

# State of Pre-Event Risk Communication

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Needs, challenges, uncertainties  
and opportunities ?

Speakers:

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# American Red Cross

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# Volcano Pre-Event Risk Communication

Albrecht Beck  
Prepared International (PPI)



# Our Experience

Prepared International has many years of experience working in regions with active volcanoes as well as assisting governments in improving pre-event risk communication strategies and governance.

## Expertise in eruption-prone regions

- Vanuatu
- Cabo Verde
- Samoa
- Iceland
- Caribbean



## Pre-event risk communication

**National Emergency Preparedness and Response (EP&R)** for countries in regions with active volcanoes.

**Review of sector-specific preparedness and response** to volcano eruptions, including risk communication gaps and strengths of the preparedness frameworks and SOPs. Development of **crisis communication strategies** for different hazards.





# What Works



Need more and more frequent and detailed information on preparedness and pre-evacuation planning

## Quiescent



- **Communicate the status of the volcano (daily/weekly)**
  - via large variety of channels
- **Communicate the hazards and actions to be taken**
- **Inform where to find information**
- **Build trust**
- **Build a strong, regular, two-way communication**
- **Deliver sector-specific information to DRM partners and build strong connections**
- **Allow & support lateral thinking (“out-of-the-box”)**
- **Keep the topic alive, despite wide time span between outbreaks**

## Unrest



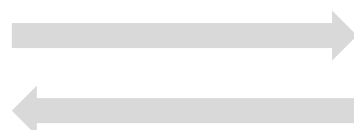
- **Updated and live physical status of the volcano communicated**
  - Radio, TV, SMS, and many more etc.
- **What might happen**
  - Scenario-building and uncertainties to be communicated
- **Response planning**
  - Importance of inter-agency communication
- **Evacuation (pre) alert, pot. exercise it, show evacuation places and alt. location, host**
- **Keep two-way communication active & intensive**

**At any stage, the communication approach needs to be layered ⇒ combining multiple media and languages to reach all, there is not one size that fits all**

# Two-Way Communication



Government



At-risk communities

Two-way communication is a continuous dialogue between the government, sending out information as education and awareness campaigns, and the vulnerable groups / communities at risk sharing feedback, needs, reporting problems pre-event and during-event.

➤ Create spaces and platforms that enable people to become active participants in their own safety and stay in exchange (continuity of two-way comms).

Provides crucial information and feedback to create a functioning system. Risk communication, pre-event and during an actual crisis need to be trained, tested, and evaluated constantly. Only way to integrate lateral thinking.

## Experiences from the Merapi volcanic region

### Village Disability Groups in Kepuharjo Village

Representatives with disability that can voice their rights and needs to the village government and responders.

Supported by additional infrastructure such as:

- Management information systems that track disability data
- Integration with existing village systems to ensure sustainable communication channels.

**Focus Groups** have also been in place since before the 2010 eruption, held by NGOs such as Yakkum Emergency Unit, Red Cross, and Jalin Merapi network and the local government.

**Online webpage (MAGMA) and social media** dialogue

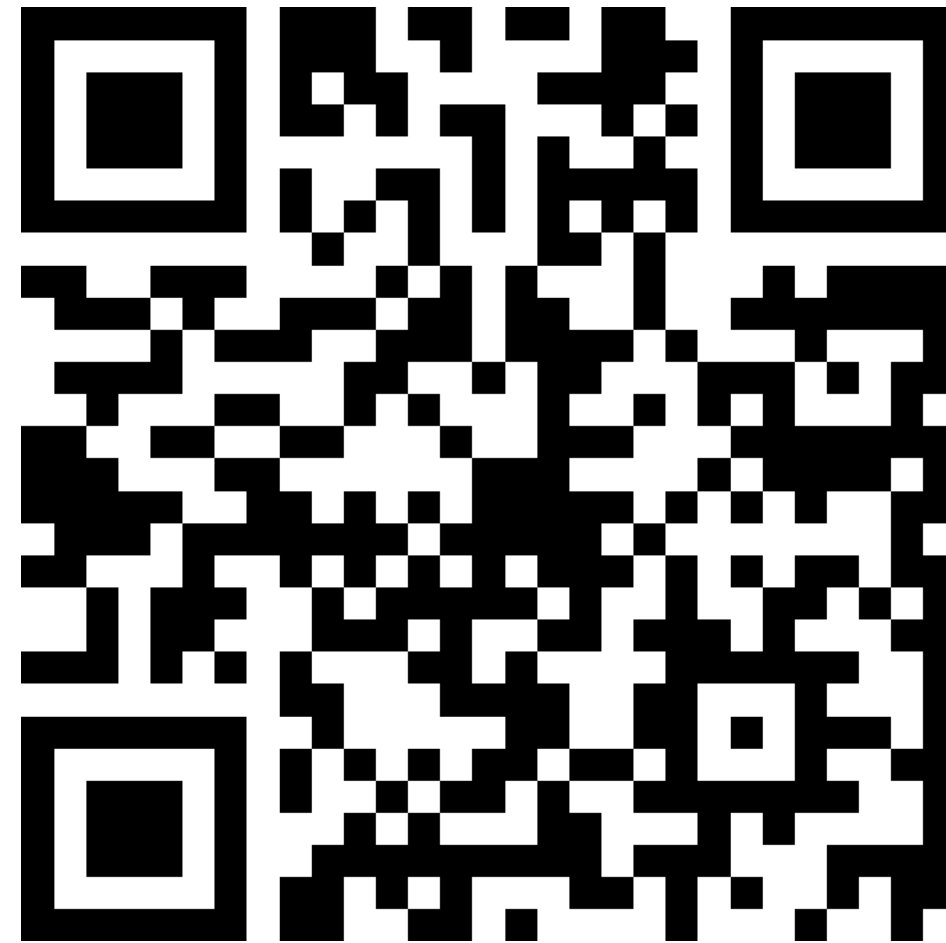
Also: **VIGIA Network** in Ecuador

Or **Iceland Risk Communication** Project

# Pre-eruption communication and evacuation (selected)

- 1** Know Your Risk
- 2** Sign Up for Official Alerts & Information
- 3** Prepare an Emergency Go-Bag & Personal Affairs
- 4** Prepare Your Home, Information of hosting in evacuation situation
- 5** Identify Evacuation Routes and Shelters, but also address long-term concerns including economically and theft
- 6** Develop a Family Emergency Plan
- 7** Participate in Community Drills
- 8** Early Warnings or Increased Volcanic Activity Occur:
  - Check and Update Your Go-Bag
  - Keep Vehicles Fueled and Ready
- 9** Stay Informed and think about dependants
- 10** Reduce Ash Ingress Risk
- 11** Community-Level Actions

**What do you think is the biggest barrier to effective pre-event risk communication ?**

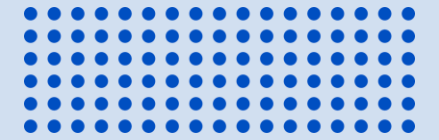






**What do you think is the biggest barrier to effective pre-event risk communication ?**

# Pitfalls - undermine trust



## Miscommunicating uncertainty

- > Vague and unclear alerts such as 'likely' can decrease preparedness and reaction from emergency managers and the public.
  - Importance of a more probabilistic approach and communicating messages in an accessible way.

