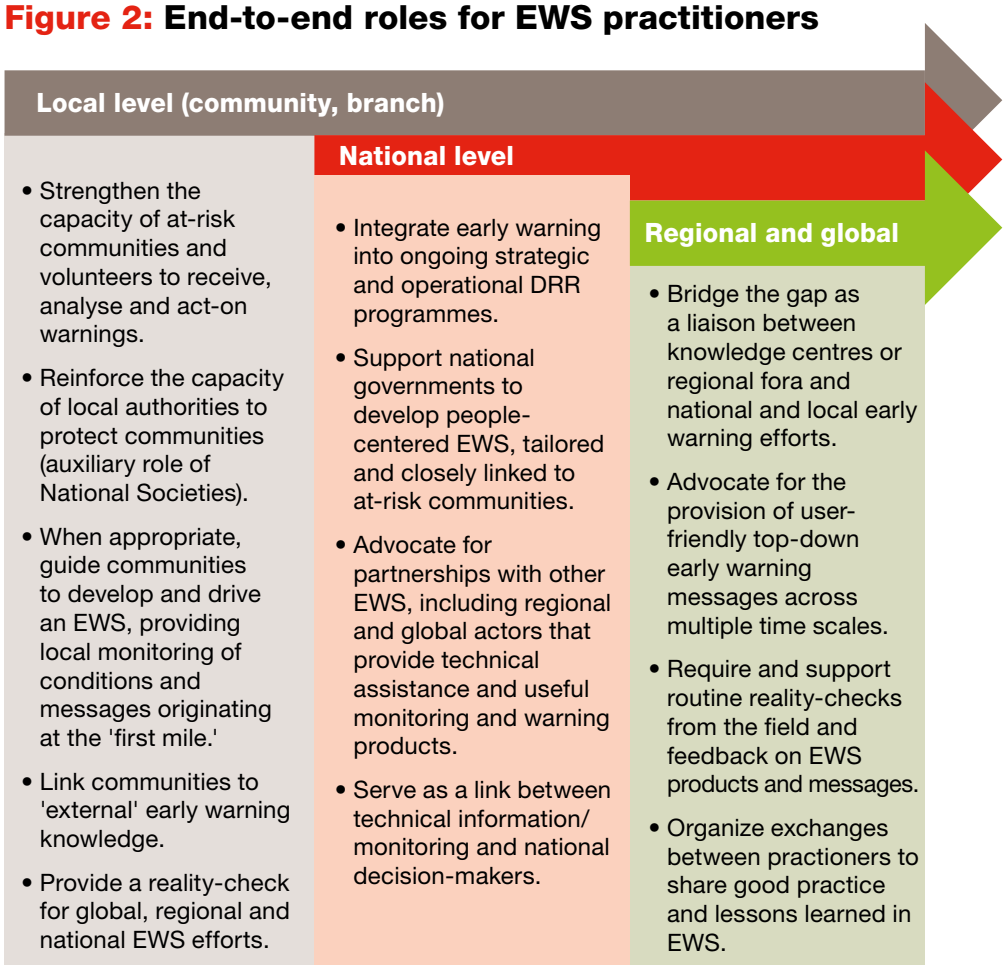
Regional technical centres are also increasing in number. The Regional Integrated Multi-hazard EWS for Asia and Africa is an interesting example of multi-hazard early warning effort across two continents sharing the Indian Ocean. The African Center of Meteorological Applications for Development produces climate and seasonal products that are provided under contract to the IFRC.

Within the **United Nations** system, many entities actively contribute to early warning; some appear in Table 4. Most monitor hazards according to their specific technical mandate. The WMO focuses on atmospheric hazards (with a new initiative guided by the Global Framework for Climate Services), the WHO tracks health hazards while the FAO accompanied by the WFP monitor hazards linked to hunger, famine and more generally food and livelihood insecurity. UNESCO also contributes to a number of early warning efforts in the field of water resources and oceanography. Other entities contributing to EWS include UNISDR, UNDP/BCPR and UNHCR.

Donors and developed countries that have demonstrated significant investment in early warning to date include the European Commission's Humanitarian Aid and Civil Protection Directorate General (ECHO) and its disaster preparedness programme (DIPECHO), Sweden (MSB), Germany (GIZ), Norway, Japan (JICA), UK and United States (USAID).

At an institutional level, synergy is required to achieve effective EWS between the different levels where action occurs. In Figure 2, the main institutional mandates concerning EWS are described for each level (local, national and regional/global). It is important to remember that the only interests to be served by an EWS are those of at-risk communities and individuals, whoever they may be. Although the roles may differ, all levels must share this ultimate goal.

Figure 2: End-to-end roles for EWS practitioners



B. Cross-cutting themes: guiding principles

This chapter aims to provide the reader with general guiding principles that should help when considering the appropriateness and feasibility of an EWS effort in a region or country at different levels (national to communities). They are compiled from an extensive study of EWS efforts across the globe. In this and the next chapter, good practices and lessons learned are provided as examples from many contexts and countries.

As discussed above, National Societies can often make an important contribution to saving lives through EWS programming. However, before developing or strengthening their role in this area, National Societies should make sure that they understand and are comfortable with the risks. A key question is whether they have the capacity to consistently meet the expectations they will raise. Those expectations may be moral, political and legal.

Guiding principle 1: Integrate within DRR — EWS is not a stand-alone

EWS are not successful or sustainable as independent stand-alone efforts. When an EWS is considered appropriate, it should be designed and set up within a larger DRR and management effort. Setting up an EWS at any level without clear links to other disaster risk reduction/management efforts and entities will inevitably result in inefficient or unsustainable products and less effective impact (loss of life and livelihoods).

Developing and maintaining CEWS, even if inexpensive relative to high-tech systems, requires considerable investment of time and resources, and should not be undertaken without careful consideration of alternatives, when appropriate, and sustainability. At any level, an EWS will benefit from being situated inside a more holistic DRR programme. In nearly every context, there is something useful and affordable that can be done to enhance existing EWS or start to build towards them. More often than not, an organization focussing on DRR is already conducting many activities that form the building blocks of an EWS (some of these activities are described in chapter C). The goal, then, is to create a DRR package that responds to needs identified by governments and/or communities that can be sustained by engaging relevant actors throughout a nationwide system.

Good practice:

The different levels are integrated and interconnected in Nicaragua's official EWS, with the support of national and municipal institutions, Nicaraguan Red Cross, Partner National Societies (Spanish Italian, and The Netherlands Red Cross), NGOs, private sector actors and community members. This is set out in Nicaragua's Law 337 of 2000, entitled Law Establishing the National System for Prevention, Mitigation and Response to Disasters[6], and its implementing decree. The INETER (Instituto Nicaragüense de Estudios Territoriales/ Nicaragua's Institute for Territorial Studies) is in charge of monitoring floods (Escondido River and Wawa River), tsunamis (in San Rafael del Sur-Managua and Corinto-Chinandega) and volcanic eruptions (in Leon, Chinandega and Isla de Ometepe). These EWS are multi-level and they are also a part of the Central America regional monitoring network. The government is in charge of issuing the alerts, which can be of any of three levels and communities are actively involved in building their own response capability (evacuation plans, creating maps and signalling routes), warning communication (information reception, coding and activation of the alarm at the community level). These efforts involve 80 volunteers from the Nicaraguan Red Cross working at the community level. The institutions that participate in funding are COMUPRED (Municipal Committee for Disaster Prevention, Mitigation) and attention with key role at local level, COSUDE, ECHO, IDB and JICA among others.

Guiding Principle 2:
Aim for synergy across levels: community, national and regional/ global

Just as EWS should not be extracted and isolated from a more integrated DRR programme, EWS at any level will thrive when other levels are also active and functioning. It is the synergy between these levels that will provide the greatest protection for lives and livelihoods. Table 5 describes the varying support roles for Red Cross Red Crescent and NGOs in an EWS starting with the community. Examples of what could be expected for a fully functioning EWS at each level are provided — first as a stand-alone (column 1) and then as a fully integrated EWS effort (column 2).

6 *In Spanish: Ley Número 337 de 2000, Ley Creadora del Sistema Nacional para la Prevención, Mitigación, y Atención de Desastres.*

Table 5: Isolated versus integrated EWS effort, isolated examples by level

Level of EWS	Isolated EWS effort	Effort integrated with other levels
Community	Households self-monitor river levels and conduct life-saving evacuation to a certain level, but district and national authorities are unaware and unresponsive to assist in relief and recovery.	Households hear about an imminent storm days before it arrives, triangulate this information with locally monitored rain and river gauges, and are able to save livelihoods as well as lives. Plans exist and have been practiced to take action once warnings are received.
National	National entities start to build EWS capacity but have extremely few weather monitoring stations.	National Met Service agents are supported by National Societies and NGOs, to visit at-risk areas with no meteorological station, to explore simple ways for communities to monitor conditions. After analysing the data themselves, it is sent to be included in the national level archive and warning system.
Regional	Flooding is carefully monitored at a regional EWS but the regional entities do not take into consideration higher level forecasts reflecting changing conditions that may influence local contexts and do not transmit timely warnings systematically to each country 'downstream.'	A region benefits from climate forecasting, improves regional tools for Glacier Lake Outburst Floods and sets up a systematic web-based warning system that alerts all concerned countries simultaneously of imminent events.
International or global	High technologies provide impressive seasonal forecasts with growing accuracy about likely drought. The countries at-risk may not receive this information until after the households, livestock and crops of high-risk communities have been negatively impacted.	Seasonal climate forecasts are packaged for national consumption in user-friendly products, accompanied by national training sessions. Funds (such as the Disaster Relief Emergency Fund (DREF)) are allocated and pre-positioning of appropriate supplies is organized in sites closest to the country's at-risk areas when a disaster is imminent.

It is a government's responsibility[7] to protect people through, as an example of many possible efforts, the creation, maintenance and updating of EWS. Even if valuable EWS are established at the local level, each government has a responsibility to coordinate nationally to ensure coverage of EWS where necessary to protect lives and livelihoods. This should be mandated to governmental institutions through legislation and clear policy, accompanied by resource allocation. As mentioned above, the National Societies have a special auxiliary role that can support governments in meeting this responsibility. Partner NGOs working towards sustainable DRR programming should also aim to strengthen capacity for national level efforts such as EWS.

At the national level, it can be useful for National Societies and NGOS to strengthen national EWS networks to receive, analyse, interpret and forecast based on global or regional monitoring products, such as those from the Regional Climate Outlook Forums.

7 *For earthquake, there are increasing opportunities in which the sole financial responsibility for EWS is not forced upon the government, but entire warning networks may be supported at the local level.*

Good practice:

In West Africa, in 2007, the first pre-emptive appeal for funding linked to a seasonal forecast was issued (funds were later obtained through the DREF). The IFRC approved US$ 750,000 in advance of observed floods and rains and the funds enabled pre-positioning of supplies, volunteer training and enactment of contingency plans. It followed unanimous prediction of increased chances of a very wet season across the region and set a new precedent for donors and the disaster risk reduction/management community. As a result, lives were saved; response time reduced and resources were used more efficiently.

Good practice:

In Sierra Leone and Liberia (West Africa Disaster Management Capacity Building Project, 2008-12), despite not having a national EWS or meteorological service equipped to issue warnings, the systematic inclusion of authorities representing the National Disaster Risk Management Authority in extended CEWS trainings across the two countries has enabled an in-depth understanding of people-centred issues in early warning and the need to align the efforts to an eventual national EWS.

Lesson learned:

Despite substantial progress being made on seasonal forecasts, they remain uncertain and probabilistic. Low probability events can and will occur. The Mongolian Red Cross Society worked closely with the International Research Institute for Climate and Society during the period December 2009-February 2010, but monitoring information (e.g., a one out of five chance of a colder than normal winter) did not lend itself to an appeal for Early Action. The following May, the government declared a state of emergency during which 8.4 million livestock died. In retrospect, this low probability forecast might still have triggered action given the heightened vulnerability to cold winter impacts that Mongolia faced after a summer drought left farmers and their livestock with diminished pastureland and hay.

Guiding principle 3:
Insist on multi-hazard EWS

An EWS, a system of systems, should centralize information, responses and warnings, about all hazards that are pertinent to a given level/entity with careful attention to resilience and vulnerability. This does not mean that the central EWS agents themselves engage in all components for all hazards, but that they compile, understand and fertilize ideas across sub-systems in a manner that encourages synergy and limits wasteful replication.

The advantages of 'multi-hazard EWS' are many. The most important is that multi-hazard EWS, by definition, are developed on the basis of a systematic analysis and prioritization of a set of threats and hazards to which a country or community is exposed. This means time has been to systematically consider many and identify those that are most damaging and most manageable by an EWS effort. This integrated and holistic analysis puts the EWS on a more sturdy foundation. A multi-hazard EWS will also benefit from:

- More stable levels of EWS activity throughout the year: during the off-season when one hazard is dormant another hazard may require monitoring. When two hazards are off-season (e.g., flood in the dry season), vulnerability (or resilience) may still be monitored.
- Greater efficiency of limited human and financial resources: centralizing EWS at any level minimizes system maintenance and number of required staff/volunteers. As an example, tracking indicators for a single hazard may not require one person full-time.

- More clarity: a one-stop-shop that has been given authority will result in less confusion for users on where to seek early warning information.

Hazards behave differently and may affect very different time scales and geographical areas, but other elements of most EWS are, in fact, very similar:

- need for and process (not instruments) of monitoring
- need for staged warning (e.g., green, yellow, red levels) and process of setting thresholds that trigger action
- channels of communication to be used to issue warnings.

Below are a few examples of multi-hazard efforts at different levels:

Good practice:

In four countries of the Asia-Pacific zone (Indonesia, Philippines, Sri Lanka and Viet Nam) the American Red Cross and Asia Disaster Preparedness Center (ADPC) organized a project entitled "Facilitating the integration of tsunami warning by strengthening multi-hazard warning systems." The project aimed to establish and/or strengthen early warning national forums, build the capacity of National Societies to translate hazard information into response options and to communicate these options to at-risk communities. It will also facilitate a system audit in order to test the functionality and reliability of EWS in collaboration with national focal points for early warning and disaster management, and relevant NGOs.

Good practice:

The 2004 tsunami provided a catalyst to create an organization known as the Regional Integrated Multi-Hazard Early Warning System. This appears to be a top-down high-tech collective effort focusing on the national level EWS of 26 Indian Ocean countries.

Good practice:

In Indonesia, the city of Semarang (supported by UNISDR/DKLV case studies) addresses multiple hazards such as creeping sea level rise, rapid on-set tidal waves, land-subsidence problems and urban dynamics. This demonstrates shows the need to monitor a dynamic long-term urban vulnerability and risk profile and to develop early warning for creeping hazards in addition to sudden-onset hazard events.

Lesson learned:

France, learning from the 2003 deadly heatwave, now combines the Vigilance Plan, Météo France and French security department to monitor eight natural hazards using a colour-coded warning system, with a direct link to the media, local authorities, public bodies and electricity operators, etc.

Guiding principle 4: Systematically include vulnerability

Risk is a function of two elements: hazards and vulnerability. For this simple reason, if our aim is to reduce risk, we cannot think about EWS for hazards in isolation of EWS for vulnerability. Both hazards and vulnerability must be given importance in EWS. Historically, EWS focus their attention on monitoring and warning about hazards and threats. The neglect of vulnerability in EWS is one of the most important weaknesses identified across the globe. Resilience is hereby recognized as the positive side of vulnerability, and can therefore systematically replace each use of that term without changing the meaning.

Just as the Red Cross and Red Crescent and NGOs can support governments to understand, monitor, prepare responses and warn about hazards, they can do the same for vulnerability. In precisely the same way indicators are chosen to monitor hazards, indicators can be identified that track evolving vulnerability levels, such as measures of income or poverty levels that reflect precarious livelihoods or various resources available to help the community bounce back from a shock.

