



Servicio
Meteorológico
Nacional
Argentina

Setting operational thresholds for Heat Early Warning Systems Lecture 1 – Warning systems

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- Purpose of a warning system
- Components of a warning system
- WMO Guidelines n° 1150
- Types of warning systems

Purpose of a warning system

The design of an early warning system is one of the components that integrate disaster risk management

Tool to help the task of the decision maker

Minimize the effects / impacts

Prevention

Be more prepared to face threats

Must be adjusted to available information, technical and human resources

Components of a warning system



Credit: Claudia Campetella

To warn of a possible threat, it is necessary to take knowledge of the characteristics of each place

Interdisciplinary approach

WMO Guidelines on
Multi-hazard Impact-based
Forecast and Warning Services

From:

what the weather will be

Towards:

what the weather will do

- Actions to develop an IBF implementation strategy
- Share good practices
- Guidelines for standardizing messages (icons, colour coding)
- Work with users and stakeholders
- Training needs

WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services



Key points:

- 1) **Partnerships**: develop relationships, understand needs.
- 2) **Impact-Based Information and Service Development**: develop the specific framework with partners. Establish relationships between the natural hazard and impacts, vulnerability and exposure from case studies.
- 3) **Functional Requirements for IBF**: infrastructure required for an IBF (data management, dissemination, data sharing strategies, format)
- 4) **Human Capacity Development**: training of staff and users on IBF.
- 5) **Validation**: development of impact-based tools and metrics.

WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services

REPORT OF THE JOINT MEETING OF THE IMPLEMENTATION AND
COORDINATION TEAM / OPAG ON PUBLIC WEATHER SERVICE DELIVERY
TOGETHER WITH THE EXPERT TEAM ON IMPACT-BASED FORECAST AND
WARNING SERVICES (ET-IMPACT) AND THE EXPERT TEAM ON SERVICES AND
PRODUCTS IMPROVEMENT AND INNOVATION (ET-SPII)