## Lack of investment

- > In many locations, volcanic eruptions are very rare, while pre-event risk communication requires continuous funding in order to operate. "Easy to forget, and hard to keep people prepared"

## Data quality

- > Data collection is not the only challenge, as quality can be compromised without adequate data cleaning and analyses. Accurate monitoring and analysis of the hazard are crucial to communicate the right information to planners and the population. Think about data from the community, e.g. disability

## Not adapted to the targeted group

- > Communication would be less efficient and might disproportionately exclude vulnerable groups. Communication must be tailored to the population incl. those with various kinds of disabilities.
  - Targeted awareness raising and communication strategies, using trusted sources and culturally relevant messaging
  - Appropriate language and wording



# Solutions

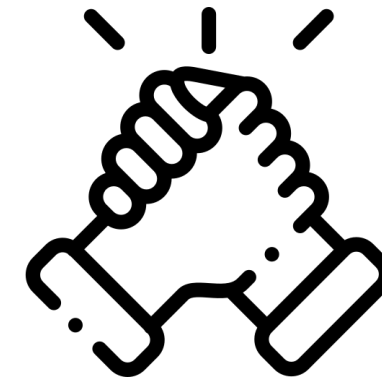
*What can be done do to address systemic challenges*



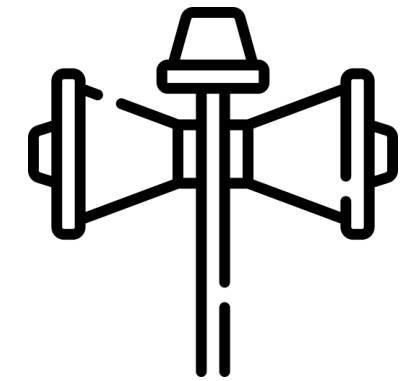
**Develop and  
deliver education  
and awareness  
programs**



**Improve governance  
for effective  
communication**



**Reinforce  
collaboration  
and exchange  
between  
agencies and  
with  
communities**



**Prepare and  
plan practical,  
easy to  
understand  
communication  
guidance**





# In closure

- Effective communication saves lives and will limit impact on livelihoods.
- Preparedness depends on public trust, two-way communication essential. Trust is still under-estimated and not strategically built and maintained.
- Continuous review of approaches and exercises are essential, not only to build skills but also to maintain awareness and preparedness.





[www.prepared-international.org](http://www.prepared-international.org)

# THANK YOU





# State of Pre-Event Risk Communication

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Needs, challenges, uncertainties  
and opportunities ?

Carina J. Fearnley  
Professor in Warnings and Science Communication  
Director of the UCL Warning Research Centre

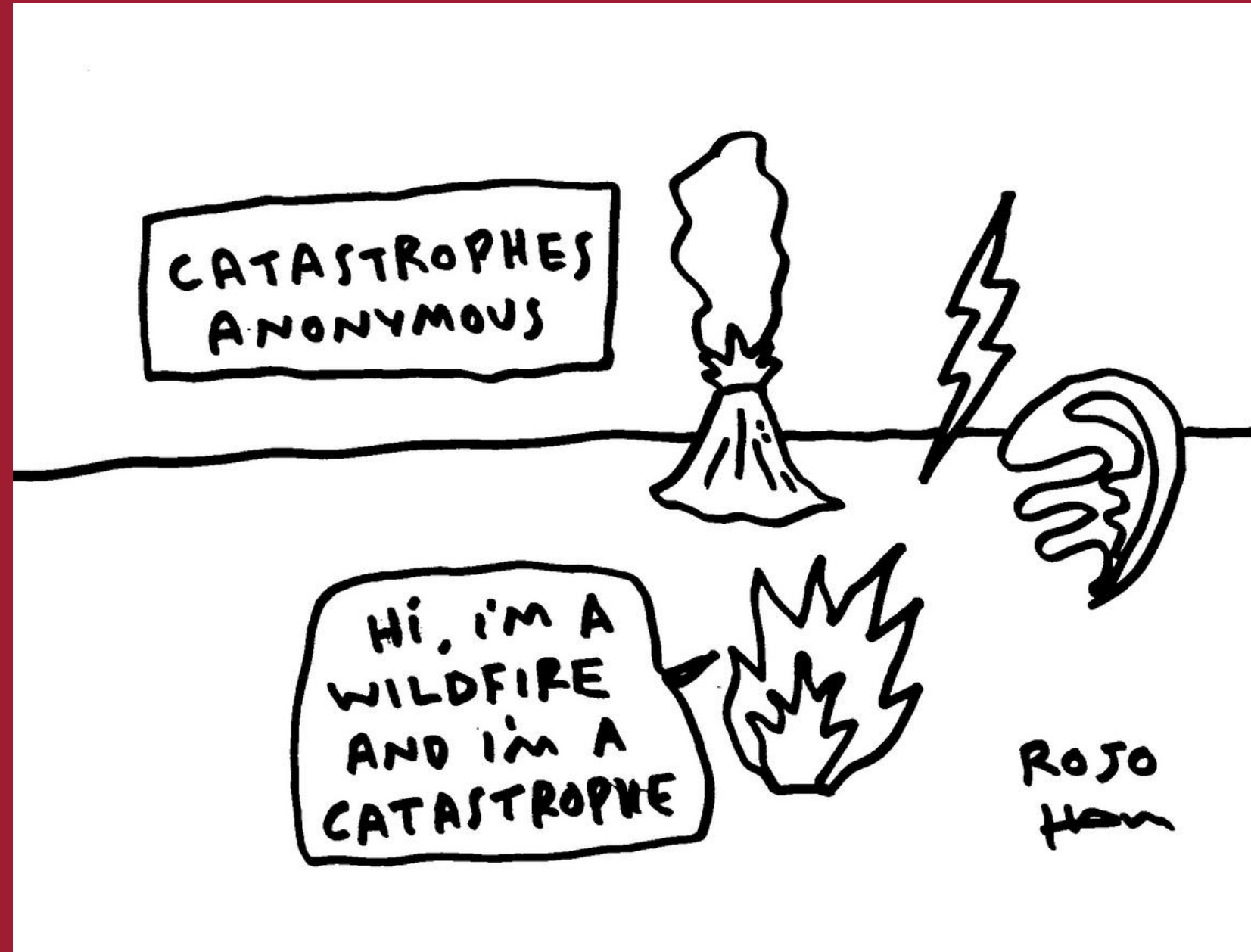
UCL  
WARNING  
RESEARCH  
CENTRE





# LET'S TALK

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SOURCE: ARTISTS HAMEED KHAN AND EUGENIA ROJO

# WHAT WOULD BEST SUPPORT OPPORTUNITIES FOR PRE-EVENT COMMUNICATION?

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# What would best support opportunities for pre-event communication?