Both hazards and vulnerability change through time and affect areas and households in different ways. Hazards come and go — not all have start or end dates that are easy to measure (such as drought). Similarly, vulnerability also evolves throughout the year. As only one example, many entire communities in Africa experience 'hunger seasons' when access to food is affected by both production shortfall and purchasing power. Even among those affected by an annual hunger season, however, some households may have resources from diversified income (like livestock) that make them more resilient and able to bounce back from an imminent hazard event.

Good practice:
Save the Children UK's efforts in the Horn of Africa highlight that CEWS among pastoral communities provide rich site-specific information that offers systematic insight into livelihoods as well as hazards and disasters. Results have proven that the monitoring of vulnerability alongside physical hazards enhances understanding of at-risk communities.

Good practice:
Since the 2003 heatwave, civil society, including the Red Cross collaborate with the French department of security under a new summer heatwave plan, which monitors vulnerability and conducts daily visits to those inventoried during heat peaks. Visitors bring food/beverage and help people to shower, eat, etc.

Good practice:
In Uganda, Agency for technical cooperation and development guides the Rapid SMS Community Vulnerability Surveillance Project, an SMS-based EWS which tracks and maps the most critical trends in Amuru and Pader districts. The system gathers real-time evidence on any changing vulnerability patterns in the day-to-day life of communities, while identifying and alerting appropriate authorities in areas of urgent need. Monitored indicators range from high level of rains, evidences of pandemics, minor disease among vulnerable population (children, etc.).

Good practice:
Drought policy in northeast Brazil (Ceara State) was able to alleviate immediate water shortage but was ineffective to decrease long-term vulnerability. The Ceará community's efforts to mitigate the effects of drought, including insurance schemes for farmers, construction of water reservoirs to dam water during the rains and drought EWS is having better results.

Hazards *and* vulnerability should be assessed together to track risk. The households that are most exposed to a hazard and experiencing the highest levels of vulnerability are inevitably those that most need to hear an early warning. Just as it is important to provide a timely warning for a wealthy (less vulnerable) community targeted by an imminent cyclone, it is also important to monitor the conditions of chronically poor communities whose resource-dependent livelihoods are precarious even without a specific hazard in sight. The systematic inclusion of vulnerability may make the EWS sensitive enough to issue warnings based on vulnerability alone, even without a measurable or imminent hazard.

Since the year 2000, the impact of excluding vulnerability resulted in major EWS failure and became the subject of many high-level discussions and scholarly debate in at least three separate instances. The experiences, described below, pave the way for learning that should widen the focus of EWS across the globe to include vulnerability, not as background contextual noise for the hazards, but as a feature of the EWS equal to hazards.

Lesson learned:

In the summer of 2003, an unprecedented heatwave affected Western Europe. Although alerts were continuously sent through a large number of communication channels, the lack of careful consideration of vulnerability indicators (age, isolation, etc.), resulted in 15,000 dead in less than two weeks. The majority of those were older persons, isolated and receiving no warning.

Lesson learned:

The Niger food crisis in 2004 and 2005 was a severe but localized food security crisis in the regions of northern Maradi, Tahoua, Tillabéri and Zinder in southeastern Niger. It was caused by an early end to the 2004 rains; desert locust damage to some pasturelands, high food prices and chronic poverty. The delayed response to official EWS in Niger reminds us that food crises are highly correlated to underlying poverty and the state of essential public services – with natural hazards as the tipping factor. As Eilerts (2006) wrote: "The most immediate challenge lies in accepting that we can no longer limit our monitoring and analysis to the strict con- fines of 'food security' and food-related crises. Livelihood emergencies of many different types, in many different places, will produce many of the next food security or famine crises. Indeed, identifying what not to monitor will be among our most difficult tasks."

Lesson learned:

Mongolia experienced a series of intense droughts between 1999 and 2002 and again in 2004-2005. When 2009 proved to be a dry summer, the country was concerned that a severe winter would again reduce livestock populations. The regional Red Cross office consulted regional forecasts and despite only 20 per cent chance of colder than average temperatures, the winter of 2009–10 resulted in a sharp and sudden drop of temperature combined with continuous heavy snowfall, recognized locally as *dzud*. The result was a loss of hundreds of thousands of livestock, leaving numerous herders without any source of livelihood, and by May 2010, two-thirds of the province was declared to be in a state of emergency. Although the Red Cross was carefully tracking the hazard conditions, it had no systematic method to track vulnerability as part of the EWS toolkit. Had a few indicators reflecting steadily increasing levels of vulnerability been tracked and compared to the hazard as an important element of the EWS, pre-emptive action, such as evoking the DREF, may have been permitted to lives to be saved.

Guiding principle 5: Design EWS components with multiple functions

Given that disasters are not always the primary preoccupation of at-risk communities, EWS sustainability depends on proposing system components that serve multiple purposes within a community. Across the globe, disaster risk reduction/management agents are regularly surprised with the priorities highlighted by the at-risk communities they support. Rather than a recent deadly tsunami or periodical floods that take five or so lives each year, poor communities in developing countries give greater importance to daily survival, food security and meeting primary and socio-cultural needs (such as school costs, medical costs, water, baptisms or funerals) each month. It is therefore important for EWS efforts to understand and address local communities priorities and needs.

There are two main techniques that can be used to address EWS concerns and daily needs simultaneously: **income generating activities (IGAs)** and **multi-purpose equipment**; both are described below:

- The development of **IGAs** can be directly linked to the EWS. It has been found that when an activity is organized to raise money in a sustainable manner by at-risk community members or volunteers, they are able and willing to reserve a portion of that money to finance the EWS effort while benefitting from the majority of the income to meet local daily needs in ways they themselves have proposed.
- Any part of the EWS that is added to the process at each (but especially the community) level must serve more than one purpose simultaneously. This could include communication equipment that serves purposes beyond early warning to call for meetings, or evacuation shelters that also serve as schools or places of worship. **Multi-functionality** does not always have to imply regular use by the communities served; linking warning functions to systems that serve scientific or any other on-going use can have the same effect.

Good practice:

Cooperazione Internazionale/Malawi partners with the Red Cross to organize CEWS for flooding that started with developing IGAs. Beyond making funds available for core daily needs, IGA funds also pay for the river "gauge readers" (EWS monitors) telephone costs as well as annual exchange visits with downstream communities.

Good practice:

In Central America, the use of radio systems was initially developed to provide flood warnings. Nowadays it has expanded to serve basic communication functions. The radios are in daily use and central to the life of the communities they serve. As a result, they are well maintained and available when warning is needed. Even if the warning is for a very rare event, the equipment will be maintained because it has become a living part of the communities.

Good practice:

In Mozambique and Madagascar, ECHO (DIPECHO) funded EWS were closely linked to the development of multi-purpose cyclone shelters. In off-season, the shelters served as churches or schools whose administrative bodies made sure that they were well-maintained and functional for use during the cyclone season.

Lesson learned:

In the HazInfo (Sri Lanka) project, it was found that equipment (mobile phones) given to provide warning to communities was abandoned for general purposes once project funding and training ended. This was because the multiple purposes of the equipment were not carefully thought out prior to the effort; the needs of the community merited more intensive exploration than time allowed.

Guiding principle 6:
Accommodate multiple timescales

In order to take advantage of longer-lead times to prepare and to manage changing climate risks associated with climate variability and change, it can be useful to incorporate multiple-timescales of early warning information into EWS. To be relevant, when using multiple timescales of forecast information, it is important to understand that the set of actions that make sense locally hours before an extreme event begins may be very different from the set of actions

that make sense long before, for instance when a seasonal forecast indicates enhanced flood risk for a coming rainy season. This is because the further in advance a forecast is made, the less certainty and detail it provides. Therefore, different types of actions will be appropriate for different timescales of forecast information.

The Red Cross Red Crescent has developed a tool (here named Response Across Time Scales—RATS) that helps DRR (or more specifically EWS) agents at national or community level to explore feasible responses in the face of a given hazard scenario with various lead times (minutes, days, months, seasons, years). The RATS exercise is further detailed in chapter C.

As a disaster risk manager, you need to plan for the worst. A simplified guide in Table 6 demonstrates the worst-case scenarios; warning lead-times may or may not get earlier than those. The hazards appearing on the left side of the table typically have warnings with shorter lead-times than those on the right side. For earthquakes, as an example, current technology is improving to provide reliable warnings at the first occurrence of p-wave signals, thereby providing 'real time early warning' or 'now-casts' with seconds to respond; the further a household lives from a fault zone, the more time it will have to respond. Flood forecasting is improving and lead times of more than seven days are gaining in credibility and popularity. Although drought may be warned only weeks before the onset (medium-term column), seasonal forecasts on drought now provide much larger windows of opportunity to enact preparedness measures. For all hazards or threats, preparedness measures remain essential any time of the event.

Table 6: Generalized 'worst-case' scenarios for early warning lead times

Real-time 'now-casting'	Short-term forecasting	Medium-term forecasting	Long-term forecasting
Seconds-minutes	**Hours-days**	**Weeks-months-seasons**	**Years or more**
Earthquakes Industrial threat Dust devils Tornados Flash floods	Severe storms Wildfire Tropical cyclones Landslides Floods Tsunamis Volcanoes Heatwaves Epidemics	Drought ENSO Extreme temperatures Conflict	Sea level rise Deforestation Desertification Dry spells Extreme rainfall Soil degradation Environmental pollution

Good practice:

Research in 2000-2004 conducted by ADPC with USAID/OFDA support enhanced lead-time for flood forecasting and warning system from 72hours to 10 days. During 2006-2009, CARE Bangladesh, through USAID, supported a programme to test and transfer this technology to the Government of Bangladesh. Aiming to build capacity for sustainable end-to-end generation and application on long lead forecasts, the model covers three types of forecast schemes: short- (1-10 days), medium- (20-25 days) and long-term (1-6 months). The 1-10 days forecasts performed extremely well to forecast the 2008 floods.

Good practice:

The Haiti Red Cross Society, Haitian government and partner NGOS have joined together to organize a volunteer-driven EWS using SMS and covering storms, tsunamis and floods. Another system in Haiti focuses use of operational infectious disease forecasting to rapidly facilitate "smart swarms" at the local level for emergency medical response.

Guiding principle 7: Embrace multiple knowledge systems

Just as science is important to ground and render EWS valid, other knowledge systems are crucial to keep EWS alive and sustained. The strongest and most relevant EWS will capitalize on as many knowledge systems as can be tapped.

Literature on the subject generally speaks of three knowledge systems: transmitted, experiential and empirical. While individuals, households and communities 'own' the first two (often called indigenous, local or folk knowledge), empirical knowledge is generally reserved for the institution of science.

- *Transmitted* knowledge is that which has been transferred to an individual through any form of communication and registered in oral histories or recorded memory: stories, songs, discussions, etc.; deeply internalized for generations, its legitimacy is rarely debated by the community.
- *Experiential* knowledge is that which is learned from personal exposure or experience; because it is not typically verbalized and rarely if ever recorded, it is sometimes contested and categorized as unscientific.
- *Empirical* knowledge is 'created' when scientists record it during systematic scientific experiments or monitoring efforts. Examples of the importance of each form of knowledge are found below in Table 7:

Table 7: Examples of EWS knowledge per type

Form of knowledge	Good practice	Lesson learned
Transmitted (transferred from previous generations in song and legends —no need for help from modern technology)	The following examples are all from the 2004 Indian Ocean tsunami: • Thailand: For the Moken people of Surin Islands, "seven rollers" is a legend passed down from their ancestors: the tsunami is cleverly encoded in a legend of the 'laboon' or giant wave. The legend holds when the water along the shore suddenly runs dry, they need to run to higher ground to avoid the "seven rollers." • Indonesia: Simeuleu Island inhabitants were largely saved from the 2004 tsunami when they responded to indicators dating back 100 years featured in a song (named S'mong) chanted by all local children. • India (Andaman and Nicobar Islands): Scientists believe that the ancient knowledge of the movement of wind, the sea and birds helped these traditional communities to "sense" the tsunami and to flee to the highland forests, much before the waves hit the coast.	Immigrants to Simeuleu and Solomon Islands perished because they did not hold the same knowledge as permanent residents and were not specifically targeted to receive warning messages.
Experiential (constructed from personal experience)	Nepal/Practical Action documents warning indicators for: Landslides, Extreme rainfall, Flooding (see document) Volcanoes (Philippines and PNG): • Ashes felt on the totems • Wild boars and chickens scurrying recklessly • Ground shaking vertically instead of horizontally • Mega pod birds suddenly abandoning their nests • Dogs barking continuously and sniffing the earth • Sea snakes crawling ashore	The Solomon Islands Red Cross documented that nuts falling from trees used to warn Pagan Priests of imminent winds and storms.
Empirical ('scientific')	Analysis of satellite imagery refined over the past 35 years now produces cutting edge and increasingly reliable estimates of storm trajectories and landfall dates and times.	Despite high-tech tsunami EWS in Hawaii, over 250,000 lives were lost to the 2004 Indian Ocean tsunami.

Language is often an important component of knowledge transmission. Seeking to understand unique qualities of a language will often unlock fascinating facts about the users that are instrumental in guiding and/or strengthening EWS.

Good practice:

One of the most practical steps the Samoa Red Cross Society has taken has allowed it to leap the language barrier. Nearly every village in Samoa has a different term for north, south, east and west, making it problematic to issue early warnings. To get around this, the National Society serves as a liaison between the community and technicians to assist with the interpretation of meteorological information and weather warnings. A better example of how the Red Cross can help communities take low or no-cost measures towards being better prepared is hard to find.

Good practice:

One of the greatest challenges of river forecasting in Nepal is communicating messages out to remote communities. A song that was written as part of a competition to build awareness about flooding. It was sponsored by Practical Action, an NGO that uses appropriate technology to challenge poverty around the world. Practical Action tried a long list of approaches and song competitions were among the most effective and popular. Translated into English, the song composed and sung in Tharu language by the Youth Awareness Club, Gulariya-6, Bardiya is catchy!

Early warning awareness song

If heavy rain falls in Dang
News will spread all around

"Warning, warning" says the team
Everyone wake up from your dream

Take your belongings
Save your life
As you hear the news

Collect your documents
Collect your jewelleries
Collect everything that you need

Phone calls, siren rings
News will spread all around

We get information from Chepang

Phone calls, siren rings
Run to the shelter
Run to the shelter
And help others reach the shelter

Do not forget old people
Do not forget the pregnant women
And those unable to walk
And also those unable to talk
Lastly don't forget anyone
Especially the most vulnerable

"Search, search" screams the team
Rescue all those who scream

Phone calls, siren rings
News will spread all around

Guiding principle 8: Account for evolving risk and rising uncertainty

Unfortunately, all types of knowledge discussed above have started to fail under multiple global pressures. First of all, globalization and modern development have resulted in changed livelihoods and less communication between and across generations such that messages from the past are no longer considered relevant or a priority to the new generation. Although technology and telecommunications has enabled access to endless information sources through the internet and social media, these changes may accentuate the rift and push knowledge of the past further out of sight.

Secondly, warming of the atmosphere is resulting in climate change and its impacts have already started to influence formerly recognized early warning indicators — making some of them no longer reliable. These two pressures have challenged both the capture and the utility of local knowledge in EWS. Today, even for scientific measurement, the past is no longer a reliable indicator or measure of future environmental conditions; the current generation has lost its baseline.

On top of that, climate change [8] is and will increasingly exacerbate existing vulnerabilities and will lead to the emergence of hazards in previously unaffected regions of the globe (i.e., flooding in areas traditionally dry). The geography and calendar of hazards is therefore evolving. In addition, one change we have already started to witness is a heightening of extreme weather related hazards: areas that used to get wet may be getting wetter more frequently; areas of chronic dryness may experience even longer droughts. Rising temperatures might change the geographical range of some disease vectors, as mosquitos and other pests, affecting communities living in higher formerly protected elevations. These new trends make early warning even more important, also in areas not originally considered at-risk.