Exeter, United Kingdom, 5-6 December 2019

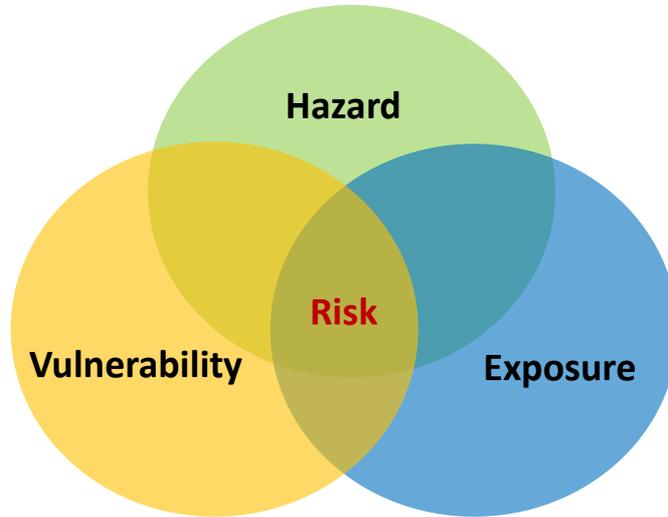


Final Report



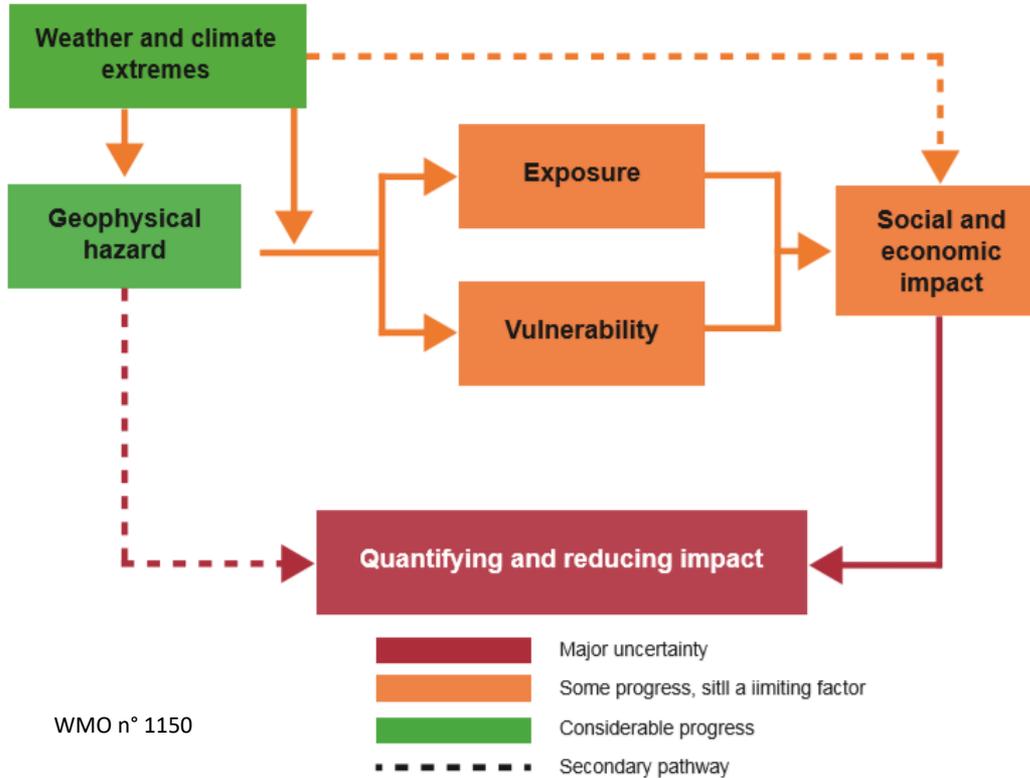
Elements to consider

$$|Risk\ of\ impact\ (x,\ t)| \\ \equiv |hazard\ (x,\ t)| \cup |vulnerability\ (x,\ t)| \cup |exposure\ (x,\ t)|$$



***The highest risk may
not be where the
weather is the worst!***

Elements to consider



WMO n° 1150

- It is not just about the hazard and thresholds.
- Requires broad partnership development.
- Better understand their needs.