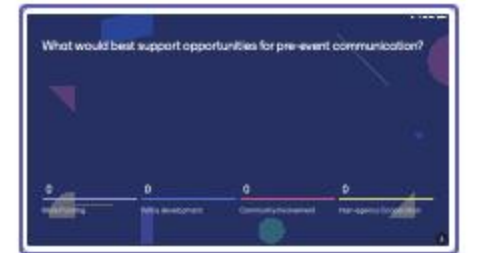


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EW4All Volc



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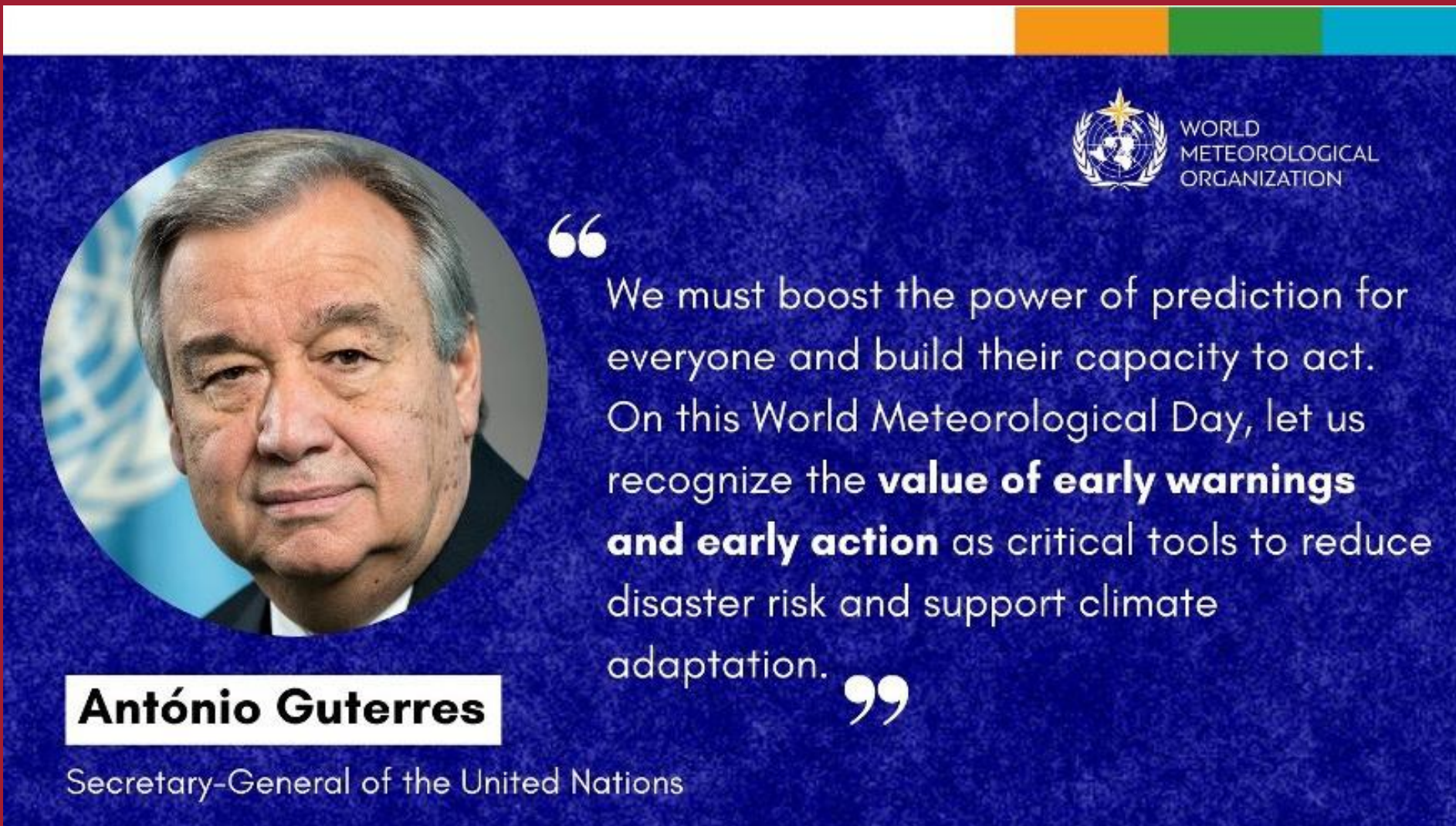
# WARNINGS FOR ALL



Priority on hydrometeorology (including climate): represents majority of risk and reflects existing focus

However, integration needs to consider **ALL** hazards and threats:

- Natural Hazards
- Human-Made Hazards and Threats
  - Accidental
  - Intentional
- Multiple Hazard Events
- Cascading Hazards
- Emerging Risks
  - New Technologies
  - Climate change



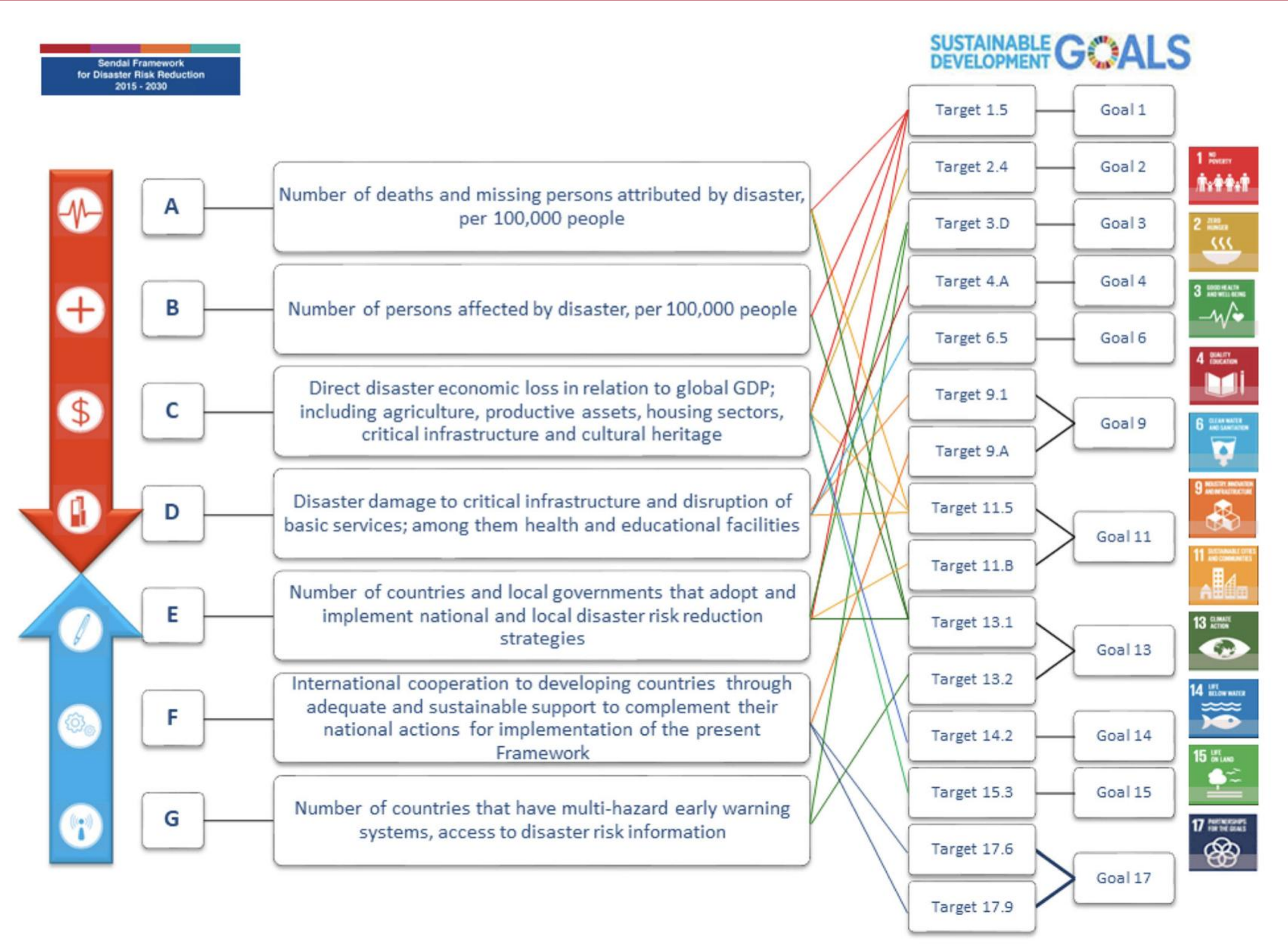


# OUR REMIT

Sendai Framework for DRR Target G:

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

SOURCE: WRIGHT ET AL., 2020





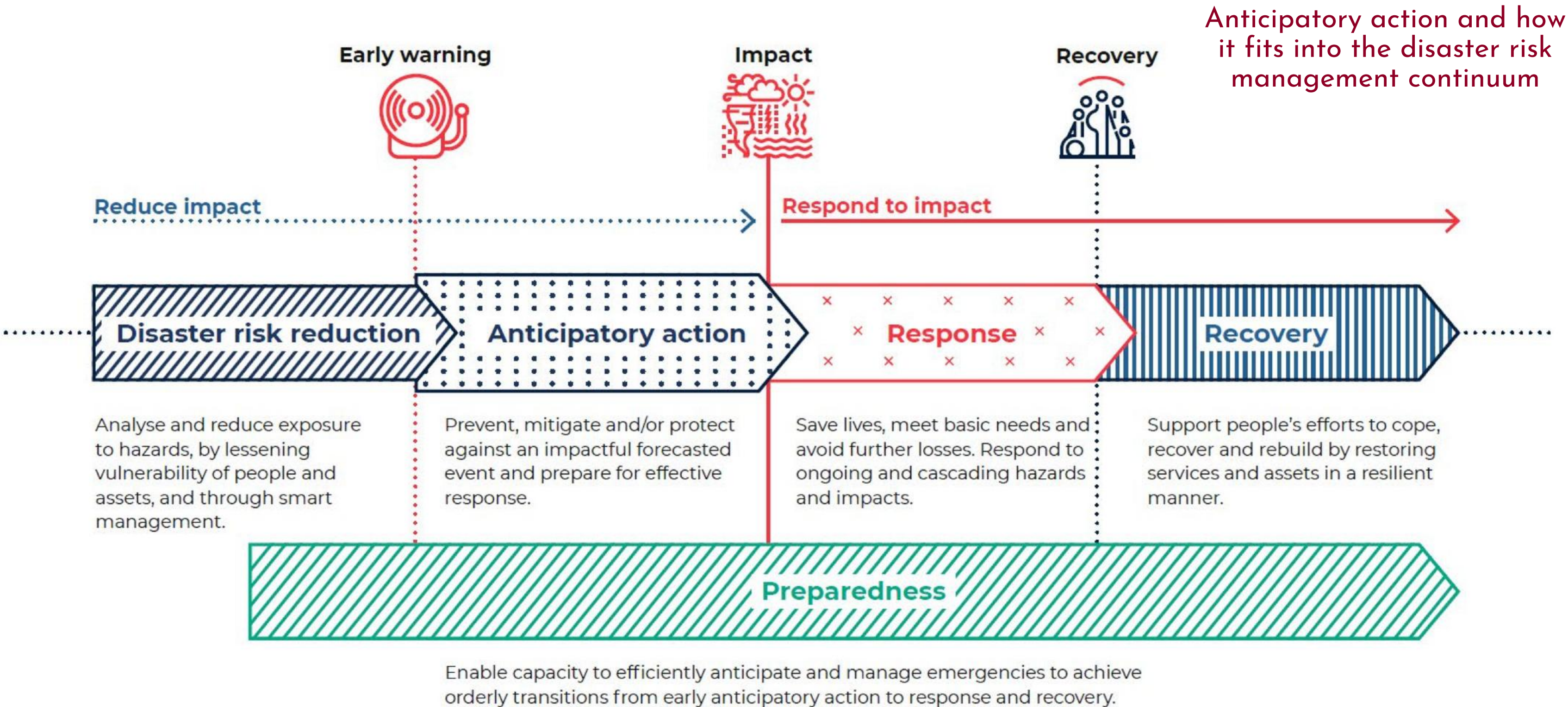


Cyclone Shelter, 2018, Kuakata, Bangladesh.  
Copyright: Kashef Chowdhury, Courtesy:  
URBANA.

The Cyclone Shelter functions as primary school and day clinic during normal conditions. All internal spaces are lit through recessed, egg-crate concrete windows, themselves opening into light and ventilation wells protected by the winding ramp.

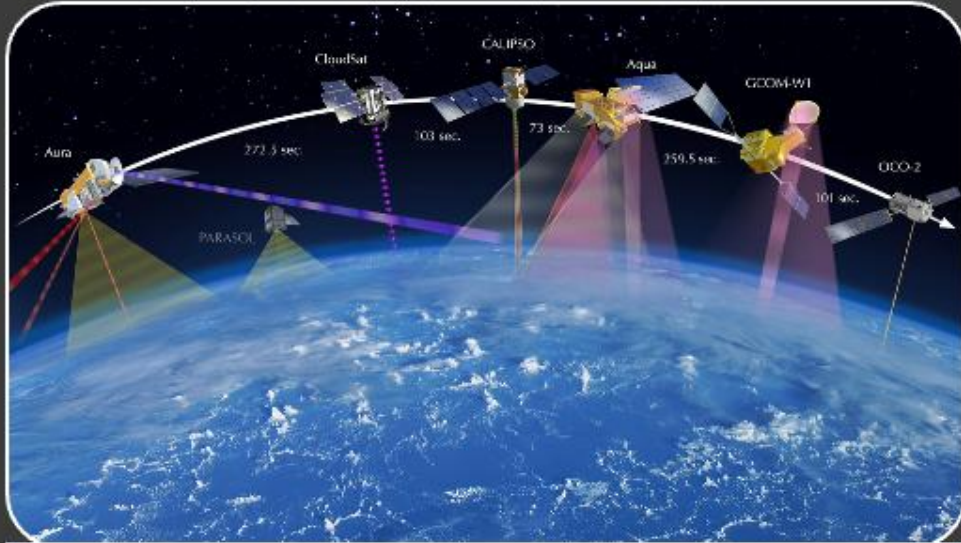


# EARLY WARNING EARLY ACTION





# WARNING TYPES AND TOOLS



## PERMANENT

Automated warning systems: without human input / trigger automated responses

Common Alerting Protocol (CAP)

Earth Observation Systems



## ANTICIPATORY

Community-based warning systems (CBEWS)

Multi-hazard early warning systems (MHEWS)

Traditional warning systems



## RESPONSIVE

Sirens / Alerts

Community-based warning systems

Multi-hazard early warning systems

Traditional warning systems

## INTEGRATED WARNING SYSTEMS

Bring together data, analysis, warnings, and response in one system e.g. the Global Information and Early Warning System on Food and Agriculture (GIEWS).