Fast, unplanned urbanization also creates new risks, greater exposure to hazards and heightened vulnerability. Increasing the number of inhabitants with homes on the coast or in river valleys means more people exposed to floods and seaborn hazards (hurricanes, tsunamis and sea level rise, etc.). The rising density of populations in urban slum areas has obvious implications for vulnerability, poverty and increased spread of disease. Climate change also exacerbates urban disaster risk management challenges as rural hazards and disasters push households to seek employment or relief in urban areas. A greater concentration of people in disaster-prone areas (i.e., growing mega-city population in seismic regions) signifies greater risk and some urban communities, such as the transient, are being polarized and pushed to dwell on fault zone regions.

The interplay of many different processes (i.e., population growth, unsustainable development, rapid unplanned urbanization, climate change, upstream environmental degradation, local changes in markets and governance, etc.) contribute considerably to increase people's vulnerability and to reduce their capacity to cope or recover from hazards and threats. Hand-in-hand with evolving risk patterns comes heightened uncertainty. Inadequate baselines added to complex and ill-understood interactions of climate and weather systems result in forecasts that must be padded with wider and wider ranges of probability, leaving wide margins for error and harder to interpret warnings. Communities need to understand the difficulties in providing accurate forecasts and disaster risk reduction and management practitioners will require technical assistance to interpret and act on both external forecasts and those coming from community-level monitoring. Even with technical assistance, practitioners need a toolkit whose number one skill is readiness for surprise.

Current understanding about climate change already gives us an early-early warning that will require early action. Disaster risk reduction and management actors will need to mainstream climate change concerns into EWS programming. For example, we will need to explain, communicate and prepare for possible worsening of current and new hazards. Practitioners need to understand how the geography of risks may change and be able to reflect the current and anticipated changes in contingency plans. More than 60 countries have already completed a national assessment [9], reviewing available information on changing weather and risk patterns to assess how their national plans, response preparedness and EWS may be affected.

8 *For more details on climate change, refer to IPCC SREX report (Managing the Risks of Extreme Events and Disasters to Advance Climate Change - http://ipcc-wg2.gov/SREX/) and the regional "Lessons from SREX" available at: http://cdkn.org/2012/04/new-cdkn-reports-will-help-developing-countries-plan-for-climateextremes/).*

9 *For more information on these national assessments: www.climatecentre.org/downloads/File/programs/PFCC/CC_PfCC_version%20web.pdf*

Good practice:

The International Centre for Integrated Mountain Development (ICMOD) workshops on early warning in Pakistan revealed traditional EWS that were nearly forgotten. In the mountains, mirror and fire systems were traditional warning systems, based on a diversity of strategies related to military, religious and livelihood (pastoral) activities. One advantage was that the diversity of strategies using both visual (mirror and fire systems) and audio (mosque and herders) means of communication allowed the system to be kept flexible enough to adapt to a diversity of contexts. The vanishing herders of Chitral demonstrate that changes are occurring in the linkages between the highlands and lowlands, between pastures and villages, between old and new generations, and between traditional and new EWS for natural hazards. "The old system is gone and the new system is not working," report EWS workshop participants (ICIMOD).

Good practice:

The Australian Red Cross and Solomon Islands Red Cross are inserting a section on climate change in their health manual so that health practitioners are more aware of the linkages between climate change, increased disaster risk and the growing potential for public health emergencies as a result of shifting disease patterns.

Good practice:

Advancing Capacity to Support Climate Change Adaptation (ACCCA), coordinated by United Nations Institute for Training and Research is a project in Kenya and Mali that makes vulnerability central to the approach. In Mali, scientific information about climate change is 'translated' into an understandable and accessible format using audio-visuals, theatre and music in local languages. In Malawi, the ACCCA project is run in partnership with the Red Cross.

Good practice:

Community-based Screening Tool, Adaptation and Livelihoods (CRISTAL) Project in Mozambique aims to reinforce community preparedness with a focus on climate change. Activities include mapping vulnerability to floods in the Zambezi basin, evaluating the link with climate change and increasing preparedness long before a hazard.

Good practice:

In a joint effort to enhance local capacities for disaster preparedness and disaster management in the disaster prone department of Chocó, Colombia; Plan Germany and Fundación Plan have launched an 18-month project covering 10 communities. The project integrates the climate phenomena "La Niña" as the trigger of heavy rainfall unprecedented in Colombia. Project equipment such as flag signals, sirens and devices to determine water levels will be installed in carefully selected locations in order to create EWS that are in line with rules and regulations and allow the integration into existing systems.

Good practice:

A two day seminar hosted by the Fiji Red Cross Society in Fuzhou as part of the project; "Disaster Risk Reduction and Integrated Climate Change Adaptation –a National Model for a Community Context in the People's Republic of China" implemented by the Red Cross Society of China with funding from the Finnish Red Cross. A convergence of government departments including agriculture, health, climate change and disaster management as well as the meteorological office with Red Cross Society of China counterparts shared the concern for how to deal with a more demanding climate. Using the 'Early Warning/Early Action' RATS template with the scenario of heavier rainfall and landslides, participants discussed actions that can be taken across different timescales such as years, months, days and hours ahead of a given event, using climate information that is available. They discussed systems, expertise and actions already in place that could be used to deal with these changes in climate, then asked themselves what they could do more of, differently or better.

Lesson learned:

People living on artificial islands in Malaita Provence, Solomon Islands find that changing wind patterns are impacting traditional methods of weather prediction. The Solomon Islands has limited meteorological records because much of the data has been destroyed during times of unrest. To make up for this deficit, traditional knowledge, such as the knowledge of elders, is being used to assess the effects of climate change in the country. The Solomon Islands Red Cross has documented that tribes in the west of the country hold valuable knowledge of plants, planting seasons and their relationship with wind conditions. In the past, the arrival and duration of dangerous winds could be predicted according to when certain nuts grew and dropped from the trees. The pagan priests who possess this knowledge are now having great difficulty predicting when these winds will come and how long they will last for (The Solomon Islands Red Cross, 2008).

Guiding principle 9: EWS without borders: target the full vulnerability and hazard-scape

Hazards know no borders: they do not respect administrative, cultural or linguistic boundaries; they do not distinguish between a rebel zone or an IDP camp. A disaster risk reduction/management practitioner must *think* like a hazard, and target the *full* hazard-scape, regardless of pre-conceived and socially constructed boundaries.

In the case of too-much water—floods, it is useful to address EWS using a watershed or landscape approach. The watershed is the full region fed or drained by one river system. Upstream communities on a watershed often receive rains first and may be unaffected or less affected by floods than the communities downstream. This offers them an important role in monitoring and alerting their neighbours downstream. Developing strong relationships between up and down stream communities in an EWS produces new social links, heightens understanding and contributes to saved lives. The watershed approach is paramount in managing early warnings linked to the management of major dams.

In the case of too-little water—drought, affected communities at a distance from each other can share strategies on how to respond to a seasonal forecast. It has been useful to bring together households from multiple links on the food and production chain—those producing, selling, and/or dependent on urban market purchases — to explore types of information available and windows of opportunity to respond throughout the entire hazard-scape.

Such efforts contribute to a much wider understanding of communities and how their actions are interlinked to those of so many others. In both of these cases, the hazard-scape transcends national borders. It is generally useful to explore cross-border and cross-regional EWS by supporting the creation and maintenance of bilateral and regional agreements between states, including coordination mechanisms for cross-border hazards, such as flooding in shared watersheds. These and other mechanisms can also include information exchange and capacity building.

Good practice:

Flood CEWS in Chikwawa, Malawi, guided by Christian Aid, involve three communities that monitor river level gauges at key points on the river (Mwanza, July, Kaloma stations). They exchange information by mobile phone and relay it to downstream villages. There, the alerts are transmitted to all concerned with megaphones and color-coded posters.

Good practice:

In 2008, in Somalia, 20 different organizations (NGOs, government agencies/departments, and customary institutions) from Somali Region (Ethiopia), Borena Zone (Ethiopia) and Moyale (Kenya) participated in a workshop entitled: “Cross Border Early Warning and Response.” Action points agreed on by all participants included: harmonization of the different early warning monitoring formats, stronger community involvement in early warning data collection and reporting, improved early warning information sharing and dissemination.

Good practice:

Conflict Early Warning and Response Mechanism for the seven member states of the Intergovernmental Authority on Development in the Horn of Africa sub-region focus exclusively on pastoral cross-border conflicts.

Good practice:

Following the 2001 floods in the Zambezi, some blamed the two massive dams along the river, Kariba on the Zambia- Zimbabwe border and Cahora Bassa in Tete Province of Mozambique, for contributing to the severity of floods. To find out more about the role of international river flows and upstream dam management, USAID-funded MIND project invited senior government officials from Mozambique's National Institutes for Disaster Management, Water, and Meteorology; chief editors of Radio Mozambique and Jornal de Notícias, a newspaper; the World Food Program country director; and a Southern African Development Community (SADC) Regional Remote Sensing Unit representative to tour the Kariba and Cahora Bassa dams. The delegates learned about operations and how dam authorities monitor seasonal weather forecasts to plan their annual discharges. The trip opened a dialogue between the dam operators and Mozambican water and disaster authorities, and raised awareness of the consequences of water releases upstream and the need for cross-border information sharing and cooperation.

Good practice:

In Kenya and Uganda, the Dodoth-Turkana Cross-Border Conflict Mitigation Initiative (implemented in 2005) involved pastoralist communities from both sides of the international border. Conflicts between communities have a long history and are fed by the seasonal droughts, which lead to the need to share pastures and water resources. The project encouraged dialogue between communities (meetings aimed at conflict resolution) and engaged both sides in joint mitigation activities (rehabilitation of water pans for livestock, of the Ugandan side of the Kamion/Oropoi main road, etc.).

Lesson learned:

A classic example of the complexity of cross-border issues was a case of one agency in Malawi that was implementing a river flood control project through planting grass on the riverbanks. It so happened that the river itself was a boundary between two traditional authorities, only one side of the river was planted with grass as the agency was not operating in the other, adjacent traditional authority. Thus, while the project might have reduced flooding in one area there was a danger that it could catalyse flooding on the other side of the riverbank. This case clearly points to the need to consider carefully the entire hazard-scape.

Guiding principle 10:
Demand appropriate technology

Science has made significant progress particularly in the monitoring and forecasting of storm systems and precipitation, advances that have strongly contributed to lives saved. There is a place for high technology in EWS; it must be harnessed effectively wherever it can contribute. A sophisticated warning remains useless if not linked to effective action.

To many actors, however, EWS are unfortunately associated too closely with high technology. This image of an EWS originates from the heavy investment in global and regional monitoring of hazards, spurred on by excitement for the use of remote sensing to monitor conditions of the earth from the sky and telecommunications and the internet to communicate.

All technology requires training for technical knowledge/skills, installation and/or maintenance costs, human resources and in general, system sustainability. The more sophisticated the technology, the greater the cost for each of these elements. A disaster risk reduction/management practitioner, however, must insist on technology that is appropriate (high cost-efficiency, robust, resilient, easily used, easily replaced parts and maintenance, etc.) at every level.

All new technology, appropriate or otherwise, needs to be introduced with a strong layer of awareness raising and community sensitization. Introducing new hardware with an insufficient *software* component to help the community assess its value themselves, can lead to surprising, counterproductive and even disastrous results. While technology does require additional resources (training, maintenance, etc.), it also provides opportunity; and new technologies such as social media should be harnessed when possible to provide timely and effective warnings.

Technology in an EWS is mainly associated with monitoring and warning communication because these components typically use hardware or equipment to achieve their goals. Ideas for appropriate technology for each component and level of EWS are found in Table 8 below and need to be contextualized.

Table 8: Ideas for appropriate technology, per EWS component and level

EWS components	Local/community or hazard-scape	National	Regional/global
Risk knowledge	Maps of hazard-scapes drawn by community members (i.e., through the VCA process, also known as community risk assessment).	GIS risk maps showing hazards and vulnerabilities throughout the country; computer network that receives and tracks major storm signals.	Satellite imagery from 30+ years can be overlaid on observation data to produce rigorous risk maps with layers portraying hazards and vulnerability.
Monitoring	Manual river and rainfall gauges; billboards to announce river levels.	Automated gauge system with information flowing into a central location in capital city.	Satellite-based monitoring system in real time with current global conditions and projections based on global climate models.
Response capability	Evacuation routes signaled by locally made (and where available, fluorescent coloured) signs and cyclone shelters designed locally.	Any response at this level will probably draw on the same technology found in warning communication below.	
Warning communication	Local devices for communication: word-of-mouth, runners, criers, drums, flags, bells, telephone, radio, television, megaphone, mosque speakers.	Radio, telephone, television.	Email and internet-based seasonal forecasts, RSS feeds

Good practice:

In Central America (Mexico and the Caribbean), simple hydrometric scales and pluviometers (rainfall gauges) are locally made, installed and monitored by the community.

Good practice:

On Monday, 4 June 2007 a tsunami early warning siren in Aceh, Indonesia, rang for one hour. It turned out to be a false alarm. Nevertheless thousands of people panicked because they were not educated about what to do in the case of a siren warning as well as about how to recognize the all clear signal. As a consequence, angry residents destroyed expensive equipment.

Lesson learned:

A case in point is Myanmar, where precise satellite-based predictions of Nargis's path were made available four days before the tragedy struck, and yet at-risk communities were not evacuated in time. The Indian Meteorological Department identified the cyclone on 27 April and classified it as a very severe cyclonic storm on 29 April, days ahead of landfall on 2 May. Forecasts and warnings were issued by the Department of Meteorology and Hydrology of Myanmar and disseminated via TV, newspapers, radio and direct communication with the national authorities, however, in many instances they were not received in a timely manner by the local communities in the remote and under-developed low-lying coastal regions were flooded as a consequence of Cyclone Nargis's storm surge. Additionally, it was found that emergency evacuation plans where inadequate or non-existent in these remote areas. This disaster highlighted the need for community planning and preparedness and the ability to activate emergency plans to prepare and respond, with coordination across agencies, at national to local levels [10]. High technology and prediction is not enough.

Guiding principle 11:
Require redundancy in indicators and communication channels

Redundancy is an important concept for disaster risk reduction/management practitioners and more generally, for risk managers. Redundancy in this sense refers to the provision of additional or duplicate systems or equipment that function in case an operating component or a full system fails. In the business of saving lives, we do not want to take too many chances; setting up redundant systems helps us make sure that the signals are detected and the messages received and acted upon. In general, redundancy is about being thorough and careful and recognizing that systems can and will fail at many points for many different reasons.

Equally important research strongly suggests that, for slow onset hazards such as certain floods, belief increases only after the same warning has been heard multiple times; [11] redundancy makes sure messages are repeated. More specifically, at least two elements need to have redundancy:

1.) indicators that are monitored
2.) communication channels used to send warning messages.

Both of these are discussed in detail below.

- **Indicators that are monitored**

It is generally agreed that there is no single magic indicator for a given hazard (with the possible exception of single sensors in seismic monitoring systems).

10 *Golnaraghi, M. (ed.), 2012: Institutional Partnerships in Multi-hazard Early Warning Systems: A Compilation of Seven National Good Practices and Guiding Principles. Heidelberg, Springer-Verlag: Principle No. 2 page 220.*

11 *For earthquake real-time early warning or 'now-casts', there is no time to await a redundant message before reacting. This puts even greater pressure on the timeliness and accuracy of the warning message.*

This means that at every level of an EWS, a combination of conditions should be tracked, such as rainfall upstream and river levels downstream. Understanding of trends and projections will result from watching each of them and how they may interact. This is also called triangulation.

Basing early warning action on only one indicator is rarely good practice outside earthquake monitoring. An indicator that a community choses to monitor locally may be closely linked to another less recognized symptom or condition, and may not be sensitive enough to the hazard that is prioritized; the choice of indicator may not be the right one. For a host of reasons, a perfect indicator monitored at any level with the highest technology may reflect human or technological error in measurement on a given day or season. It may also be based on incomplete scientific understanding (a current example is cloud behaviour).