➤ Partnerships

➤ Impact data

Figure 1. Relationship among the key elements of an impact forecast system

Elements to consider

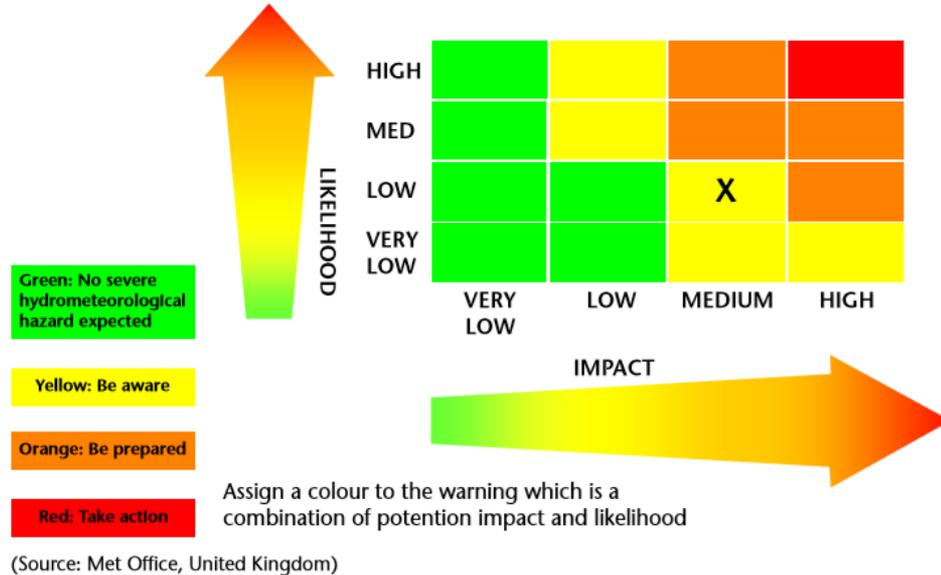
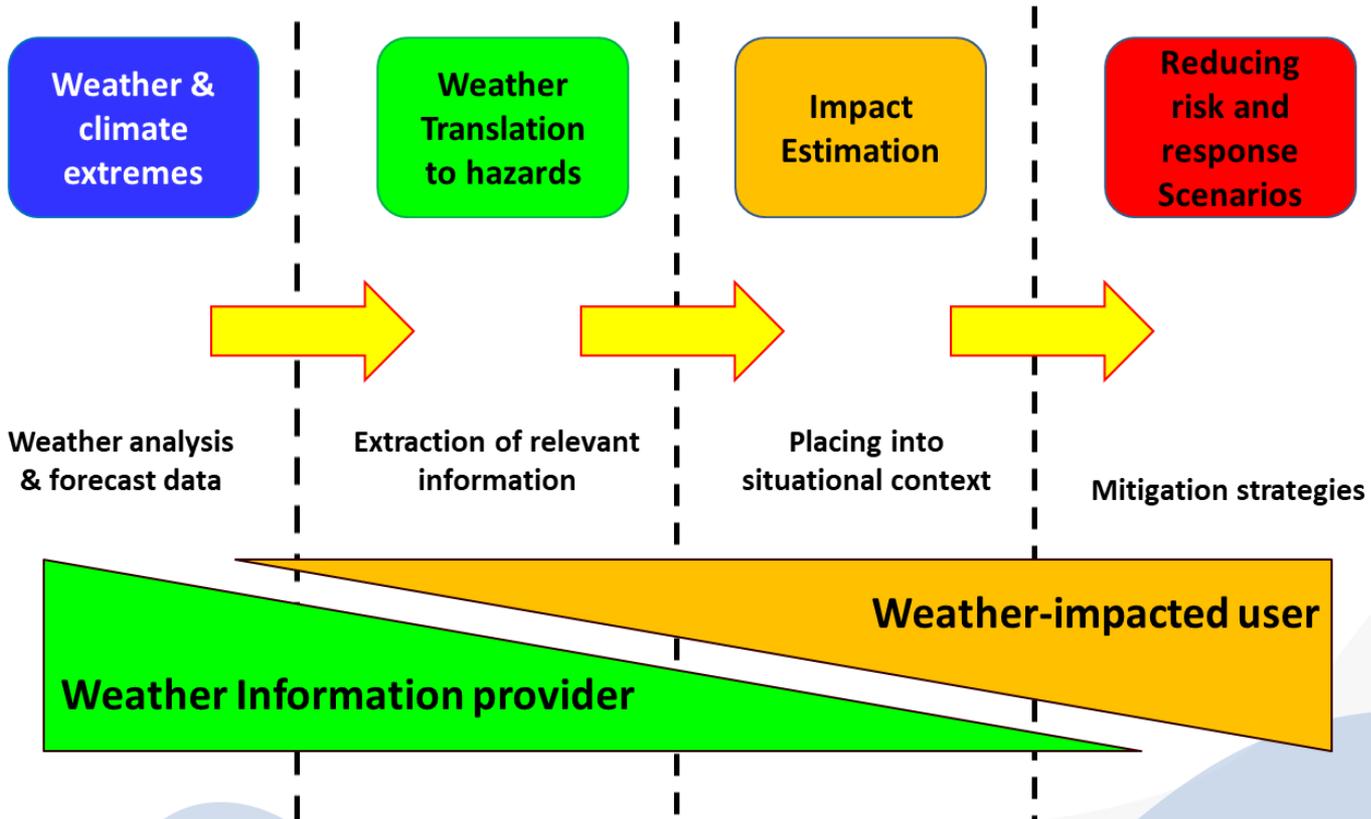