# WHAT CAN EW4ALL DO FOR US?

## Supporting the volcano community:

- Common Alerting Protocol (CAP)
- Cell broadcasting capability
- Extension of WMO type systems and processes
- Inclusivity: considering diversity, gender, disability, and equity
- Further engagement with NGOs, humanitarian, and climate focused organisations
- Measuring capacity and impact including quantifying effectiveness and linking warning and action

SOURCE: UNDRR FEARNLEY AND KELMAN, 2023



WARNING ELEMENT 1

DISASTER RISK KNOWLEDGE

Action

Develop community-based/driven early warning systems (CBEWS)

Why

To empower people and communities to design, prepare for, respond to, and issue warnings that include local knowledge and meet individual needs

How to Implement

- To build or enhance the existing CBEWS, follow guidelines such as those provided by the International Federation of Red Cross (IFRC) Toolkit on CBEWS, including:
  - Compile all the evidence on existing warnings.
  - Get as many interested stakeholders as possible around the table to produce a joint proposal for funding. Use bridging, sustainability and partnerships to achieve this.
  - Advocate for improved laws and procedures for EWS
  - Empower the local communities using the 13 guiding principles laid out in the IFRC Toolkit
- Enable and support communities to integrate local knowledge from any gender and persons with a variety of disabilities, including traditional knowledge and local observations, into their CBEWS.
- Build CBEWS to be more inclusive, enabling engagement with minority groups and providing more gender and disability inclusivity as part of the process. However, there may still be marginalised groups, as some genders and disabilities may not be accepted within a certain community. Local and regional organizations must therefore have engagement with the CBEWS.
- These inclusive warning systems provide a tool for continual feedback from everyone

Partners

- Gender focal people
- Disability focal points
- Organizations of persons with disabilities
- Local women's organizations/groups/charities
- Local gender-focused organizations/groups/charities
- Local disability-focused organizations/groups/charities

- National agencies
- Government (local, regional, national)
- Local populations
- Media, e.g., radio channels
- Church groups
- Tribal leaders
- Caregivers
- Health organizations/medical professionals

Key Resources/Examples

IFRC CBEWS Tools  
<https://www.ifrc.org/document/community-early-warning-systems-guiding-principles>

IFRC Community Early Warning Systems (CEWS) Training Toolkit – Field Guide  
<https://www.ifrc.org/document/community-early-warning-systems-cews-training-toolkit-field-guide>

Community-Based Early Warning Early Action (EWEA) in the Pacific: Findings from Palau  
<https://www.climatecentre.org/wp-content/uploads/RCCC-Pacific-Palau-report-Final.pdf>

Community-Based Early Warning Early Action (EWEA) in the Pacific: Findings from Tuvalu  
<https://www.climatecentre.org/wp-content/uploads/RCCC-Pacific-Tuvalu-report-final.pdf>

WARNING ELEMENT 5

GOVERNANCE

As in the "Key concepts and definitions" on page 6 and 7 accompanying this checklist:

- Gender refers to women, girls, men, boys, and all diverse genders, which can vary depending on culture and context.
- Persons with disabilities include those who have long-term physical, mental, intellectual, cognitive, or sensory impairments.

Select one answer for each question.

See the accompanying guidance note to fill in gaps and to continue improving.

Question	Yes	No	Partial	Unknown
Question here	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Question here	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Warning Secured as a Long-Term National and Local Priority

Question	Yes	No	Partial	Unknown
Has a framework for analysing the cost and benefit analysis of warning services been established?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are data collected and analysed for the economic benefits of gender-inclusive warnings (such as a cost-benefit analysis of previous warnings during hazard events or disasters, or financial recovery following an event)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are data collected and analysed for the economic benefits of disability-inclusive warnings (such as a cost-benefit analysis of previous warnings during hazard events or disasters, or financial recovery following an event)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the economic benefits of gender-inclusive warnings amplified for government and political leaders?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the economic benefits of disability-inclusive warnings amplified for government and political leaders?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are examples and case studies of successful gender-inclusive warnings shared with government and political leaders?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are examples and case studies of successful disability-inclusive warnings shared with government and political leaders?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are gender-inclusive warnings integrated into local development planning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