Hazard conditions may be deteriorating for a given community, but at the same time certain households might be building up personal or communal reserves, thereby less vulnerable and more resilient to the imminent threat. Monitoring hazards and vulnerability is another form of redundancy in EWS.

Another example of redundancy in monitoring is across levels. When the regional climate forum tracks global indicators to produce a monitoring tool such as the seasonal forecast, it should be systematically verified by the additional monitoring of local conditions. Local indicators are most often much more sensitive to small changes in space and time than those received from global or regional EWS.

For the above reasons, it is strongly recommended to insist on multiple indicators for every hazard at every level. Some specific examples follow:

Good practice:

Despite the well-designed dissemination set-up of the DMCs in Laos, the official warning does not reach the Village Chief. Instead, a village member who works at the meteorological department has access to the flood warning, which is passed on to the Village Chief. The employee of the Nam Ngum Dam also provides warning to the village, two to three days before the gates of the dam are opened to release water. On the other hand, the community has its own traditional hazard detection system. It observes water levels against its own indications of danger levels.

Good practice:

In Kenya and Tanzania, pastoralist Masai track signs of drought, environment deterioration, and food security by studying their livestock. Their local indicators include daily milk yield, animal coat texture and colour, consistency of cow and wildlife dung, and the extent of bush encroachment. The Masai never use only a single indicator to make conclusions, but rather triangulate many indicators.

- **Communication channels used to warn**

When an EWS is ready to issue a warning, the monitoring service (disaster risk reduction/management, meteorology, hydrology, health, etc.) needs to immediately link to and/or launch a communication system that has been well-studied and organized to reach every possible at-risk individual. A multitude of factors influence whether that warning will reach the intended target. They range from technology failure to disregard; Table 9 portrays a shortlist of factors and the requirement for redundancy.

Table 9: Require redundancy in warning communication

Factor name	Description	Example	Require redundancy
Technological failure	A device used to transmit the warning did not work as planned.	Telephone network is not working because of weather conditions.	Use a second and third appropriate technology simultaneously before the network fails.
Physical reach inadequate	The device or channel does not convey a message to all at-risk households.	The sound of a flood alarm is not heard by the most remote part of a village, closest to the river.	Organize a series of runners or criers to personally carry the message at the same time the alarm is turned on
Social reach inadequate	Individuals with hindered mobility, hearing or sight do not have access to the message.	An older person, ill or deaf individual does not receive the warning because s/he has little contact with the community outside his/her home. A tourist does not listen to the local radio.	Set up a neighbourhood network (or Village Disaster Committee) in which volunteers are each delegated responsibility to personally share the message with three-four specific at-risk households.
Misunderstanding	A warning is received that makes no sense to the community, or various individuals.	Flags to announce volcanic activity were seen but their meaning not understood. Immigrant households did not understand the instructions in local dialects.	Duplicate messages in languages understood by at-risk groups are prepared and issued to accompany the flags.
Disregard	A warning is received that is ignored, not believed or disregarded for any reason, leading to inaction.	Communities mistrust all information from outside; women at home receive the warning and understand it, but are not authorized to leave their homes until they have permission from their fishermen husbands.	Repeat warning messages to have greater impact: belief occurs after multiple hearings. Build trust between levels of EWS.

For the above reasons, it is urgent to explore all appropriate channels of communication and systematically include as many of them as is feasible, even to send the same message to the same community. Redundancy is good and essential.

Guiding principle 12: Target and reach disadvantaged and vulnerable groups

This principle refers to the population groups that are within the physical hazard-scapes discussed above (Guiding principle 9). EWS must always include *disadvantaged* groups as a key focus, during every component and at every level. The term disadvantaged is chosen instead of *vulnerability* to include a wider group at-risk (exposed and/or vulnerable). It is not useful in disaster

risk reduction/management to isolate gender because those disadvantaged or marginalized are not strictly women, children, older persons and persons with disabilities. Depending on the hazard, they also may include the homeless, semi-illiterate, those working at night on a river, youth playing near the river, single-headed households (whatever their gender), or very simply the least economically secure.

Nearly every community has a group of people that are, for whatever intentional or unintentional reason, marginalized. It may be visitors—tourists, or seasonal and permanent immigrants to a community. Given that they do not listen to local radio stations or are unable to understand the local language and pick up cultural clues from their neighbours, they become marginalized during an imminent hazard. They must all be accounted for in early warning: identified, included, engaged or at the very least, warned.

Across the globe, women have expressed frustration with being routinely referred to as the most vulnerable in DRR or management settings. The truth is that their social and daily exposure to hazards distinguishes them from men more than their vulnerability or capacity. Women may be more conscious of and directly responsible for children, putting them in precarious situations to rescue them in schools or play sites. Their social status may make them unable or uncomfortable to respond to a warning alone (i.e., by evacuating with neighbours), thereby taking the brunt of a cyclone full face. Social and cultural processes have translated into a higher risk level for women, but not always a higher level of vulnerability. Acknowledging this enables a more useful analysis and a more efficient targeting of disadvantaged groups.

Good practice:

A Masters student in Nepal (Banke and Bardia districts) explored how socially defined roles and responsibilities place one sex at a disadvantage due to gender stereotypes in in community-based flood EWS. The findings highlight that the gender stereotyped roles and responsibilities, along with their skills and capacities, lack of mobility, and other socio-cultural practices have sometimes made women more vulnerable than men to floods. Men who observed water levels (gauge monitors) were more at risk when they monitored during the night. Also, since men were always more mobile than women, they were more likely to contact upstream gauge reader on their own and ultimately disseminate the message to the community.

Good practice:

Viet Nam: EWS for the Lower Mekong River, has trained community members, who upon receipt of flood warnings, lead persons with disabilities and children to safety.

Good practice:

The city of Cape Town, South Africa has developed an EWS that targets the full hazard-scape of the Diep River, which flows through Du Noon's Doornbach informal settlement. Authorities have intensified public awareness education in low-lying floodplain areas in which residents were given practical tips (in Xhosa, English and Afrikaans) on how to raise floor levels, divert floodwaters and reduce the health hazards associated with stagnant water. The city works with non-profit organizations which could provide "a safe, clean and dignified environment," providing immediate shelter, food and security for the homeless.

Lesson learned:

Anecdotal data show that during the 2004 Indian Ocean tsunami, of the seven people that died in Simelue Island (only 20 minutes from the epicentre near Indonesia), five people were immigrants from neighbouring provinces/districts in Indonesia. The reason offered for this is that the immigrants to the island did not share the local knowledge.

Guiding principle 13:
Build partnership and individual engagement

The mainstay of sustainable EWS at any level is closely tied to partnership and engagement of specific individuals. Although not unique to early warning, a full-fledged multi-hazard and multi-level system can only thrive when partnerships are crystalized and committed individuals are visibly attached to the efforts. Their inclusion brings active participation and ownership of EWS products to the forefront.

A main argument in support of partnership is that partners bring greater resources, financial or otherwise. Financial resources are always in short supply and creative venues or ways to raise them may need to be lobbied. Imagine also the value of a local Red Cross Red Crescent volunteer who, through, unfortunate personal hardship (such as losing her own children when a dam was released without warning), speaks out adamantly and eloquently in favour of early warning. In doing so, her personality rallies many others who share her concerns. Soon, the safety and sheer weight of numbers bring the need for an EWS to the attention of the district mayor, or even the national president. Such a *champion* is an immeasurable resource for the success of a local EWS. Champions are out there; go find them.

The list of potential partners for an EWS is very long, and will vary with each level, hazard and context. A good place to start exploring EWS partnership is at the first mile, at the local or community level. In at-risk communities, it should not be impossible to identify committed volunteers and credible champions (as described above). EWS partnership efforts may start with them. Many other examples of partnership are detailed below:

- **Schools and youth:** Still closely entwined with the community, it is important to creatively explore how to use schools and groups of youth to compile risk knowledge, monitor hazards, build response capability and communicate early warnings. Teacher training programmes can be developed. Engaging students in the act of monitoring river levels and rainfall provides the perfect teachable moment for a lesson on disaster risk science, while developing an archive of data that could serve both community needs and science (National Met Office, NEWS and WMO).

Good practice:

In the Cayman Islands, the National Hurricane Committee is a public-private partnership in charge of managing hurricane DRR, taking care of preparedness, response and recovery. Whatever success the Committee retains, appears related to the fact that it had respected civil volunteers in its initial integration (and ever since), its constant improvement by learning from past experiences (annual revision of the plan), operating within the national DDR framework and reinforcement by its success year after year in reducing losses during the hurricane seasons.

Good practice:

The Egyptian Red Crescent Society's youth clubs are widespread all over the country, covering all governorates. There are 26 clubs in total with at least 20 sub-branches covering the villages and small towns. The network of youth has been influential in transmitting early warnings.

Good practice:

In the mountainous Nuwara Eliya district of Sri Lanka, a group of young science students supported the protection of local communities from landslides and floods. Driven by heavy losses in 2008, students were taught to take turns to monitor rainfall twice a day using simple low-cost gauge. During the school holidays (much of which overlaps with the rainy season) students who live nearby the school are tasked with monitoring. If rainfall exceeds 75 cm in a 24-hour period they are to inform their parents and the authorities. A call is immediately placed to the district office that verifies results with the Department of Meteorology, which in turn issues appropriate warnings via television and radio. This programme is now being replicated throughout the district, and plans have been made for field trips to the district offices. Student presentations will be made to the monthly district meetings as well as to the District Disaster Management Committee, attended by representatives of all local societies.

Lesson learned:

EWS in Nepal (organized by Practical Action) had a strong component on awareness, even expecting contributions of monitoring by school classes (teachers and students). This suddenly became disappointingly impossible when it was realized that public schools are not in session during cyclone season, when monitoring is the most important.

- **Private sector:** Even at the community level, and definitely higher, private sector enterprises have resources that could be put to good use to strengthen EWS. Not only will warning messages directly benefit the private entities by helping to keep their supplies safe and sound, but they should also be encouraged (or demanded by governments) to demonstrate corporate social responsibility. Giving back to the community by donating a communication device or building a shelter demonstrates recognition that they are part of the community. The private sector entities most often linked to EWS include telecommunications (warning dissemination) and the service sector (such as hotels usually with relatively larger and safer buildings for eventual refuge); some examples follow:

Good practice:

In March 2007, LIRNEasia, with the resources and coverage of Sarvodaya and its Community Disaster Management Center, successfully completed a pilot study of a “Last Mile” Hazard Warning System in 32 Sarvodaya villages throughout Sri Lanka. The aim of this project was to evaluate the suitability of five information technology devices deployed in varied conditions in selected villages for their suitability in the last mile of a national disaster warning system for Sri Lanka and possibly to other developing countries. As regards organizational capacity, the pilot demonstrated that mobile and fixed phones performed best since they required little or no training. This project thereafter took the effort to a new level with Dialog Telecom.

Good practice:

In the United States, as part of the efforts by Local Emergency Planning Committees under SARA Title III, there are communities where the local chemical industry has provided resources for nearby houses to become less prone to airborne risk. The SARA Title III *establishes requirements for Federal, State and local governments, Indian Tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals*. It provides a framework for the creation of Local Emergency Planning Committees (LEPCs) and in some communities; the efforts of these LEPCs have resulted in investment by the industry to provide solutions to houses located near facilities that could be at risk of airborne contamination. The LEPCs are autonomous and seem to seek funding on their own within the community. It is probably cheaper for the industry to pay for prevention than from lawsuits after medical problems start to appear.

Good practice:

In Indonesia, a five star hotel chain in Bali signed formal MoUs with the National Red Cross Bali Chapter and the Musa Dua community, to contribute to tsunami preparedness actions, such as evacuation linked to early warnings.

- **Civil society, NGOs and the Red Cross Red Crescent:** there is a growing cohort of grassroots organizations that are making interesting advances in the field of bottom-up and genuine community-driven EWS, in support of national and local authorities wherever possible. There is little reason for the International Red Cross Red Crescent Movement or any NGO to start an EWS all alone. Although partnerships may slow down the process (gaining wide ownership and consensus takes time), they will greatly strengthen the impact and sustainability.

- **Government:** given their mandate, governments at all levels are the quintessential partners of an EWS. The National Red Cross and Red Crescent Societies have an obligation to support recognized governments in their humanitarian work. NGOs also assure greater impact and sustainability of their EWS actions when they support governments in meeting their obligations to protect the people. From the national level that definitely needs an EWS to the at-risk community where EWS, if not driven locally, must be linked to response capability, strong government partnership is paramount to sustainable and successful systems. Local and provincial governments, often have the first legal responsibility for disaster risk reduction/management, should be the first partners a community should look to when developing EWS. It is critical to promote local government much more in DRR/EWS, as they are the closest governmental institutions to communities, usually have many regulatory powers relevant to DRR, and can be an accountable channel for state resources for EWS.

- **Military:** in countries where a military presence is active and visible, they, too, have strengths and capacities that can be tapped to deliver warning messages to at-risk communities. They may have human resources or communication channels that they would consider lending to a warning effort, if authorized by the governments that manage them. They may benefit from EWS training sessions that are organized.

Good practice:

USAID, along with Pakistan's Ministry of Public Health and the WHO, funded a disease surveillance system of permanent and mobile health clinics and laboratories to track individual cases and respond rapidly to treat and isolate communicable cases from the surrounding populace. If a villager in Dadu District in Sindh Province had acute watery diarrhoea, health workers could quickly determine if it was cholera, isolate the patient and his family, step up public health messaging throughout the community, and treat the local water source. An outbreak in one village would not spread inevitably to the next, and appropriate resources could be focused where more cases where reported. The disease EWS was initially put in place in 37 districts judged earthquake and flood-prone, with the aim to expand it to other high risk districts and build the capability of health personnel at the most peripheral level for early detection of epidemics.

- **Media:** national and local media channels have an edge on EWS. Their business is communication: getting the word out to the largest possible group of listeners or readers. The media also have the responsibility to relay accurate and timely information to those in need. All EWS efforts, and especially training sessions, should include media representatives, not just to be informed and publicize the effort but also to participate and contribute as another active member of the community. Capitalize on the strengths of the media to better explore communication channels for remote communities, help package warning messages into consumable actionable chunks and lobby for free or subsidized air-time or print-space to assist in issuing real warnings.

Good practice:

In Sanniquellie and Tappita Districts, Liberia, Red Cross community-driven EWS development (funded by MSN through the IFRC with support from Swedish Red Cross) sought out media agents to be participants from the start. Not only did they contribute as community members, they also helped repackage warning messages and were able to negotiate for subsidized airtime for the National Society's CEWS.

Good practice:

The Viet Nam Red Cross Society, with support from American Red Cross, partnered with ADPC in a 4-country EWS programme (Indonesia, Philippines, Sri Lanka and Viet Nam) that for the first time established a seasonal forum aimed at encouraging dialogue and learning among policy-makers and other government officials, early warning entities with institutional mandate (e.g., hydro-met services) and the media to represent the communities they aim to serve at the highest levels. The programme also entailed a training component whereby staff and volunteers were trained in early warning messaging and planning so that appropriate action could be taken in the event of a disaster.

Good practice:

Transmission of the radio soap opera "Tiempos de Huracanes" (Times of Hurricanes), very popular in the region, was initiated by IFRC, UNISDR and other UN partners in over 74 local radios stations in six Central American countries at the start of the rainy season. The objective of this campaign is to provide an alternative type of information on disaster risks to the most vulnerable communities. "Tiempos de Huracanes" consists of four stories in the context of floods caused by the heavy rains and hurricanes. These stories take place in communities with different levels of preparedness, and deal with issues occurring before, during and after the disaster www.eird.org/esp/radionovela/radionovela.htm. Based on this experience IFRC and UNISDR jointly with other partners launched In 2011 la new radio soap opera "Vida que te queremos tanto," the first chapter is related to CEWS "cuando el rio suena" www.eird.org/radionovela/index.html

C. Community-level practice: guiding principles per EWS component

For each of the four EWS components, all five IFRC zones were canvassed to identify and showcase good practices and lessons learned specifically at the community-level. The sections below explore tools and approaches that have been tested and applied to develop each component through community level efforts. Also provided are guiding principles specific to efforts occurring at this first mile.