Figure 2. Risk matrix

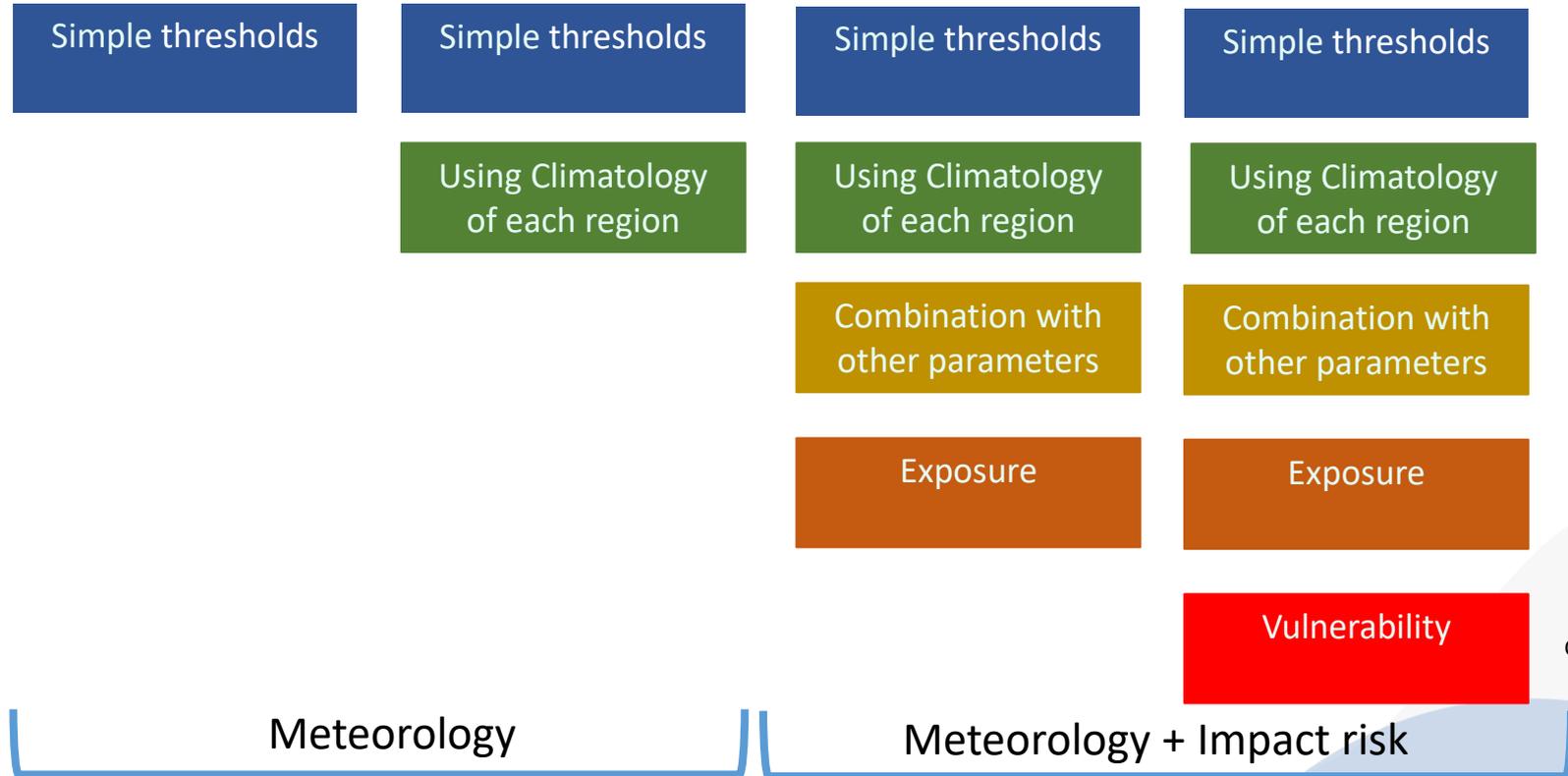
- Provides information on the expected degree of impact and the probability of impact.
- Meteorological thresholds are not decisive, but are part of decision making.