# WHAT CAN EW4ALL DO FOR US?

## Cell Broadcast - how it works





# WHAT CAN EW4ALL DO FOR US?

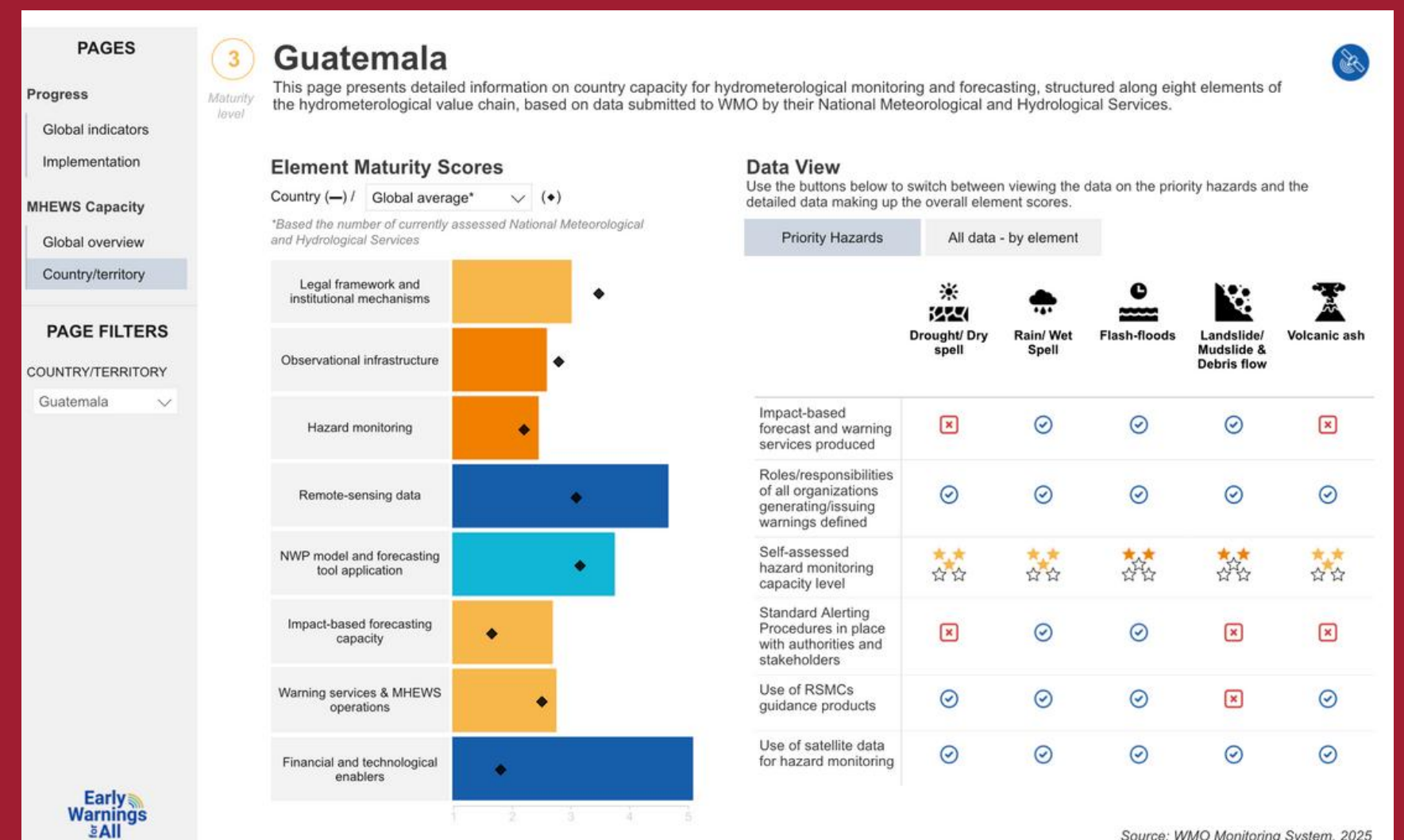
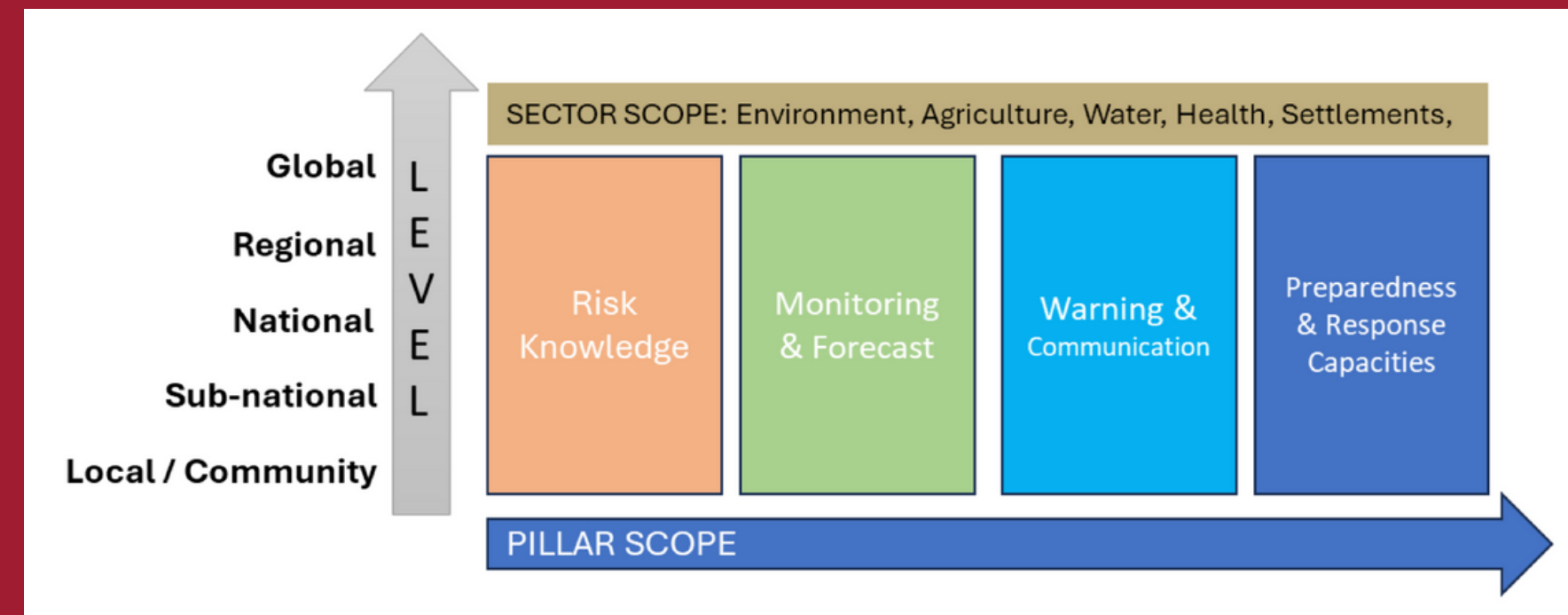
SOURCE: TOOLKIT FOR MONITORING & EVALUATION OF EW4ALL, 2024, AND THE EW4ALL DASHBOARD

## Warning Systems (EWS) Metrics:

- Taking stock of Capacity
- Effectiveness Index

## Multiple indexes:

- EW4All Dashboard
- EW4All M&E Toolkit
- EW4All Maturity Index
- UNDRR led After Event Review (AER)
- Hi-Weather Database / UCL Warnings Database
- Other WMO Databases for Hazards
- Country Hydromet Diagnostic assessment
- CREWS MEAL framework
- DesInventar Sendai Database