EWS component 1: risk knowledge

Risk knowledge can be produced from a systematic exploration of hazards and vulnerabilities at every level (global, regional, national and local). Although modern technology can develop geo-referenced maps and overlays for multiple hazards and vulnerability over entire continents, the resulting risk knowledge is most insightful when produced directly with and by those individuals and communities who are considered to be at-risk. At the community level, risk knowledge is often produced through community risk assessments. No knowledge system, however, is a panacea.

A substantial number of guides have been developed by various institutions to help build required foundations in risk knowledge.

- Acknowledging the importance of establishing and updating baselines, early warning actors such as WFP's vulnerability assessment and mapping unit (often with the FAO and USAID's Famine Early Warning System) produced vulnerability assessments for many countries across the globe from as early as 1990. These were mainly annual snapshots of vulnerability overlaid with common hazards at the country level. At this level, it has long been possible to capitalize on remote sensing technology; for example, rainfall estimates derived from satellite imagery can fill in gaps between a handful of rain station observations in a large country. These layers form part of the risk profile.

- The IFRC has produced a series of guides for conducting VCAs. VCA is a useful toolkit of well-tested and refined strategies to establish risk knowledge at the community level. Highly participatory techniques embraced by VCA and others include risk mapping, risk ranking, hazard mapping, transect walks and seasonal calendars. It is easy to imagine how each of these building blocks of risk knowledge can strengthen the development of EWS at the community level while getting local participants more and more engaged in the process of learning and monitoring their risks. Given that the risk knowledge component of EWS is all about exploring risk with the community, it has great opportunities for participatory techniques embraced by local cultures, such as song, dance and theatrical games. Experience on facilitating discussions (also with providers of formal warnings, particularly met offices) has shown participatory decision games to be an unmatchable vehicle for learning at all levels - from communities to disaster management staff, policy-makers and donors.

Good practice:

In early December 2009, the Senegalese Red Cross Society and partners, guided by the Red Cross Red Crescent Climate Centre, convened a workshop in St. Louis, one of the African cities most threatened by climate change. Participants included climate scientists, Red Cross staff and community members. The challenge was the translation of often-incomprehensible climate forecasts into concrete decisions for disaster management. A game of cards was created to spark discussion and debate, understanding and new ideas. In the game, a plausible forecast is drawn and actions are played out from pre-made cards, or from cards created by players. Players created over 300 action cards, generating new ideas for response capability. Participants then brought the game to an affected island community where people suffer and die due to entirely predictable storms. Community members there debated and voted for actions they thought were best for them in the event of floods. The game may not save lives but can play a role in learning about risk and preparing to respond. Video online: www.youtube.com/watch?v=Mpj_EbKdwEo

Good practice:

In an innovative approach to addressing both current and future climate risk, the Solomon Islands Red Cross road-tested a participatory assessment, called the Frontline Community Toolkit, which combined the Red Cross Red Crescent's VCA with WWF's Climate Witness Community Toolkit produced in the Pacific. The aim of the exercise was to identify communities' vulnerabilities to the impacts of climate change and disasters and to develop activities to address priority needs and strengthen coping mechanisms.

Good practice:

In Latin America and the Caribbean, Riesgoland (Riskland, supported by UNISDR -UNICEF-TACRO) is a board game that helps making it easy to learn about disasters and what to do to be better prepared before and when they happen. This interactive game allows children ages 8-12 to learn about natural disasters and how certain human activities can reduce their impact as well as how other activities can increase vulnerability. It has been easily adapted to local situations by several countries within and outside the Americas. Originally produced in English, Spanish and Portuguese, it has been translated to several languages including Bengali, Creole, Kichwa, Mayan Kaquichel, Nepalese and Papiamento; it is also being translated to several other languages.

Good practice:

Under the UNDP-AusAID/Philippines effort "Hazard Mapping and Assessment Effective Community Based Disaster Risk Management (READY) Project," eight hazard maps were completed in the high-risk provinces of Laguna, Olongapo City, Vigan, Ilocos Sur, Cavite, Rizal and Iloilo.

Fascinating elements of local knowledge are often captured when establishing these risk baselines. Local indigenous knowledge can often be put to use in subsequent parts of a larger DRR programme or when necessary, questioned.

Good practice:
Guided by ADPC, it was discovered that some preparedness actions are associated with superstitious beliefs in the Philippines. One such belief is that tying sharp objects on the roof of the house to break the wind or weaken the typhoon. It is believed that the sharp object induces lightning and the ensuing thunder. It is thought that when this happens, the typhoon weakens and the rain stops.

The elements above lead to two very basic guiding principles specific to risk knowledge in light of EWS:

Guiding principle on risk knowledge, 1: Although risk knowledge exercises may not lead to early warning, all early warning must be founded on risk knowledge

Whatever surfaces from the risk knowledge effort should have a link to some type of action. This is important because the fact that an investment was made to conduct VCA or another risk knowledge effort in a given community indicates that the community had already voiced the need or strong desire for an intervention of some sort that landed on Red Cross Red Crescent or NGO ears. Although learning about risk is a valuable action in itself, it most certainly provides opportunity for follow-on action to reduce risk in a community. That action may include simple measures of hazard mitigation, such as creating volunteer teams to regularly drain channels in which debris causes localized floods. The action may involve more specific training or even the assisted movement of an entire village from a chronic flood zone to a hazard-free area.

There are some cases where risk knowledge or VCA exercises have been documented to have a direct and instrumental link to the development of an EWS at the community level. There may be many more undocumented cases of this important link that shows the interconnectivity of DRR programming.

Good practice:
In Nepal, after conducting a VCA-type process, the National Society worked with villagers to create community-based programmes to deal with local hazards such as flooding. The participatory nature of the process and the difference that people were able to make through their own actions helped them to realize that disasters were something they could influence and as a result they have become less fatalistic about risk.

Guiding principle on risk knowledge, 2: Accept that a community's priorities may not be our own

Establishing understanding of risk at a community level is an opportunity to take a peek into local perceptions. If you are not a member of the community, these perceptions may often appear unfounded or at odds with your reality. For example, you may learn that although hundreds lost their lives two years ago in a major disaster, that same disaster takes a back seat today to the daily challenge of survival, feeding one's children today.

If, despite this difference in perception, we proceed to set up an EWS for that same disaster, it may not be a meaningful or sustainable exercise. The only way to marry the two perceptions—one prioritizing disaster and another daily survival—may be to identify and develop an IGAs that meets the community's prioritized needs while also contributing equipment or other elements required for an eventual EWS (see Guiding Principles above).

Activities to explore:

- Support a risk knowledge exercise for a community without a preconceived notion of the actions that must result from the effort,
- Assist in the creation of maps portraying all pertinent hazards and vulnerability as well as areas/buildings that could serve as refuge/shelters outside the hazard's expected impact zone.
- Identify on the maps the homes of all the most disadvantaged households or individuals.
- Insist on local or indigenous knowledge to be given a place in the risk baseline.
- Guide the communities to keep track of each future hazard and their impacts (geographic and economic, etc.).
- Describe a list of possible actions that surface from your understanding of their risk maps (CEWS may be one of them) and let the community identify which they value.
- Seek to integrate risk knowledge into local law or policy, if not already included.

Building upon this strong foundation of risk knowledge, you may find a community who expresses interest in beginning an EWS effort.

EWS component 2: monitoring

Monitoring builds directly on the first component of EWS: risk knowledge. The risks (hazards and vulnerability) prioritized in a risk ranking exercise in component 1 are most likely the ones the community will want to keep a close eye on, to monitor.

Monitoring was, until recently, considered the main, or only, component of an EWS. It is not a surprise that, of the four components, it has received the most attention and funding on a global scale. Due to this, solid scientific advances have been made and most of the lives saved to date are largely attributed to monitoring and forecasting combined with preparedness.

Good practice:

Early warning successes from around the globe have been largely driven by advances, such as those in monitoring seismic and storm activity, that led to timely warnings and successful (even if not total) evacuations. Some examples include:

- Hurricane Gustave in 2008, Cuba
- Typhoon Krosa in 2007, China
- Hurricane Rita in 2005, USA (largest peace-time evacuation in modern history)
- Mount Nyiragongo in 2002, DRCongo (volcano)
- Merapi in 2001, Indonesia (volcano)
- Mt. Usu and Mikaye Island in 2000, Japan (volcano)
- Vulcan and Tavurvur in 1994, PNG(volcano)
- Mount Pinatubo in 1991, Philippines (volcano)
- Haicheng, China, 1975 (earthquake).

Good practice:

The Nicaraguan Red Cross coordinated with INETER (Nicaraguan Institute of Territorial Studies) and Cosude (Swiss agency for Development and Cooperation) community monitoring efforts linked to the project promoted the adoption of EWS integrated into community plans to respond to hurricanes and floods. The most at-risk rural communities were supported with measuring instruments and communication. However, one of the lessons learned was the opportunity to integrate EWS to commercial radio. Radio is the predominant means of communication in rural areas and in most cases the only one. Radio can transmit key messages and instructions for preparation and response as well as basic information on the evolution of events. In the case of BETA hurricane alert in October 2005, the role of the media was instrumental in the transmission of messages to communities. In a parallel fashion, there is an opportunity to integrate EWS to networks of amateurs, who are a very active and transmits a lot of information exchanged. One of the difficulties encountered is the absence of standardized protocols. Authorities do not have an inventory of communities with radios, nor do they have access to all frequency and bandwidths to operate community radio in an emergency or disaster, and the languages or codes needed. Alternatively, the Red Cross radios benefitted from an operator 24 hours a day.

Monitoring is a primary data collection effort, compiling fresh data to overlay on the foundation of risk knowledge. The three most important elements of monitoring are observation, measurement and prediction:

- Observation is using your eyes to follow an environmental or other condition. Example: you can observe the level of water in a river.
- Measurement is what you write down to describe and track the observation (numbers, words or even simple drawings can be recorded). Example: you can record the number corresponding to the current water level from the staff gauge.
- Prediction, or forecasting, is what you expect in the future, based on detection of measured trends. This involves analysis and agreement on thresholds that, when reached, will trigger action. The analysis draws on local understanding of contextual factors. Example: based on the rapid rise of the river level over the past few hours combined with continued heavy rains, you expect the situation to become dangerous for the community…action may be needed to protect lives and livelihoods.

This series can be remembered with a 3-step mnemonic 'W-R-A': watch, record and analyse.

All hazards and threats can be monitored with varying lead times. For earthquakes, and at times other hazards, the forecasts more closely resemble 'nowcasts' (two to five seconds); they are still known to save lives in very specific situations and the seismological advances in prediction are expected over the next few years. The hazards most commonly monitored directly by communities are floods, drought, landslides and more and more often, conflict. A few monitoring techniques for these hazards are highlighted in Table 10 below, with examples of good practice and lessons learned from across the world.

Table 10: Monitoring driven directly by communities

Common monitoring instruments indicators per hazard:	Good practice	Lesson learned
FLOOD • Rain gauge • Water level gauge (staff stage marker)	**Cambodian Red Cross Society:** home flood stage markers were contagious offshoots to a project that promoted local monitoring using river stage staff gauges.	Nepal: Glacier Lake Outburst Floods, a growing threat in the region, are highly unpredictable (due to very localized cloudbursts and rains) but EWS monitoring is being explored.
DROUGHT • Rain gauge • Livestock wellbeing • Prices • Ground water levels • Crop status and production	Oxfam **Viet Nam** is exploring how to translate success with flood CEWS to drought, using radio broadcasting.	Cambodia: With 16 drought years since 1982 in Svay Rieng Province, the National Society is exploring mitigation by involving communities in local decision-making based on improved weather forecasting.
LANDSLIDES • Rain gauge • Vegetation cover • Slope	**Nepal:** ECHO (DIPECHO) funded project guided by the Danish Red Cross identified three indicators to measure risk. A simple toolkit helps communities understand the causes, measure the risk and stay alert. **Indonesia:** DRH with Gadjah Mada University developed simple and low-cost equipment (with linked siren) for monitoring that was installed, operated and maintained by remote communities in five provinces.	**Sri Lanka:** The worst landslides in 50 years hit Ratnapura and surrounding districts in May of 2003 affecting over half a million. No warning was provided.
CONFLICT • Crime • Prices • Sale of livestock	**Sri Lanka:** FCE has developed a strong presence of grass-roots level monitors, which consists of over 30 field monitors operating in the conflict zone.	

Monitoring is the EWS component that is most closely tied to science. Useful and actionable data and information about evolving hazard conditions need to have a solid scientific foundation. It will be important during the design of a community-driven or based monitoring effort to involve stakeholders and authorities that have a scientific understanding of the hazard, the local environment and the way it is best monitored in a given area. For flooding, it would be useful to start a dialogue with a local hydrologist; for drought, a meteorologist; for epidemics, a medical doctor; for conflict, a law enforcement officer. It is also important that government institutions that gather relevant data have the mandate and the capacity to both give and receive community risk knowledge as part of their monitoring responsibilities. This does not mean that communities are not able to actively guide and participate in monitoring.

Proven by mere human survival, individuals do their own qualitative monitoring spontaneously. Farmers know when conditions are getting worse for their crops; merchants see when sales are down; fishers are attentive when their daily catches decrease and often see a link with environmental conditions. Likewise, any survivor of a disaster who has lost someone or something precious to them automatically monitors conditions that may trigger another similar disaster. Rather than being based on science, this monitoring is based on undocumented *lived* experience, often times *generations* of experience. It is crucial to capitalize on this wealth of experiential knowledge when designing EWS. Experiential monitoring and scientific monitoring can be a winning combination.

Activities to explore:

- Review the knowledge systems of at-risk communities to identify the ways they conduct(ed) their experiential monitoring and the indicators they spontaneously track or act on.
- Calibrate indigenous monitoring of indicators with science.
- Seek to ensure that community-level monitoring is valued in national EWS and its use mandated by local law or policy, if not already included.

Lesson learned:

In southwest, coastal Bangladesh after Cyclone Sidr on 15 November 2007, the affected people were found to have been reluctant to respond to cyclone warnings, even when the warning signal was raised to 10. This was because they had not experienced a similar major cyclone since 1970 and disbelieved the warning. During Cyclone Sidr, most of the affected households only left their houses when they saw water coming close.

Good practice:

GOAL/Malawi (ECHO-DIPECHO funded project) inventoried the local indigenous warning signals recognized and used by the community and hired a scientist to study them and justify or refute their scientific validity.

This component is completed with four specific guiding principles:

Guiding principle on monitoring, 1:
Passive receivers of information do not save lives

In many cases, nearly always in developed countries, monitoring is conducted by technicians or scientists at a central (global, regional or national) level. The most common entity that conducts scientific monitoring for environmental hazards is the National Meteorological Service. Typically, "Met" services monitor

by combining high technology (such as satellite imagery) with measurements set up to be compiled from many localities (such as automated weather stations). The resulting information is then analysed, packaged and communicated to those who are at-risk of a given hazard or disaster—ideally giving communities time to prepare or take action. This is a classic top-down EWS where communities are more or less *passive receivers* of monitoring products.

To be considered a CEWS at least one of the four EWS components must be 'active' inside the community. According to the definition of a CEWS (see chapter A), if a community does not observe and record information, it needs to be able, at the very least, to *analyse* the information received from the outside. If a community is entirely dependent on monitoring information coming to them from the outside, it is critical that those who *receive* it also *own* that information. Analysis leads to ownership. Table 11 describes efforts across the globe that demonstrate ownership of active monitoring or, at least, active analysis of monitoring information by first receivers at the community level.