From weather to impact



Credit: Michel Jean

Stages in the evolution of early warning systems



Credit: Michael Staudinger

Types of warning systems

WMO n° 1150

<i>Evolving warning paradigm using a heavy rain event as an example</i>		<i>Factors incorporated</i>
General forecast	A cold, windy, wet day tomorrow with spells of very heavy rain expected in the afternoon and evening.	Hazard
Warnings with fixed thresholds	Rainfall accumulations of 30 mm to 40 mm expected tomorrow between 1400 and midnight.	Hazard
Warnings with user-defined thresholds	Heavy rain expected tomorrow afternoon with rainfall intensities of 3 mm/10 mins possible, leading to overflow in the drainage system. <i>(Note that this type of warning would typically be issued to a municipal authority only.)</i>	Hazard Vulnerability
Warnings with spatial and/or temporal variations in thresholds	Spatial differences: Weather warning – rainfall accumulations of 20 mm to 30 mm expected tomorrow in low-lying areas between 1400 and midnight, with accumulations of 50 mm to 60 mm possible at altitudes above 1 500 m. Temporal differences: Weather warning – rainfall accumulations of 15 mm to 20 mm expected tomorrow afternoon during rush hour. <i>(Note the lower threshold at times when the roads will be very busy.)</i>	Hazard Vulnerability

Types of warning systems

WMO n° 1150

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→ Only weather

→ Risk impact information

Types of warning systems

WMO n° 1150

Impact-based warning	Rainfall accumulations of 20 mm to 30 mm expected tomorrow between 1400 and midnight, resulting in possible road closures due to flooding across the south-east. <i>(Note the subtle but important distinction between the impact-based warning and the threshold warning described above. The distinction is that the threshold-based warnings only specified generalized flooding; the impact-based warning provided specific mention of an impact, in this case road closures.)</i>	Hazard Vulnerability
Impact warning	Expect journey times on the A111 likely to be lengthened by an hour because of significant traffic disruption in the south-east tomorrow afternoon due to localized flooding which is expected to follow a heavy rain event.	Hazard Vulnerability Exposure

Example - UK Met Office

Sun 10 Nov	Mon 11 Nov	Tue 12 Nov	Wed 13 Nov	Thu 14 Nov	Fri 15 Nov	Sat 16 Nov
No warnings			No warnings		No warnings	No warnings

Yellow warning
Rain

00:00 12:00
Tomorrow UTC **Tue 12**

Rain followed by frequent heavy showers likely to cause some flooding and transport disruption.

What to expect

- Flooding of a few homes and businesses is likely
- Bus and train services probably affected with journey times taking longer
- Spray and flooding on roads probably making journey times longer

What should I do?

- Protecting your property from flooding >
- What to do in a flood >
- Further details >**



Further details ✓

Issued: 11:23 (UTC) on Sun 10 Nov 2019

Following recent wet weather an area of rain will affect the area on Monday morning before clearing to frequent heavy showers by Monday afternoon, these continuing until the middle of Tuesday. Over the high ground of the Peak District widely 30 mm is expected to fall with 60 mm possible in a few spots. Snow may prove an additional hazard, falling over the highest peaks at times but only small accumulations are expected.

