World Meteorological Organization

Weather • Climate • Water

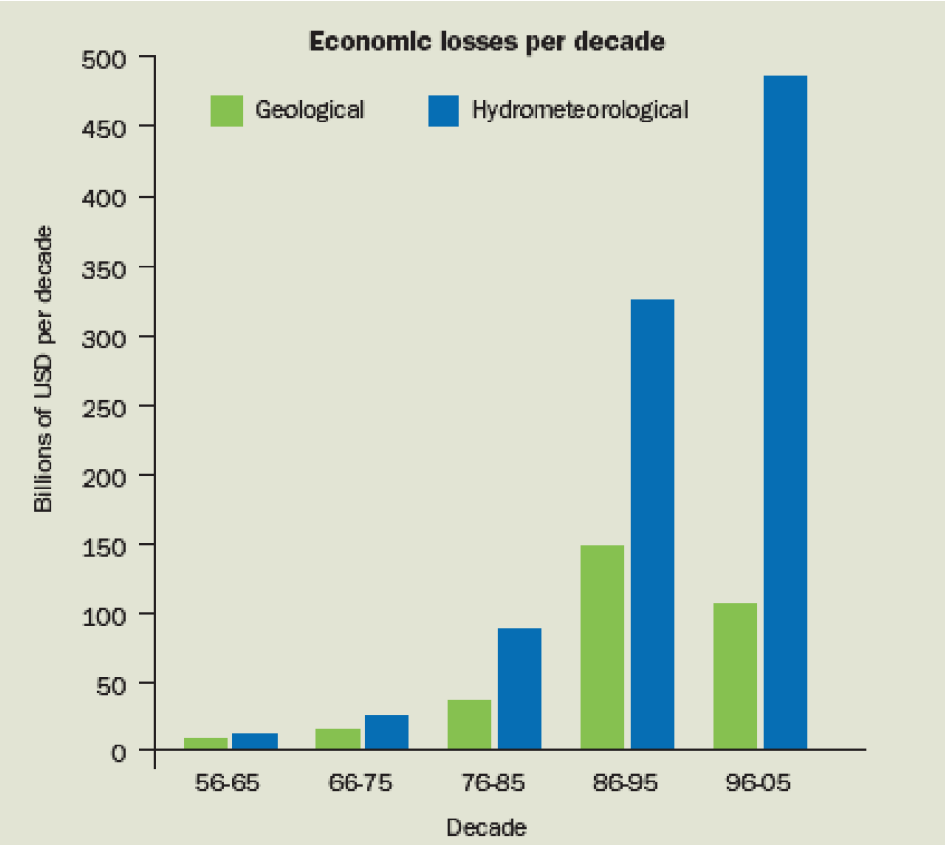
Extreme Event Warning : Brief WMO perspective

Jérôme Lafeuille

WMO Space Programme

WMO, Geneva

Decadal loss of life and economic losses related to geological versus hydro-meteorological hazards



Trends in natural hazard impacts over the five last decades show increasing economic losses and decreasing loss of life associated with hydrometeorological hazards

rce: EM-DAT: The OFDA/CRED International Disaster Database

From Golnaraghi, Institutional Partnerships in Multi-hazard Early Warning Systems, 2012

International framework for building resilience

- 1994: Yokohama strategy for a safer world: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation

- 2003: 2nd International Conference on Early Warning identified 4 main components of EWS:
  - **Monitoring and warning service**
  - **Risk knowledge**
  - **Dissemination**
  - **Response capacity**

- 2005: Hyogo Framework for Action 2005-2015 (HFA): Building the Resilience of Nations and Communities to Disasters
  - Outlined 5 priority areas: Institutional basis, risk monitoring and warnings, education to safety, risk factor reduction, preparedness