Table 11: Active monitors and/or first receivers of early warning monitoring (good practice)

Country	Exact name of monitor or first receiver	Hazard and description	Funder/NGO
Sri Lanka	Observation families	Tsunamis…	JICA
China	Geo-hazard monitoring volunteers	Landslides	Government
India	Observation Man	Floods	Government
Australia	Creek readers	Floods	Government
Nepal	Gauge readers	Floods	Practical Action
USA	SKYWARN Weather spotters	Storms and rainfall	NOAA/FEMA (government)
UK	Neighbourhood Flood wardens	Floods	Self or government

Activities to explore:

- Confirm whether or not hazard information already monitored for an area is pertinent and adequate to cover the risks identified and prioritized by the community.
- Serve as an active bridge between the national or official EWS (technicians conducting the monitoring or scientists) and the community:
  - Explain to the community in simple terms what monitoring information is already captured at the local level and what scientists do with that information.
  - Start a dialogue with authorities and scientists exploring how and why the information they are monitoring does or does not satisfy the needs of at-risk communities.

- Look for ways to strengthen or upgrade on-going monitoring, at the community level:
  - Fill gaps by adding new low-tech measurement stations linked to the national EWS, but managed by the community.
  - Identify *first receivers* at the community level, whose role is to receive monitoring information from upstream villages or national authorities and to *analyse* and act on that information, long before it becomes an official warning.
  - Provide training to first receivers on how best to analyse monitoring information received from the outside of a community.

Good practice:

GKiogani, a local NGO in Indonesia, brought scientific information to the government and strategized with local authorities on how to monitor conditions and identify danger areas. They also ensured that vital information from the outside reached the communities. This was tested when an earthquake occurred in September 2010 and people knew what to do and evacuated to safe areas when warnings were issued.

Guiding principle on monitoring, 2: Some communities will need to DRIVE their EWS

Some communities will need to DRIVE their EWS

Despite the high level of commitment and effort required to build and sustain a community-driven EWS, there are many situations when monitoring is important at the 'first mile,' by the community themselves. These include when:

- There is no national EWS and/or other pertinent authority such as a meteorological service.
- National EWS or related disaster risk reduction/management authorities are unable to provide clear and timely warnings to communities at-risk of a given hazard.
- Hazards are so localized that even strong national EWS would not pick up the signal (example: highly localized stream or flash flooding with the closest gauge at more than 10km; landslides that follow seismic activity; mudslides that follow deforestations; highly localized rainfall).
- EWS or related authorities at any level provide information that the communities do not easily trust.
- Disaster mitigation or communication, alone, may be enough to protect communities. In some situations, empowering communities to regularly clear debris from water channels will be enough to prevent annual flooding. With communities living downstream of major dams, advocating for proper communication channels to be developed may suffice. In these two very specific cases and others, setting up a community-*driven* EWS might be wasteful.
- Regardless of the above, communities are self-motivated to safeguard their lives and livelihoods from high exposure to risk by producing complementary, or redundant, monitoring products.

For each of the cases described above, communities should be empowered not only to receive and act on messages (when available), but also to drive, or at least actively participate, in monitoring the conditions closest to them. Only in this case do we have a true bottom-up "*community-driven* EWS."

Good practice:

In the Caribbean and Central America, community-driven flood warning systems provide cheap and simple water level gauges in several communities. These simple monitoring devices are tools for an individual to monitor flood with or without rainfall measurement. This equipment has several advantages as it is linked to an automatic buzzer/lamp in the house of the designated "reader" and allows for 24-hour monitoring. This means there is no need for someone to actually read from the instrument but requires the person to stay at home to monitor conditions closely when there is a heavy rain forecast. One of the most important improvements made to the initial system is to include automatic dialling in the alarm system so a phone call (landline or GSM) is generated to alert the "gauge reader". This effort is coordinated by the Caribbean Disaster Emergency Management Agency, supported by JICA with the participation of the West Indies University in Trinidad and Tobago.

Activities to explore:

- Review the conditions above to confirm that a community driven EWS is the most appropriate option to reduce a community's risk levels. If there is a national meteorological service or national EWS, consult them and keep them fully engaged in the process.
- Identify community members that participated in the risk knowledge exercise who feel that a community driven EWS is crucial. Confirm together that risk levels/frequency and/or numbers of interested volunteers make embarking on a community driven effort a sustainable option.
- Develop early warning committees at the community level, such as sub-community development or village disaster committees.
- Organize an EWS training for volunteers at which the indicators to be monitored will be identified by the community for each important hazard. The training should also feature modules on the other EWS components (see chapter D).

Good practice:

FARM Africa approach is to identify existing groups in the Hamer community (Ethiopia) who have traditional responsibility to gather early warning information and advice on disaster response. No one undertakes farming without the blessing of the Gudii, who requests rain from God before cropping begins. Donzas are elders who provide advice on disasters. There are also traditional forecasters and fortunetellers who advise the community (Met'eed who forecast based on the movement of stars, Moorah who throw shoes up and predict the future, and Koymo who forecast by looking at animal intestines). Because the Hamer community strongly believes in these traditional institutions and follows decisions made by them, they are systematically included in the early warning sub-committee.

Guiding principle on monitoring, 3:
Public displays of monitoring can motivate communities

Tracking monitoring information is vital to detect trends. A regular analysis of trends lends itself to forecasting, and eventually warnings may be issued. One way to publicize the trends detected by the EWS is to put them on public display. The display is not strictly speaking a warning in itself, but serves as a daily reminder that information can promote powerful change. Billboards or posters in public places with EWS information changing everyday spark a growing interest in those changes. Community members that never participated in risk knowledge or monitoring training and activities also develop an appetite for information in general.

Such billboards can be as simple as a handwritten series of numbers on a poster outside a town hall. With more resources, blackboards near the market or sophisticated score signs in town have also been used to display monitoring information.

Activities to explore:

- Decide which of the indicators tracked by the committee/community or received from outside, if not all, are fit for public consumption.
- Discuss the impact the display may have on the community and document how to measure that impact.
- Identify the most cost-effective materials available locally to produce the display and lobby for and/or raise the necessary funding.
- Create rotational responsibilities for volunteers or local authorities to take turns to post the new information.

Good practice:

The Sierra Leone Red Cross Society's CEWS developed in Bumbuna monitored two hazards and vulnerability and recorded the data on sheets of flip chart paper hanging in the central most part of the village.

Good practice:

A Cambodia Red Cross Society project was based on a two-way radio communication system that allowed Red Cross volunteers to send river level data to the MRC as well as to receive forecasts. Thirty-eight villages were chosen based on pre-established criteria including historic vulnerability to annual and flash floods, proximity to MRC water-level gauging stations, the presence of Red Cross volunteers and the level of interest among local communities and authorities. Village level billboards give four readings: 'yesterday,' 'today,' 'tomorrow,' 'the day after tomorrow.' The forecasts are generated by the Department of Hydrology and River Works. Alarm levels and corresponding responses have been developed with the involvement of local communities. This EWS has been recognized as a positive example and has been incorporated into National and Cambodian Red Cross Society DRR strategies but has faced difficulties since the end of the externally funded project period.

Good practice:

Malagasy Conseil National de Secours/CARE established commune-level EWS in Madagascar. Local authorities chose their indicators and prepared chalkboards, hung in a public place, upon which, they recorded the indicator evolution.

Guiding principle on monitoring, 4: When hazards evolve, so must their monitoring

In this era of heightened climate change, just as hazards evolve, so must monitoring information. After every season or hazard event, it is crucial for the EWS committee/team to return to the information collected, and critically analyse the experience.

Questions to ask:

- Are the indicators tracked the right ones to permit timely action?
- Were the monitoring instruments installed in the right places and functional?
- Was the community-based analysis of monitoring messages from the outside appropriate and useful?
- Were the thresholds used to trigger action or emit warnings adequate?
- Did a public display of monitoring information serve its purpose? Can it be improved? Who else may need to receive this information?

Lesson learned:

Australia floods, "What Can Go Wrong if Reviews are not Held: A case at Narromine, in New South Wales," indicates why reviews are necessary. The original 'minor flood' level was set during the 1970s as the height on the local gauge at which a low-level bridge connecting two parts of the community would close. Later, the bridge was replaced by a higher-level structure, but the 'minor flood' level was not reviewed until after 2000. The result was that the prediction agency continued to issue flood predictions that were no longer appropriate and which the community disregarded. If a larger flood occurred shortly after, the community would not have been prepared.

Monitoring is separated in this guide from communication because the skills and equipment you need to monitor hazard conditions are very different from the skills and equipment you need to issue warnings (component 3). An individual who is good at observing, measuring and analysing information may not be a good communicator of warnings, and vice versa. In a parallel manner, the instruments you use to measure floods during a monitoring effort are not the same as those used to issue a warning message.

EWS component 3: response capability

If an EWS is a healthy body, response capability represents its hands and feet: the hands help prepare for a hazard and the feet carry the body out of the disaster's reach. Improving the brain's conditioning and signals it sends out (risk knowledge and monitoring) without having ready hands and feet has very little value, particularly for the community. This chapter is about how to get those hands and feet ready.

The first question in response capability is: **"What we are responding to?"**

Guiding principle for response capability, 1: In EWS we respond to warnings, not to disasters

Communities need to be ready to respond in case the risk becomes a reality. The response here is to a *warning*, not to a disaster. Remember that disasters are preventable, and EWS is one tool that helps prevent them. We need to be ready to respond the moment we hear that a hazard or event is pending or heading in our direction. An early warning sounds the alarm, telling us to roll out a set of response options we have already given careful thought to and organized. Response capability typically involves actions that prepare for, or reduce the impact of, a hazard or disaster. A community is deemed "response capable" when they know, have practiced and have the means to engage in appropriate response actions.

Before the term DRR became commonplace, most practitioners' focus was on responding to *disasters*. Disaster relief, recovery, rehabilitation and reconstruction all entail responses to a disaster. A lot of guidance exists on tools and mechanisms in place for disaster response. This guide has an entirely different goal: preventing disasters through early warning, making disaster response less and less necessary. In early warning, we respond to warnings to prevent disasters.

A second key question in *response capability* is **"What are standard response options once we receive or hear a warning?"** The answer depends a lot on the hazard and on the warning lead-time, the time between receipt of the warning and the moment the hazard will strike.

The most effective way to answer this question is by engaging in an exercise such as one proposed by the IFRC, at any level (communities, disaster risk management staff, policy makers and donors). As a reminder, guiding principle 6 in chapter B explored the various time-scales for which EWS must be poised to respond. The idea behind the RATS exercise is to systematically think about what you and the people around you could do today if you heard that a major drought would affect you in six months, in 10 days, or in 12 hours. What could you and those around you do today if you heard that a massive river flood would strike next year, next season, next week, in eight hours or in 15 minutes?

Table 12: Respond Across Time Scales (RATS)

To be completed by communities Lead-time of message:	1. Early warning message says:	2. Appropriate early actions that are feasible today:	3. Early actions that could be possible with support:
Years			
Months			
Weeks			
Days			
Minutes (now)			

The RATS exercise guides the community to produce one table per hazard, like the one in Table 12. Examples of completed RATS tables are provided in the Annex (for cyclones, river floods, drought, tsunamis, volcanoes and flash floods). Systematically thinking about response actions separately for each pertinent hazard, at your level, with no added resources (column 2) is a fundamental step towards mastering this component. Column 3 will get you thinking about future DRR programming. The RATS exercise can eventually guide practitioners at any level to prepare and lobby for more substantial interventions (that may require support) across timescales that are required to make communities safer, such as infrastructural or technological solutions, when appropriate.

Because the RATS exercise can be a very engaging tool for communities, it is best to let them complete the tables themselves, without prejudicing their responses (DRR managers may find it easier to complete the early warning column for the participants). Some guidance will be required to identify or rank those

proposed by their feasibility or appropriateness. It may also provide guidance on the limitations of forecasts and understanding probability and likelihood of various outcomes. Conducting the RATS exercise with communities can produce some very innovative solutions to cope, including responses needed to mitigate damage and loss. Once the response options are established, training sessions, educational activities and public displays of information make people think about the risks they are under and may propel the generation toward new, innovative solutions [12].

Simple mitigation actions that can be conducted at the community level (with lead-times of hours or more) may include reinforcing river-banks with sand bags (for flooding), putting heavy objects on household roofs (for wind), adapting to construction materials that are more resistant to water logging (for heavy rains) or clearing debris from channels and inhabited areas (limiting risk of flood and fire). Raising all water points above the flood level to keep water from being contaminated is yet another.

Good practice:

The Cambodian Red Cross Society helped villagers in Kandal, Kartie and Prey Veng provinces raise the level of their houses and relocate their cattle to higher ground to prepare for the following year's flood season. The villagers did not consider building up the soil level on the riverbank until the project started disseminating simple methods of preparing for floods.

An EWS should include a means to receive feedback from community members; depending on the cultural context, it can be a suggestion-box, a contact form in a website or gathering information as part of school programs (example: volunteers can organize an activity with students in which they gather information at their homes, as homework, regarding feasible response options).

Activities to explore:

- Prepare RATS sheets for each pertinent hazard (complete the early warning column 1 with appropriate contextual messages).
- Organize a meeting at your level (institution or community) to work in small groups to complete the sheets, one group per hazard.
- Give all ideas time; do not discard anything without proper discussion and consideration.
- Get children, teenagers and older persons involved. This activity can interest them and they are naturally more creative than adults and a good source for innovative solutions. When culturally appropriate, conduct RATS separately for each gender.

Sometimes, a RATS exercise will produce so many possible actions that it is difficult to sort out the good from the less useful, or to prioritize them. Another rule of thumb is as follows:

Guiding principle for response capability, 2: Strive to organize robust no-regrets response actions

The term *robust* means strong or vigorous in daily jargon. However, in science, robust takes on a larger meaning. Robust [13] response actions in early warning are those that are useful, not wasteful, even if the disaster does not come as planned (as in a false alarm). Investing in robust actions is without risk, because whatever the cost or disaster event, that action will serve another purpose.

12 *A good resource for this is Box 3 on the 6th page of: www.climatecentre.org/downloads/File/FAQ/FAQ%20climate%20risk%20management_global%20platform_final[1].pdf*

13 *Robust is a term adapted from parallel use in the field of climate change scenario planning.*

Robust could also mean actions that are common to (will be useful during) more than one hazard. Efforts to develop response actions that satisfy hazards as well as other, perhaps daily, needs will also make them more meaningful, robust and sustainable, even in the event of a false alarm. We should give priority to response actions that have multiple utilities. Examples of robust responses to warning are provided below:

Good practice:

In Antigua and Barbuda, the National Plan to Reduce the Vulnerability of School Buildings to Natural Disasters (www.oas.org/cdmp/schools/anbplan.htm) is part of an effort to improve the nation's response capability. Schools are usually used as shelters during disasters and as such they should comply with minimum set conditions to reduce their level of vulnerability. However, there is a movement to use schools as the last option, so that classes can resume. The plan was developed in an effort by the Government of Antigua and Barbuda, OAS, USAID and ECHO, and it aims to get the community involved in aspects of vulnerability assessment, policy-making, actions taken and safeguarding/maintenance of the facilities the children will use but that they will need to use in case a disaster strikes.

Good practice:

ECHO - DIPECHO implementing partners in Madagascar organize communities to build storm shelters that serve as administrative offices with space for the local DRM committees to function.

Good practice:

In Malawi, making all new ECHO - DIPECHO funded water points at schools to be fully raised (above the flood level) helps to protect water from contamination during floods. Also in Malawi, DIPECHO partners develop community shelters that serve simultaneously as schools.

For a response action to be robust through time, it should rely on community knowledge and locally available resources. External funding may be present at a moment, but communities should not depend on it as it may not be always available, different locally generated funding options should be considered.