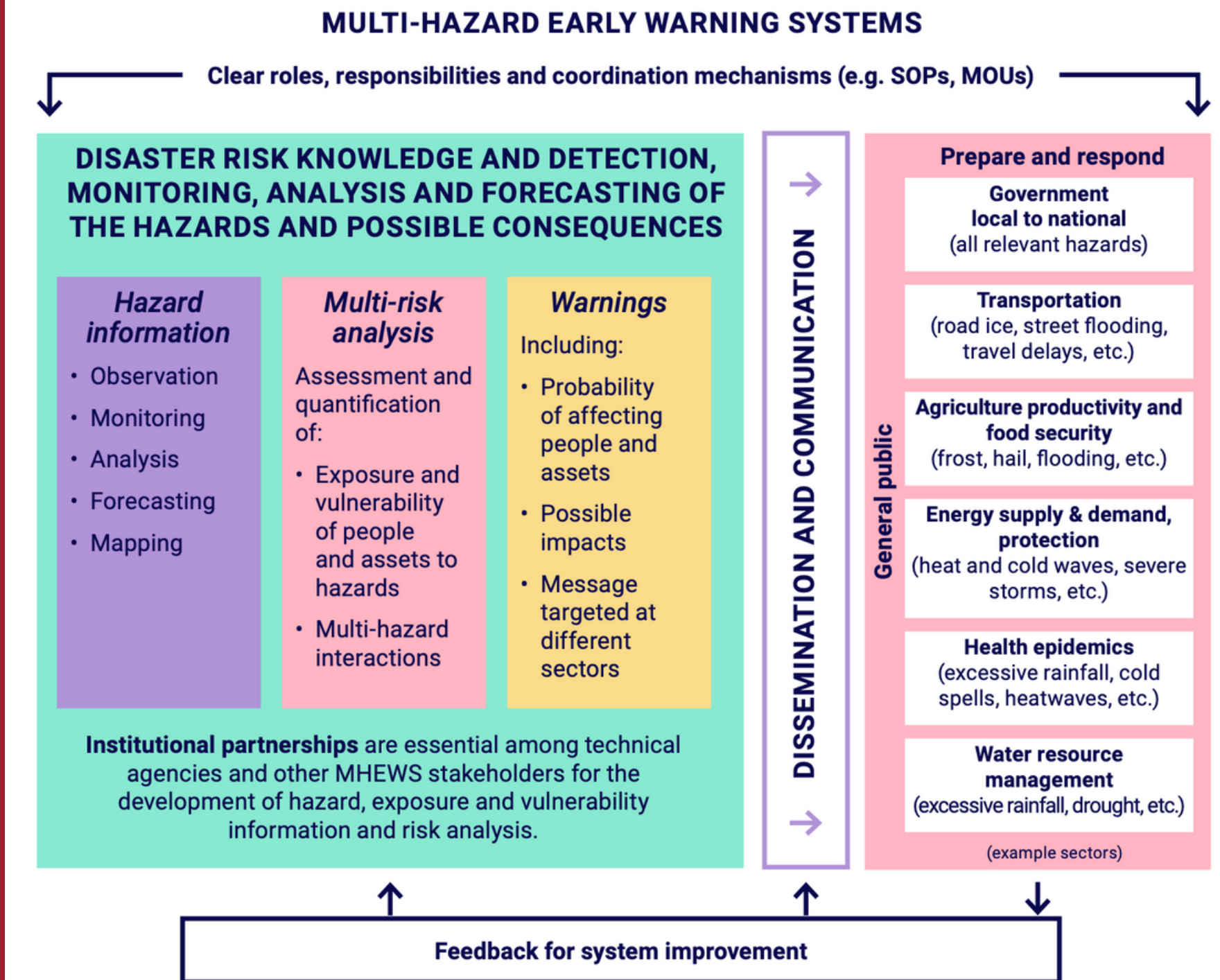


# WHAT CAN EW4ALL DO FOR US?

Volcano community can support the EW4All initiative:

- Effective MHEWS
- Working across and with multiple hazards
- Developing multi-hazard legal agreements
- Hazard risk mapping
- Public engagement and outreach
- Co-production of knowledge
- Embedding long-term resilience
- Scenarios and exercises
- Learning from Cities on Volcanoes approaches: engaging local communities and civil protection

Figure 2: Schematic of a multi-hazard early warning system (WMO, 2018)











# WHAT CAN EW4ALL DO FOR US?



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Mai i te rangi, ki te nuku o te whenua,  
ka puta te ira tangata i te po, i te whaiao, i te ao marama.  
Nau mai, haere mai ki Te Pū Ao

From the sky and the land came people,  
from the night, to the old world, to the world of light.  
Welcome to GNS Science

GNS Science is joining with Māori partners in research and commercial initiatives centred around our mutual interests in ngā taonga tuku iho – the treasures of our heritage.

Economic


Realise economic potential through sustainable development of natural resources.



He kai kei aku ringa - There is food at the end of my hands.

Social


Build community resilience to natural hazards through risk reduction, planning and education.



Toitū te Marae o Tane, Toitū te Marae o Tangaroa, Toitū te Iwi - Protect and strengthen the realms of the Land and Sea, and they will protect and strengthen the People.

Environmental


Serve today's demands and future needs through improving the quality of natural resources.



Whatungarongaro te tangata toitū te whenua - As man disappears from sight, the land remains.

Cultural

Prove authenticity and origin of taonga māori through scientific verification.



Naku te rourou nau te rourou ka ora ai te iwi  
- With your basket and my basket the people will live.

Maori Legends

- Rocks and minerals
- NZ's geothermal fields

What's On?

- Te Kura Whenua
- Lakes380

Learn More

- Learning Zone: Science Topics
- Geoscience glossary
- Popular publications
- Geological Maps

External Links

- He kai kei aku ringa
- LINZ (Land Information NZ)
- Te Papa Tongarewa
- Te Ara Encyclopaedia
- Te Kahui Mangai
- Whakarewarewa - The Living Maori Village

SOURCE: GNS

ERUPTION HAZARDS AT MT RUAPEHU

VIEW FROM THE NORTHWEST

Whangaehu Valley is at risk from lahars in an eruption

Tukino Ski Area is only at risk from ash

Te Heuheu

Crater Lake

Tahurangi

Turoa Ski Area

Summit Hazard Zone

Paretaitonga

Whakapapa Ski Area

Eruption risk of flying debris and lahars on upper Turoa Ski Area: Know the Turoa Volcanic Hazards Map

Eruption risk of lahars on Whakapapa ski area: Know the Whakapapa Volcanic Hazards Map

MAIN VIEW

Historic lahar paths

Whakapapa Ski Area

Tukino Ski Area

Turoa Ski Area

Crater Lake

Tahurangi

Whangaehu Valley

LEGEND

SUMMIT HAZARD ZONE

HISTORIC LAHAR PATHS

Safe ski lifts

Lifts at risk

WHAT TO DO!!

If there are any signs of an eruption (earthquakes, rumbling from crater, ash-steam cloud or flying rocks):

- Seek shelter, watch for flying rocks
- Stay on ridges, out of valleys as much as possible
- Move as quickly as possible down the mountain away from Summit Hazard Zone
- Know where the safe areas are (buildings and ridges below the Summit Hazard Zone)
- Stay in safe areas until advised by ski area or search and rescue personnel.

HAZARDS

Ruapehu is an active volcano:

- During an eruption there will be flying rocks on the upper mountain, especially within the Summit Hazard Zone
- Eruptions generate lahars (volcanic mudflows), which flow down valleys in a flash flood.

WARNING SYSTEM FOR SKI AREAS

An Eruption Detection System (EDS) is operating at Whakapapa and Turoa Ski Areas:


- The system will set off sirens and loudspeaker messages at Whakapapa.
- Follow instructions from staff.