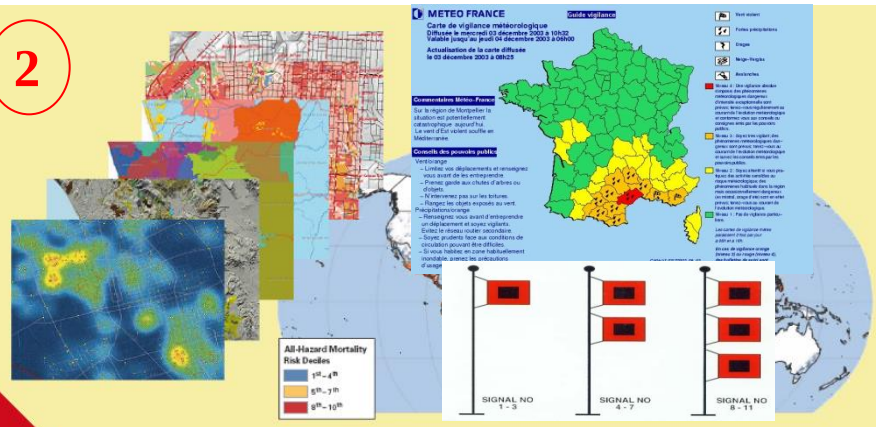
Early Warning Systems Require Coordination across Many Levels and Agencies

National to local disaster risk reduction plans, legislation and coordination mechanisms

1

Hazard Data and Forecasts

2



Risk Information

Coordination and Collaborations

3

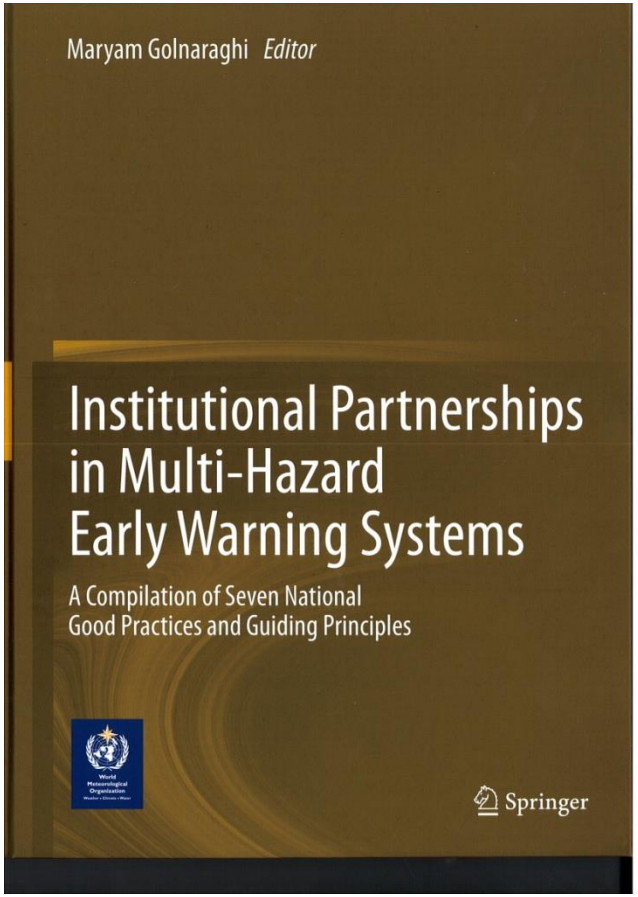
Communication and Dissemination Mechanisms

4

Preparedness and Early Response

Multi-hazard Early Warning Systems
Pros and Cons

- My science is unique !
- Downstream users and stakeholders often have multi-hazard interest
  - Civil protection authorities
  - Public media, operational users
- Warning procedures tend to be forgotten if not activated
  - pooling different hazards allows the players to get familiar with the procedure