Once prioritized, response actions must find their way into a plan and actors must strategize and record the operating procedures.

Guiding principle for response capability, 3: Embed response options in annually updated contingency plans with links to funding

An important tool for disaster risk managers is contingency plans. These are regularly updated plans that are negotiated at the community level. The contingency plan's Standard Operating Procedures should be a clear inventory *who does what when and how* in an emergency. One full chapter at the beginning of a contingency plan should be dedicated explicitly to early warning. That chapter should clearly detail *who does what when* and *how* in response to the first, second and/or third warnings received for each pertinent hazard.

The long-term projections for regions/countries currently available from climate change fora need to be applied in adapting to a changing future. Disaster risk management planning and contingency plans are not only based on past experiences, but on 'expecting the unexpected.'

Contingency or response plans to cover the needs of the whole community are a good idea, but so are response plans at the household level. Getting people

involved in an exploration of responses that they can do with their children in their homes, makes the experience very personal. Key messages for public awareness and public education for DRR can be use for this purpose. The IFRC is developing Public Awareness and Public Education for Disaster Risk Reduction: key messages for all-hazards targeted to households and communities.

Within a contingency plan, there should be details on how to appeal for or request disaster funding. There are a growing number of opportunities to request funds before a disaster strikes, once again in response to a warning, especially a warning with a long lead-time. Another much less common response involves index insurance, i.e., as soon as the early warning monitoring of rainfall reaches a certain threshold, the farmer's insurance pays a pre-determined amount that should help find solutions.

The DREF has provisions, despite its name, to release funds based on early warnings of certain imminent hazards predicted for onset within days to weeks. When requested by National Societies, DREF funds can be used to cover specific eligible costs within the at-risk area, including the "activation of community early warning systems" (Refer to DREF Position Paper and Guidelines). Examples follow of DREF and others:

Good practice:

In the Zambezi flood basin, the Namibia Red Cross requested support from the DREF in March 2011 based on their monitoring of existing river levels. Using predicted flood surges, they evacuated families from specific at-risk areas and prepared shelters. One month later a national emergency was declared and an emergency appeal launched.

Good practice:

The Mozambique Red Cross Society was able to take effective "early action" in response to "early warnings" in December 2007 – that the Cahora Bassa dam on the Zambezi river was increasing its discharge rate to 4,450 cubic meters per second and that the Buzi river to the south was only a meter below "critical" level. The Mozambique Red Cross Society did not let a moment go wasted and an aquatic-rescue team was able to replenish its stocks of fuel and quietly dovetailed a detachment of Mozambican marines, completing the bulk of evacuations in the Buzi river basin even before the end of December and proving yet again that disasters need not be disastrous.

Good practice:

In India the state involved NGOs in a major education campaign regarding cyclone early warnings and preparedness to handle sanitation the isolation period following a cyclone. The contingency plan also laid out detailed evacuation routes, location of cyclone shelters and prepositioning of medicines, and provided for a unified command, pre-determined rescue teams and emergency health teams to be dispatched immediately in case of a cyclone.

Activities to explore:

- Take the lists from the RATS exercise and prioritize them, with community members.
- Fold the prioritized response actions into contingency plans; clarifying who should do each action, when and how.
- Encourage single households to consider individual response plans: these may not be written, but can easily be rehearsed and repeated (such as where to meet if a storm hits when children are at school, etc.).
- Identify funds available for disaster and lobby with their donors to make a certain proportion of them tied to early warning, to prevent disaster.

- Seek to ensure that these activities are mandated by local law or policy, if not already included.
- Contact local authorities, NGOs and private sector to promote efforts at local level.

Guiding principle for response capability, 4
Practice makes perfect: test-drive your response actions

Drills and simulations must be conducted to test if the response options and contingency plans are adequate and if the community as a whole is prepared to use it effectively. The results of these simulation activities or those of the actual response actions when an event strikes should be analysed regularly to improve this component and the EWS as a whole. It is important to remember that although fear may be present during a real event (particularly during hazards with short lead-times), practice makes people face their fears and installs reflexes and life-saving routines.

Some response actions are neither robust nor creative, but still have an important and highly visible role as part of the EWS response package. Evacuation is one of these. It has been said that if you cannot control a hazard, you must adapt to it (strengthen the construction of your home, or raise it) thereby developing resilience to recurring hazards. If, then, you cannot adapt to it, the last resort is to flee. There are times when the only good response to a warning is evacuation, seeking shelter in a safer place. Creating emergency evacuation routes and signalling them clearly, creating and maintaining multi-purpose shelters and convincing people to leave their homes, animals behind are very important response actions. There is a hefty body of literature that describes and provides guidance on evacuation as a group response; these are not explored further in this guide.

Good practice:

In Argentina, a successful simulation/drill was conducted in 2010 as part of an effort to enhance the response capability of the most vulnerable communities in Embarcación, Salta after a series of efforts had been made to promote risk awareness. Several actors acted in a coordinated manner to successfully evacuate 485 people, after the local Emergency Operation Centre issued an evacuation order. Another interesting key element of this EWS is that the alert is given by a member of the community that "monitors" flooding of her own fields. This EWS is part of an effort by Project DIPECHO VI with the Argentine Red Cross.

Good practice:

In Shanghai, residential communities actively take preparedness actions and rehearse multi-hazard mitigation every year. A residential community-centred response procedure, with the support of government agencies, the practicality of a residential community-centred strategy was demonstrated during the 2005 typhoon season. For example, on 23 March 2005, a rehearsal was held for a trial typhoon warning issued by SRMC. The administration departments immediately implemented prepared plans for multi-hazard mitigation. On receiving the warning, the managers informed residents through electronic screens and community sirens. The residents started to prepare for the hazard and evacuation.

Good practice:

RC India, In Orissa, preparedness drills are organized at local cyclone shelters to ensure that communities know what to do when storms strike.

Activities to explore:

- Organize drills or simulations before every hazard season, at least annually, assuring diverse participation from the community.
- Assign various roles to participants and have them act out drills/simulations during training sessions.
- Document experiences from drills and simulations, as well as from live events, to reduce the possibility of making the same mistakes more than once.
- If the system cannot be tested as a whole, test it by parts and integrate the information later.

Response capability seeks to reduce risk once hazards and heightened vulnerabilities have been detected and analysed. Response capability must be strongly connected to warning dissemination: Issuing a warning that results in no action is a useless effort.

Lesson learned:

Kalam, a 42yearold farmer near the coast of Sandwip Island, Bangladesh, reminds us of what is a stake during a warning for cyclone evacuation. "I used to see every year cyclones in this area but I do not know which cyclone would be dangerous. I always work in my paddy field. I sometimes hired day labourers to work in my field and I have to pay for them. I need their services in exchange. Therefore, I cannot leave working just on hearing a warning signal. I am responsible for earning livelihoods of my wife, four children and my aged parents. I raise two cows for ploughing my crops. I have to look to see whether my cows are enough fed, for better services tomorrow. There is no cyclone shelter nearby to my houses for us or a raised place for shelter of my domestic animals. I rather rely on Allah's wish, whatever I have got in my fate, I believe that will happen in my life."

EWS component 4: warning communication

Warning communication is an essential link between monitoring and response capability. If the EWS is a healthy body, communication is the mouth. When the brain sends the message (monitoring), the mouth must transmit it to those who need to hear it before the hands and feet can act on it (response capability). The information gathered during monitoring feeds directly into warning communication by providing the material that this component will spin into a clear message and a full communication strategy.

An actionable early warning provides a timely message that reaches, is understood and is acted upon by the population at-risk. Communication is the central theme of this component; there are many experts in communication whose skills should be put to good use when preparing messages and launching a communication campaign to deliver the message.

Main actors in warning communication

For successful communication to take place, there are at least three actors. They are as follows:

1. **Author:** responsible for creating or assembling the contents of the alert message (typically a technical service such as meteorology, hydrology or health; but sometimes a community).
2. **Mediator:** receives, aggregates, reformulates and redistributes alert messages among at-risk recipients; also known as transmitters or 'first

receivers.' S/he should attempt to preserve the original information but may make meaningful changes to the message content or envelope. It is rare that a message goes directly from the author to a recipient with no mediator.

3. **Recipient:** a 'consumer' of the delivered alert message, also known as the audience.

The problem in early warning is that the authors rarely know their audience well, the recipients. They are often the same people who are responsible for monitoring, scientific and technical experts not necessarily skilled in communicating data in ordinary language. Recipients, then, when they receive the message, often do not understand the full meaning. The real meaning gets lost in technical language and a tone that does not hold attention; often the language itself is not in the locally understood dialect. This makes the role of mediator extremely important. As a disaster risk reduction/management professional, you must polish your skills as a mediator and interpreter of early warning messages.

All too often, key recipients have little faith in the warnings. This may be due to a human inclination to ignore what appears inconvenient at the time, to a general misunderstanding of the warning's message or to frustration with yet another false alarm. When developing official EWS, planners must account for the recipient's perceptions, their past experience of reacting to warnings, and general public beliefs and attitudes regarding disasters.

Even though governments are ultimately responsible for issuing timely public warnings, National Societies and NGOs can play a supporting role. They can serve as mediators between scientists or technicians and the recipients, helping by interpreting and repackaging early warning information. Efforts to build mediator capacity should complement local knowledge and capacity related to disaster early warnings.

Guiding principle for warning communication, 1
Clearly delegate responsibility to alert or mediate

Clearly identifying who plays the role of author and mediator is very important, especially with hazards of long lead-time. Although the author may be outside a community (wherever monitoring is conducted), the mediator should be the person inside the community who is the first to receive the message; sometimes we refer to these individuals as the 'first receivers.' First receivers benefit from specific training in forecast interpretation, communication and mediation—to repackage and transmit messages in a timely manner. The goal is to carefully consider the audience and to promote an on-going two-way dialogue between the author—mediator—recipient.

An efficient community EWS communication component should identify more than one first receiver, or mediator. Following the rule of redundancy, a receiver may be away from the community or ill. With two or more trained, mediators can fill in where/when the other(s) is unable. Too strict a determination of mediators might discourage individual/ad-hoc innovation. Regardless, messages will flow through local channels as if they had a mind of their own. Our job is just to speed up the process, make mediation more certain to reach those most at-risk and more likely to be understood and acted upon.

This may or may not influence a community EWS, but it is good to know the rules and how to interact with the national EWS. As noted above, it should also

be borne in mind that taking on a role in official EWS may lead not only to political and moral responsibility to correctly carry out your responsibilities but also legal liability if you fail to do so. Consulting with a domestic lawyer prior to developing the National Society's role in this area will provide a fuller picture of any potential risk.

For CEWS, the responsibility to issue warnings may be implicitly given to key community members. Experience shows that some EWS actors may naturally play the role of mediator, with no additional incentive or delegation. Mediation may require no formalities, but harnessing knowledge of these actors to channel their energy through EWS or communication strategy development can be a powerful dynamic. Whenever possible, this local mediation can greatly benefit by being integrated with the national EWS.

Good practice:

In Samoa Island, seeing lagoons starting to empty after an earthquake, older persons immediately started to alert and encourage the evacuation of the area.

Good practice:

In Mali, PESINET program – similar to UNICEF SMS EWS for children diseases built a system of health workers teams who are in charge of monitoring (weekly visiting children and verify determined elements of their health conditions) and alerting at the same time (transmit monitored results through GRPS and alert in cases of worrying changes in one child's health condition). Higher up in the system, a second team receives SMS/GRPS data (related to each child), analyses the changes and mediates toward families and reference doctors if the child presents worrying symptoms.

Good practice:

The Mozambique Red Cross Society counts on local risk committees around the Zambezi Basin to notify the population with color-coded flags, whistles and loudspeakers about imminent cyclones and floods. Information comes simultaneously from the National Met Station and local monitoring efforts.

Lesson learned:

In, repeated destructive bushfires (Canberra, 2003; Black Saturday fires in Victoria, 2009) bring to national attention the legal responsibility of authorities "to issue warnings and provide information to the community… for the purposes of protecting life and property." Perceived popular negligence regarding this duty to warn has been taken to court where it remains to be seen if the various contexts (duty, failure and whether warning would make a difference) will justify liability.

The next issues at hand concern what constitutes a good warning message. Here, we explore the contents, tone and standardization of warning messages.

Message content

A worthy early warning message must contain the six following elements:

1. Timing: When is the hazard due to strike?
2. Location: Which areas are going to be affected?
3. Scale: What is the magnitude of the hazard? (e.g., level of water, wind speed, etc.)
4. Impact: What will be the effect of the hazard on the communities and environment?
5. Probability: What are the chances of this happening?
6. Response: What should at-risk populations do to protect themselves?

One way to remember these six elements is to memorize the sentence: "*Telephones lose service in peri-urban regions.*" The first letter of each word will help you remember one of the six message components.

Good practice:

The Buzi/Save basins in Mozambique are regularly affected by disastrous floods. Since 2007, practice drills/ evacuation simulations have been organized in which community members become familiar with the warning tools, the content of the warning messages and learn how to physically evacuate a wounded person.

Message tone

Recent research is mixed on the importance of *emotion* in a warning message. Messages with strong emotional appeal may in some contexts be more successful in both reaching and convincing the recipient. In addition, messages need to use a "vocabulary" that resembles that of the recipient community: language, tone, choice of meaningful words.

Message standardization

It is vital to seek a balance between consistency and contextualization, to have messages that are not contradictory or confusing. Consider language, vocabulary and culture as strong influences to guide the phrasing and tone of the messages. Warning messages, however, are not subject to the 30-second rule for commercial publicity. It is better to provide the full story and to let it evolve. It is also advised to prepare messages long before the hazards strike; they can and should always be adapted to each context. They could even be in an annex of the contingency plan.

Standardized messages are important, especially in a mobile world in which people have fluid movement between regions and hazard-scapes. The IFRC's "Key Messages for Pubic Awareness and Public Education in DRR" is a useful place to shop for well-analysed messaging.

Another source for pre-packaged messages that you could start with as a baseline when composing and contextualizing your messages is the Common Alerting Protocol (CAP). The CAP is a comprehensive source that exists for standard messages at the international level. It is the basis for a common framework for early warning messages, although not fully updated for some hazards.

Communication strategy

Now that the message has been prepared and packaged taking into full account the profile and perceptions of the at-risk recipients, the challenge is literally to speed it on its way. To get that message launched we need a communication strategy. The communication strategy maps out all possible local options to be able to identify the most efficient:

- Devices: the technology used to convey messages. Below we will explore low, medium and high technology options used in warning communication.
- Dissemination or channels: the flow, frequency and redundancy of message transmission.

Guiding principles for warning communication, 2
Do not fall into the sophistication trap for warning devices

The sophistication trap describes contemporary thinking that everything modern and technocratic is more reliable or more likely to work. This fallacy is dangerous because it leads to the use of inappropriate technology. In community and national EWS across the globe, no-to-low technology has provided excellent results in transmitting messages.

- No-technology: In some communities, to deal with illiteracy, warning messages take the shape of drawings (pre-determined or not) that promote very swift understanding. Runners rapidly transporting messages from one place to another and town criers use no technology beyond their voices to mediate. Posters and anything recorded on paper is considered no-tech.

- Low technology: Flags, boards, whistles and megaphones. Traditional sounds and instruments have long been the mediators/conveyors of warning messages.

Good practice:
The kanungkong is a bamboo instrument which was traditionally used to call community members to assemble at the village hall for meetings, alert people or call children home. The flood EWS set up in eight villages in Dagupan City, Philippines, has revived the use of the kanungkong along with staff gauges as flood markers in strategic locations in the villages of the city.

Good practice:
Sometimes the herders in Pakistan happened to be at the right place at the right moment to communicate the imminent danger of flash floods to communities lower down. They would shout the message to another herder in a lower pasture or to the nearest village if possible. A few of them also knew how to blow the 'booq,' a trumpet- like instrument made from the horn of a yak or a wild goat.