Warning impact matrix

		Very low impact	Low impact	High impact
Very likely				
	✓			
Unlikely				

Very low impact → High impact

Example - Meteofrance

- Color code associated with potential impacts, not only to meteorological phenomena.
- Validation: involves stakeholders, takes into account forecasts and reports of impact information.
- Recommendations



Vigilance météorologique

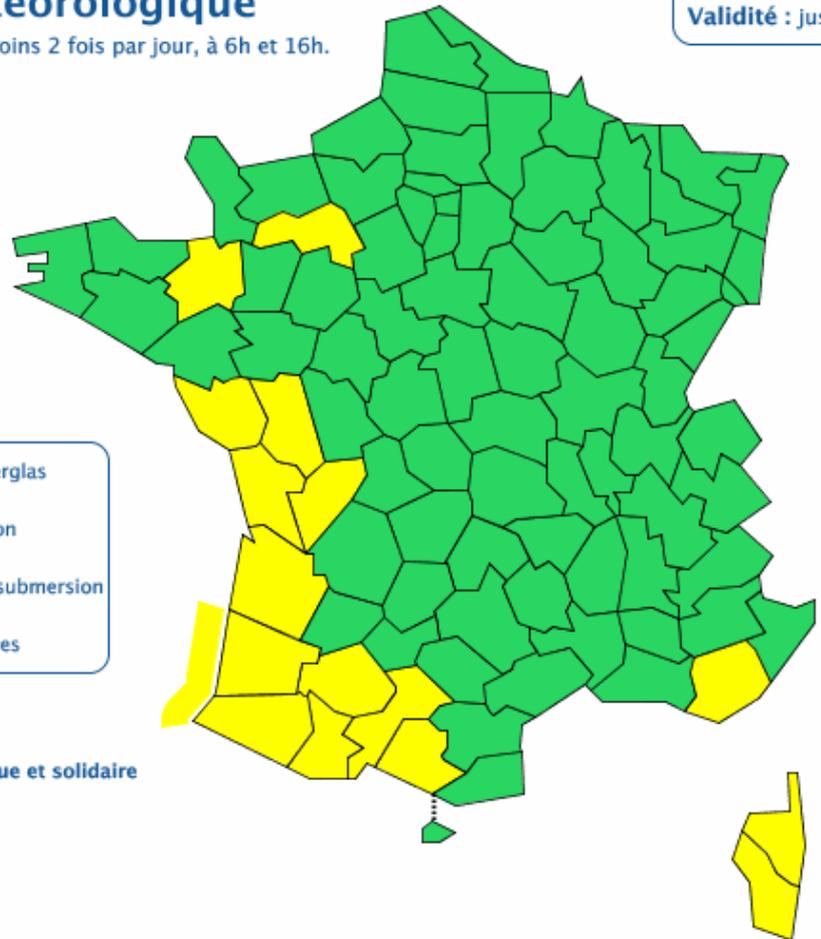
La carte est actualisée au moins 2 fois par jour, à 6h et 16h.

Diffusion : le
Validité : jus

- Une vigilance absolue s'impose** des phénomènes dangereux d'intensité exceptionnelle sont prévus...
- Soyez très vigilant**, des phénomènes dangereux sont prévus ...
- Soyez attentif** si vous pratiquez des activités sensibles au risque météorologique ...
- Pas de vigilance particulière.**

	Vent violent		Neige-verglas
	Pluie-Inondation		Inondation
	Orages		Vagues-submersion
	Grand Froid		Avalanches

Les vigilances pluie-inondation et inondation sont élaborées avec le réseau Vigicrues du Ministère de la transition écologique et solidaire



Summary

- Collaboration and permanent dialogue between meteorological services and emergency agencies / users.
- For meteorological information to be suitable for specific dangerous situations, it is necessary to understand the potential impacts of meteorological phenomena, as well as the uncertainties involved.
- Importance of impact, vulnerability and exposure data, and the infrastructure required.
- Warning systems must be adjusted to available information, technical and human resources.
- Interdisciplinary approach, partnerships.

Thank you



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2020 | Año del General Manuel Belgrano