25 Sept. 1995 summit eruption and lahars above Far West T-Bar

Photo: P. Otway

Department of Conservation

Te Papa Ihāwhiri





SOURCE: GNS, DOC, AND MT RUAPEHU



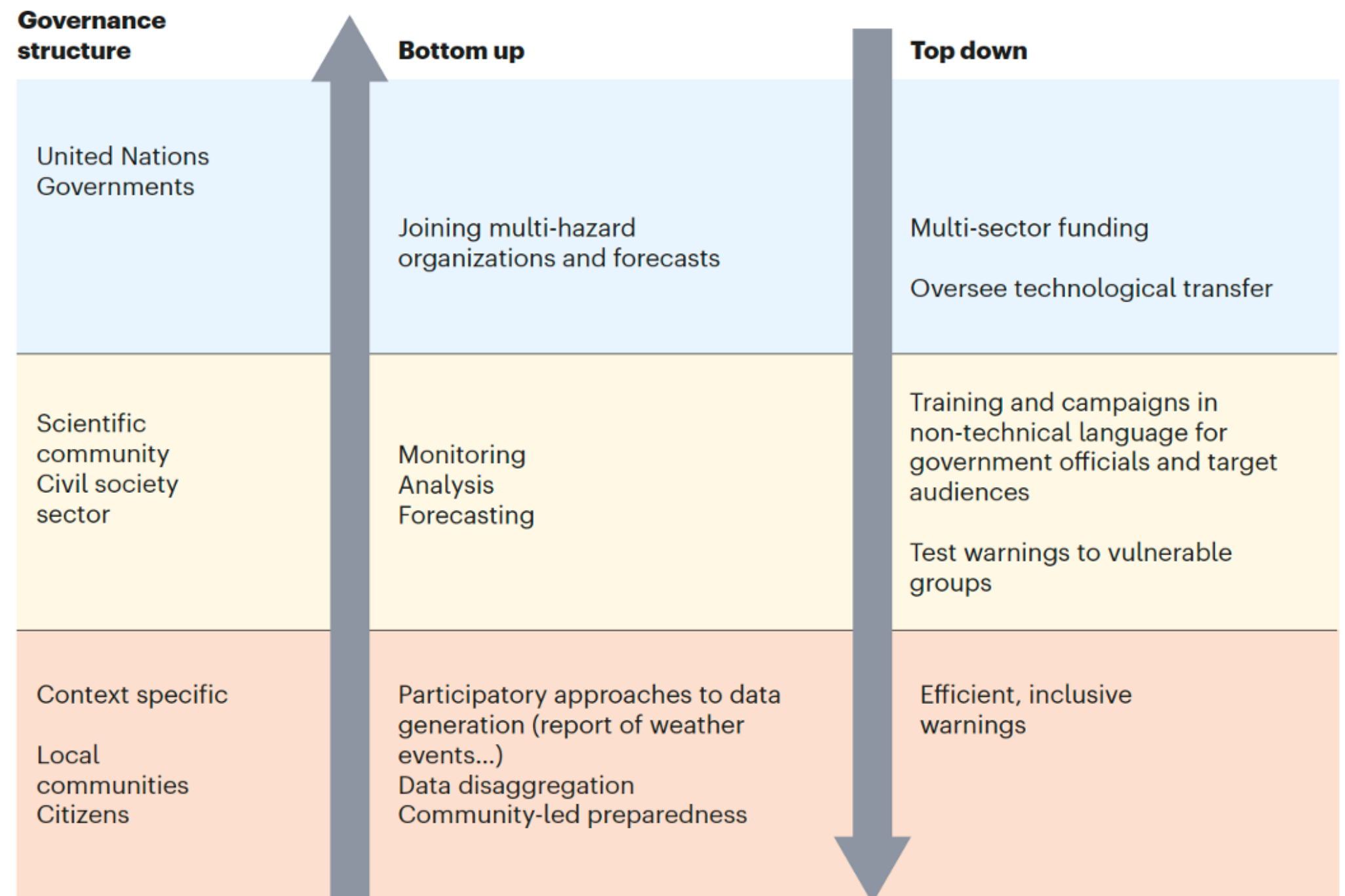
# WORKING TOGETHER

“Early-warning actions are plagued by structural gaps. We call for a determined effort from the global scientific community to identify some of them – and to help bridge them. National and local governments, international organizations, researchers, the private sector, operational staff, community workers and the public all have an essential part to play in the efficient running of early-warning systems”.

“We contend that all actors need to take note of each others’ contributions and be intentional about forming a collective effort. Better resources will follow, as well as improved hazard coverage and warnings that are more efficient and more inclusive”.

## COMBINE TOP-DOWN AND BOTTOM-UP PROCESSES

To run efficiently, early-warning processes need joined-up thinking and actions across silos, spanning hazards, risks, vulnerability, regions and institutions.



SOURCE: TUPPER & FEARNLEY, NATURE, 2023



# WORKING AT THE TOP

Organizational patchwork

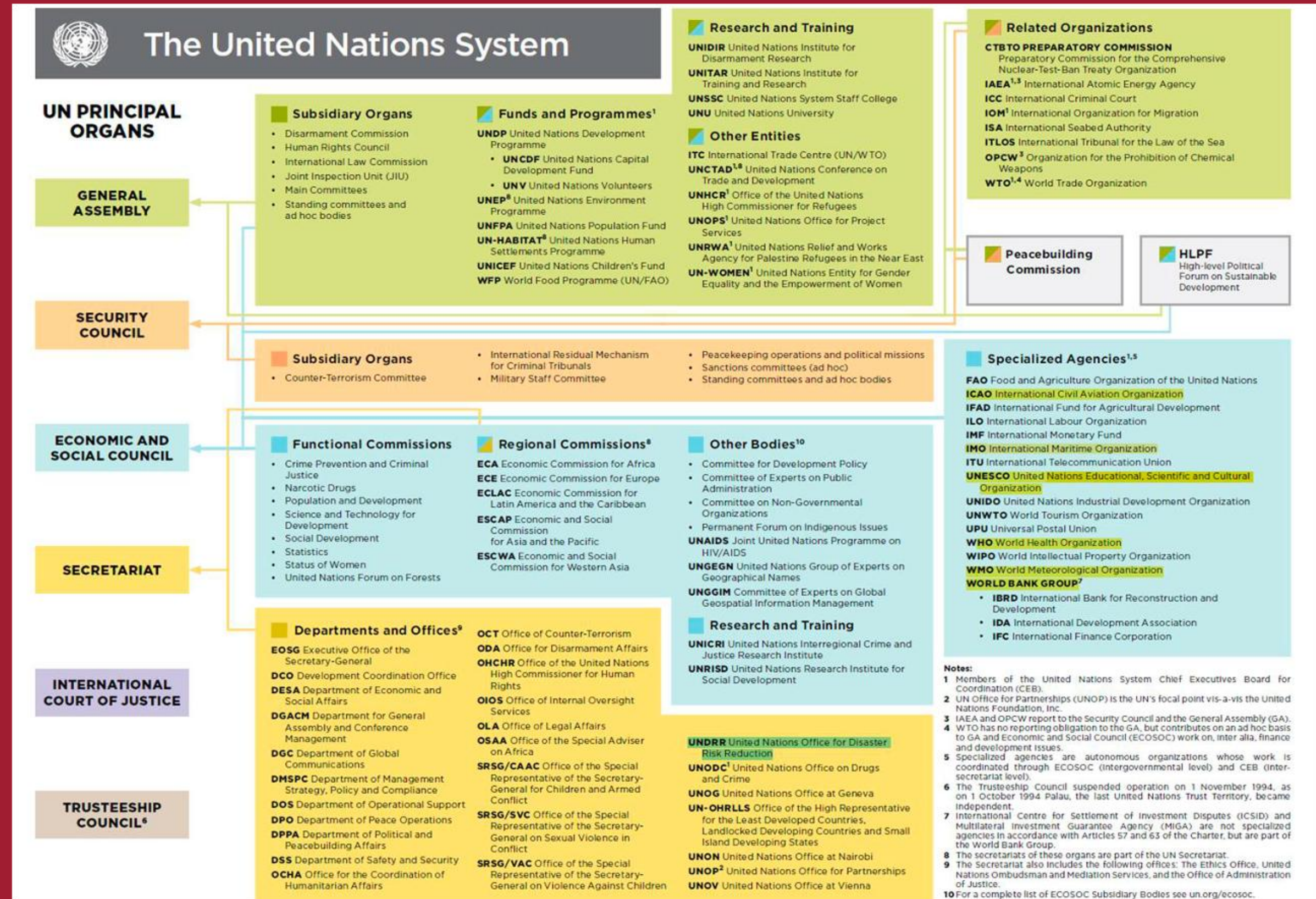
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Differences between  
countries and regions

=

Barriers to the smooth  
running of multi-hazard  
early-warning systems  
across the world

(see Tupper & Bear-Crozier  
2022)





# LET'S TALK PRE-EVENT

- The Sendai Framework states we should have MHEWS under Target G
- EW4All can benefit from the experience and knowledge of volcanology, especially around anticipatory approaches
- Volcanology can benefit from the work under EW4All and working with other hazard communities

## Ways forward:

- UN representation (however small)
- Seeking diversity of funding and support
- Collaborating across top-down and bottom-up approaches to work across the many silos
- Talking to one another