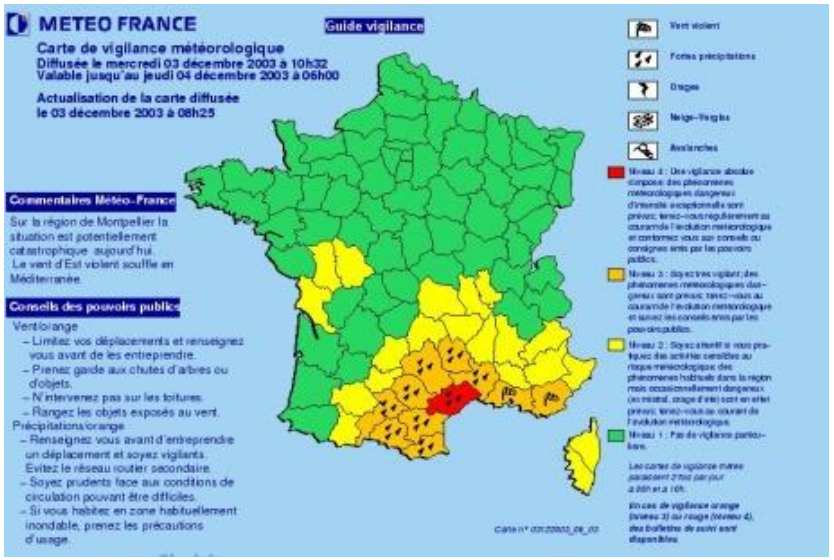


Example: the « Vigilance » scheme in France

- **Dec 1999 storm** : 88 casualties, 60 M trees, 200 pylons, 3 M houses w/o power
  - good forecast but poor alert chain : meteorological Vigilance scheme was defined
- **Jun-Aug 2003 heat wave**, abnormal death rate 15000 persons: heat wave risk added
- **Sept 2005 flood**: rain flooding risk added, partnership with flood prediction service

- => 4-colour map, with pictograms for each type of risk, issued at least twice/day to civil protection authorities, public web and media, for the next 24h

No vigilance is required
Be careful for sensitive activities, keep informed
Be extremely vigilant, keep informed, dangerous phenomena are forecast, follow safety guidelines issued by the authorities
Utmost vigilance required, ***exceptionally*** intense dangerous phenomena are forecast, keep informed, follow safety guidelines issued by the authorities



Risk level combines probability or lead time, and impact

Example: Special vigilance scheme for cyclones

Impact / Probability or lead time	Low impact	Moderate impact	High impact	Major impact
Low (plausible) or > 48h				
Probable or 36-48h				
Highly probable or 24-36h				
Very high probability or 12-24h				
Almost certain or 6-12h				
Almost certain or < 6h				

International Harmonization of Extreme Event Procedures

- Large scale events (international impact)
  - Ensure consistency across various national information sources
- International users
  - Consistent procedures (terminology, thresholds) facilitate user education / mitigation plans
- Warning centres interoperability
  - To share experience, increase confidence, provide back-up
- Should all Warning Centres use the same alert thresholds?
  - Hazard frequency, exposure, vulnerability may be different
  - Physical thresholds adjusted regionally to ensure consistent degree of rarity of « extreme » events

Challenges in Early Warning for Extreme Events

- Scientific problem
  - Observation, analysis, prediction, evaluation

- This information has to be:
  - Communicated
  - Understood
  - Trusted
  - Responded

Equally important !

- => Requires preparation/agreements with relevant partners to ensure end-to-end efficiency

Early Warning information has to be…

- Communicated
  - Specific, active delivery (beyond routine channels), protocols (CAP?)
  - From designated authoritative source
  - To determined recipients: authorities, major operators, public at risk
- Understood: minimize information losses or mis-interpretation
  - Simplified information
  - Focused on decision support : inform on risk resulting from the hazard
  - Standardized information (e.g. scale) with pre-defined explanations
- Trusted: demonstrated reliability
  - Objective or standardized information to enable verification
  - Verification statistics are needed to justify the « extreme » nature
- Responded: efficient user reaction
  - Preparedness for mitigation, throughout alert chain