Good practice:
In the Zambezi Basin, Zambia, for centuries people along the Zambezi River relied on drumming to communicate information about river conditions. The tradition had been lost, and the Red Cross is working at restoring it in light of the floods CEWS.

Good practice:
OXFAM has put the Darfur Hakamaat—female traditional singers and storytellers—back in business. Having ceased their important storytelling since the hostilities, the hakamaat spread messages to the communities with song and could play an important role in alerting on drought and conflict.

- Mid Technology: SMS (UMS for earthquake), telephone, radios, high frequency radios, secure radio transmission

Good practice:
With support from the Red Cross Red Crescent, Colombia, Haiti and Nicaragua have incorporated SMS into their efforts to strengthen national and local early warning systems. The affordability and coverage of cell phone technology has enabled a level of communication never before available.

- High technology: automatic SMS (subscriptions to automatic alerts), TV, Internet, and satellite-driven instruments.

Redundancy: Singular dependence on one communication device or channel can also be problematic.

Lesson learned:

In Mali, a community-based health EWS focused on reducing early childhood mortality from infectious disease failed because of a singular dependence on SMS/GRPS warning combined with unstable internet quality. A redundant flow of messages using appropriate technology may have been a solution.

Guiding Principle for warning communication, 3
Use staged warnings (levels and colours) in dissemination

Warnings are typically issued in stages of increasing urgency; the communication/dissemination strategy must develop a staged flow of information. There are many equivalents of staged warnings throughout daily life. With some exceptions, traffic lights are typically in threes: green to go, yellow to beware and red to stop. The childhood game "Ready, Steady, Go" (or the equivalent "On your mark, Get Set, Go") stages warnings for runners that advance behind a pretend traffic moderator whose back is turned. You may find many more examples in your local context.

Very commonly, early warnings draw on three stages progressively increasing in importance such as: watch, warning and alert. They also often colour code warning communication devices to align with the three stages: green, yellow and red where red is the most important stage. Although there are certainly differences in cultures, in early warning the colour red has come to signify "Go – flee" or "Take immediate cover." Beware of cultural differences in the meanings and interpretations of colour by those affected with colour blindness (typically four to eight per cent of the population, with the least in Africa).

Staged warning of increasing urgency can also be replicated in the tone of voices on megaphones or radios. Loud and fast voices repeating the same message normally convey more stress and urgency.

Good practice:

In Indonesia, they adapted the information scientists prepared into easily understood diagrams of red/yellow/green to identify danger areas and evacuation routes. The scientific information was presented in easily understood messages that people could comprehend and act on.

Good practice:

In Haiti, EWS project uses colour-coding when warning flags are used to communicate the warning to communities. It was detected that problems could arise from a local meaning of the orange and red flags related to voodoo so the warning flags were adapted with writing in Creole. This adaptation strengthens level-coordination because it allows the use of the same colours at the national-level (3: yellow, orange and red) and the community-level (2: orange and red). The system has been tested during cyclone Thomas in 2010, and the storms Emile and Irene (2011), and receives financing from ECHO, UNDP and USAID.

Activities to explore in warning communication:

- Identify implicit authors or mediators in the community. Explore existing warning architecture: who played these roles during previous events? Explore how the implicit arrangement could be used as a first base for the CEWS communication.
- Work with community EWS committees to contextualize standard messages making sure they contain six or seven elements and are inscribed in the local contingency plans.
- Guide the community to choose which staged and colour-coded system is most appropriate given the local context.
- Have the community carry out an inventory of all communication devices and channels to convey messages to those who need to hear them. Be certain that the needs of the most disadvantaged be reached by the listed devices and channels.
- Work with the community to extract the best combination of devices and channels from the inventory above to produce a communication strategy and architecture: How many people should be involved? What should be the profile/status/availability of first receivers and/or mediators?
- Create linkages between monitoring actors and mediators or first receivers at multiple levels to assure a seamless flow of warning messages into the community. Knowing each other personally makes warning transmission more meaningful.
- When pertinent, lobby to acquire appropriate technology required for message mediation.
- Seize the opportunity after each disaster to evaluate what individuals have understood from each message, and how it can be improved.
- Seek to ensure that relevant laws or policies require these activities, if not already included.

At this point, you have now explored all four components of EWS at the community level. This guide above all aims to provide strategic guidance on good practice; the last chapter below will give you a few hints on operational guidelines.

D. Operational aspects of EWS and CEWS

The aim of this chapter is to get you out from behind this guide and launched into an EWS effort as soon as possible. In summary, your answers to a few simple questions should help you get started on an early warning adventure.

1. Where to start?

Start by gathering evidence of EWS effort at your level. Some of the questions you will need to explore are as follows:

Table 13: Compile the evidence

Compile the evidence	Questions to ask at any level...
Who are the actors? What factors (policy, legal, institutional, technical) are in place to help them meet their mandate?	• Review the risk knowledge at your level and decide where EWS makes the most sense. • Which entities in your area of focus have the mandate, enabling policy and resources to undertake EWS efforts? (review them against those proposed and showcased in this guide) • Which entities have interest and technical capacity in EWS? • What institutional arrangements are in place to enable communication between levels and agencies?
Risk knowledge	• Have the communities/districts/countries at highest risk been guided in a comprehensive risk knowledge effort? • Have they expressed the need for more timely information to help prepare for imminent hazards? *If yes, they would be a good place to start applying what you have learned in this guide.*
Monitoring	• What monitoring and forecasting information is available for the level, but perhaps not harnessed? • Are current efforts multi-hazard? Do they consider slow and fast onset hazards? Do they monitor vulnerability?
Response capability	• What do those communities/districts/countries do once they receive a warning? What could/should they do better? Who supports this?
Communication	• How effective are existing warnings in meeting the most at-risk individuals and communities?
Where are the gaps?	• Which of the four EWS components above appears to be the most challenged at your level? • Which community/region/country is the least advanced in EWS? Why (to both of these)?

2. Then, what?

Once you have done all the groundwork described above and have used this guide to glean ideas of good practice and pitfalls to avoid, it is probably time to get as many interested stakeholders at your level as possible around the table to produce a joint proposal for funding.

Do not forget to also explore EWS advances made at each of the other levels, and bring representatives of those efforts to your drafting table. Your goal is to produce a solid proposal that fills the gaps identified above by capitalizing on all existing systems and actors taking into careful consideration the factors below:

Bridging	How best can you serve as a bridge between science and at-risk communities? Between different EWS levels? What capacity is needed? Who can support this?
Partnership	What partnerships could you explore at each level to advance CEWS?
Sustainability	Every effort you propose should show a direct link to a sustainable funding source (through community level IGAs or inscribed in national and local budgets, etc.)

3. Advocacy for improved laws and procedures for EWS

In addition to implementing CEWS, you are encouraged to advocate with your government for laws and procedures on official EWS that support community initiatives. As discussed above, good official EWS require clear roles and responsibilities for government at all levels, as well as for the technical institutions that measure and distribute risk data. In addition, they should be ready and able to interact with and value the contributions of communities' own CEWS.

While much can be accomplished through good communications and relationships, it is often critical that the above elements also be set down in official policy and/or laws to ensure that they are taken seriously and applied consistently over time. For example, in the absence of clear rules of this kind, data collected by official EWS may not be made available to communities on a regular or timely basis. This means the communities may feel the need to collect their own data, which takes time and resources. In other situations, communities may have the best risk knowledge but the official EWS might fail to take this into account, meaning that the knowledge is not then distributed to other communities.

Where your existing regulatory framework does not fulfil the needs of communities for timely official EWS, you are encouraged to advocate for such mandates, as requested by Resolution 7, of the 31st International Conference in 2011, when it identified domestic legislation as one of a number of instruments able to promote community-level DRR.
The elements of institutional mandates most relevant for making links between official EWS and CEWS are the need to:

- make EWS a priority for community-level action as a key element of DRR
- promote risk mapping at the community level
- promote communities' access to risk knowledge and monitoring data
- promote the involvement of community representatives, National Societies, other civil society actors and the private sector in EWS at the community level
- allocate adequate funding for EWS activities at the community level
- promote strong accountability for results in EWS at the community level.

4. Last words of advice

You should now have a good idea of the *strategic* considerations, guidelines and examples of good practice to steer you around pitfalls as you explore EWS at your level.

Taking your interest to the next hands-on level, there are other valuable tools available that offer operational guidelines on standards or training of your staff and community volunteers in EWS. A few of these tools and training packages are described below, with Internet links (when available):

- MSB, Swedish Red Cross and IFRC **Toolkit to Developing Community Early Warning Systems:** *A full Training of Trainers (ToT) Field Guide / Package, to be finalized in 2012:* Three ToT sessions are prepared in seven-day events, with a live community present for four days within each event to create the CEWS. Type I is a once-off session for CEWS that can benefit from a functional national EWS. Type II is for CEWS that must actively drive their system, thereby requiring two, more in-depth, sessions. In Type II, Part A features the identification of indicators and collection of data. Part B explores the transformation of data trends into key warning messages and response actions for the community. Both Types and parts of the EWS training are packaged into a toolkit with learning objectives, schedule, session plans, detailed exercises and materials needed to contextualize and replicate the sessions: "adapt-and-run." This field guide is multi-hazard and draws on work in West Africa from 2008-12; it will benefit when deployed with an accompanying roster of trained graduates.

- Practical Action and Mercy Corps: **Establishing Community Based Early Warning System: FACILITATORS Guide & PRACTITIONER'S HANDBOOK** *(developed in 2010)*
www.preventionweb.net/.../19892_19867cbewsfacilitatorsguide1.pdf
This is an excellent training series funded by ECHO - DIPECHO and developed in Nepal for situations of too much water, or flooding (it is currently being adapted for use in landslides). Guides prepared for facilitators and practitioners. Also available is a series of six Set-Up Notes and critical reviews of Practical Action efforts in early warning from 2002-08.

- **FARM Africa: Key Steps in establishing Community Managed Disaster Risk Reduction in South Omo pastoralist areas** *(developed by E. Jackson, 2010)*
www.farmafrica.org.uk/resources/Community%20Managed%20Disaster%20Risk%20Reduction.pdf
In areas of too little water, this practical guide can serve as a model on how to develop EWS with drought-prone communities, with standard notions on how to set up EW sub-committees, how to link them to contingency plans, to other government levels as well as to response funding. It is a good foundation on which to build a CEWS, anchored in other dry contexts. Funded by CORDAID, the steps described in these guidelines also draw on experiences of Save the Children UK and other NGOs.

- **Early Warning System for Watersheds #11 Available in Spanish and English)**
http://cruzroja.org/desastres/redcamp/crrec/modedu-en.htm
One of a series of guides Better be ready. No. 11 offers communities good practices on early warning, as well as the way to develop and implement them at a significantly low economic cost and with high impact. Developed by the Red Cross Reference Center for Disaster Prevention, based in Costa Rica.

- **EW>EA, A Regional Guideline for Effective Engagement for Asia**
https://docs.google.com/a/email.arizona.edu/viewer?url=http://www.climatecentre.org/downloads/File/EWEA/IFRC%2520EWEA%2520Guidelines.pdf
Developed by IFRC

- **UNISRD's Training Package on Natural Hazards and Early Warning for Training of Trainers in Kenya**
www.unisdr.org/files/26445_trainingpackageonnaturalhazardslow.pdf See Module 9: Disaster Preparedness and Early Warning

Annex 1.
Full list of guiding principles

Cross-cutting themes: guiding principles

Guiding principle-1 Integrate within DRR: EWS is not a stand-alone
Guiding principle-2 Aim for synergy across levels: community, national and regional/global
Guiding principle-3 Insist on multi-hazard EWS
Guiding principle-4 Systematically include vulnerability
Guiding principle-5 Design EWS components with multiple functions
Guiding principle-6 Accommodate multiple timescales
Guiding principle-7 Embrace multiple knowledge systems
Guiding principle-8 Account for evolving risk and rising uncertainty
Guiding principle-9 EWS without borders: target the full vulnerability and hazard-scape
Guiding principle-10 Demand appropriate technology
Guiding principle-11 Require redundancy in indicators and communication channels
Guiding principle-12 Target and reach disadvantaged and vulnerable groups
Guiding principle-13 Build partnership and individual engagement

Community-level practice: guiding principles per EWS component

Risk knowledge

Guiding principle K-1 Although risk knowledge exercises may not lead to early warning, all early warning must be founded on risk knowledge
Guiding principleK-2 Accept that a community's priorities may not be your own

Monitoring

Guiding principle M-1 Passive receivers of information do not save lives
Guiding principle M-2 Some communities will need to DRIVE their EWS
Guiding principle M-3 Public displays of monitoring can motivate communities
Guiding principle M-4 When hazards evolve, so must their monitoring

Response capability

Guiding principle R-1 In EWS, we respond to warnings, not to disasters
Guiding principle R-2 Strive to organize robust no-regrets response actions
Guiding principle R-3 Embed response options in annually updating contingency plans with links to funding
Guiding principle R-4 Practice makes perfect: test-drive your response actions

Warning Communication

Guiding principle C-1 Clearly delegate responsibility to alert or mediate
Guiding principle C-2 Do not fall into the sophistication trap for warning devices
Guiding principle C-3 Use staged warnings (levels and colours) in dissemination

Annex 2.
List of good practices by zone/country

50+ countries	Chapter B: General guiding principles	Chapter C: Community-level practice			
Zone	**Guiding Principles-1-13**	**Risk knowledge**	**Monitoring**	**Response capability**	**Warning communication**
Africa (19 countries, plus West and Horn)	Ethiopia GP2: West Africa; Sierra Leone/ Liberia GP4: Horn, Uganda, Niger; GP5: Malawi; Mozambique, Madagascar GP8: Kenya, Mali, Mozambique; GP9: Malawi (2), Somalia, Ethiopia, Mozambique, Kenya / Uganda; GP11: Kenya, Tanzania; GP12: South Africa GP13: Liberia	Senegal	DRCongo Malawi Ethiopia Sierra Leone Madagascar	Technicians, specialists	Technicians, specialists
Americas (nine countries plus Central and Latin America and the, Caribbean)	GP1: Nicaragua GP4: Brazil GP5: Central America GP6: Haiti GP8: Colombia GP10: Central America GP13: Cayman Islands, USA (2), Central (6 countries)	Senegal	DRCongo Malawi Ethiopia Sierra Leone Madagascar	Technicians, specialists	Technicians, specialists
Asia-Pacific (21 countries plus regional)	GP2: Mongolia; GP3: Sri Lanka, Vietnam, Indonesia (2), Philippines; Regional GP4: Mongolia GP5: Sri Lanka GP6: Bangladesh; GP7: Thailand, Indonesia, India, Solomon Islands (2), Kiribati, Nepal (2), Samoa (2); GP8: Pakistan, Solomon Islands (2), Australia, Fuji, China; GP9: Nepal; GP10: Myanmar, Indonesia; GP11: Laos; GP12: Nepal, Indonesia, Vietnam; GP13: Sri Lanka (2), Nepal, Indonesia (2), Pakistan, Vietnam, Philippines.	Philippines (2) Solomon Islands, Pakistan, Nepal	Philippines (2) PNG Japan Indonesia (3) Cambodia (3) Nepal (3) Vietnam Sri Lanka (4) Bangladesh (2) China (2) India Australia (2)	Cambodia (2) China (2) Bangladesh (2) India (2) Indonesia Vietnam	Australia Samoa (2) Nepal Indonesia Philippines Pakistan
Europe (two countries plus Western Europe)	GP3: France; GP4: W. Europe, France		UK		
Middle East and North Africa (one)	GP13: Egypt				

The Fundamental Principles of the International Red Cross and Red Crescent Movement

Humanity The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality In order to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity There can be only one Red Cross or Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality The International Red Cross and Red Crescent Movement, in which all societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

For more information on this IFRC publication, please contact:

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