Climate-related extreme weather events and their implication for technological risks

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Climate is no longer stable.

Climate of the future will be different from the past – some times quite a bit.

Consider worst-case-scenarios of today to be better prepared for the future.

Hydro-meteorological hazards

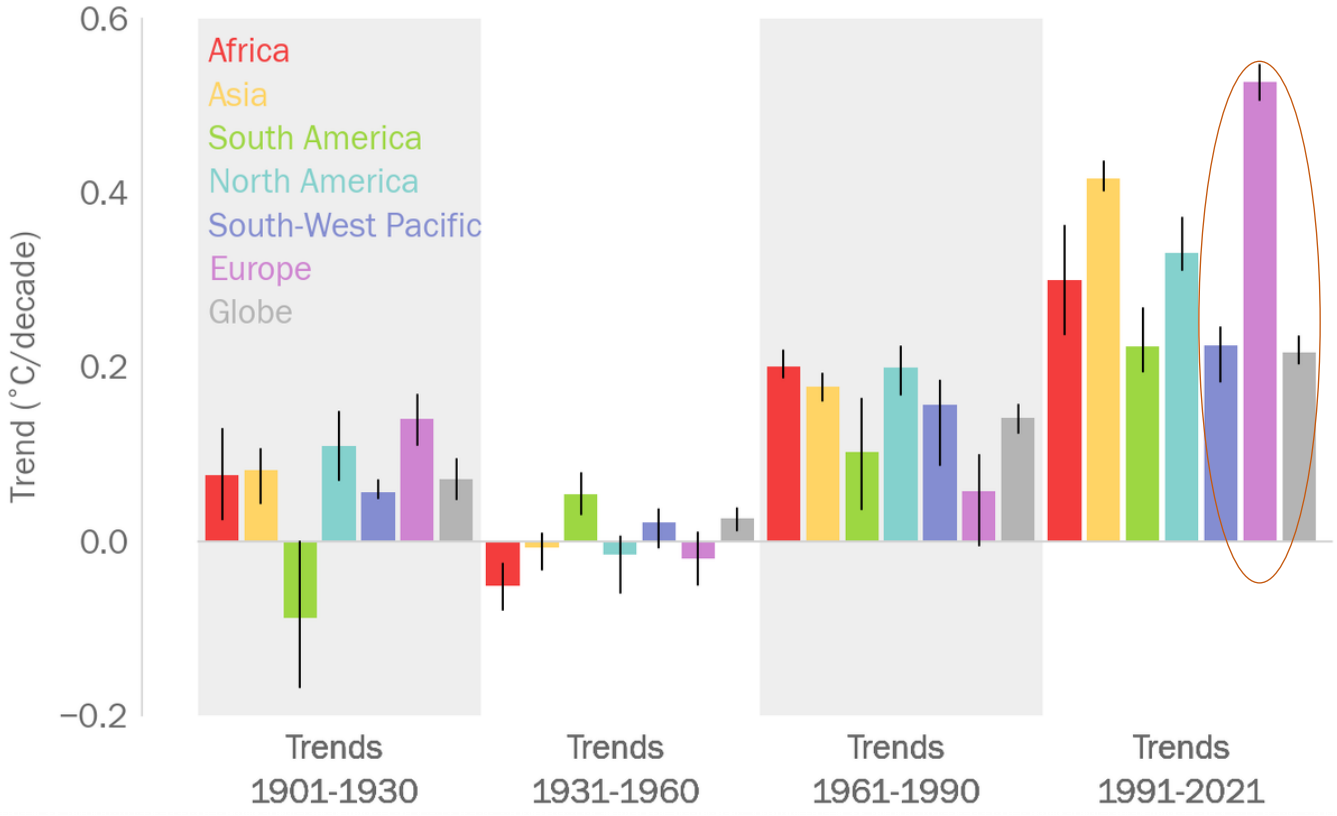
- Extreme temperatures
- Heavy precipitation
- Hail
- Flooding
- Run off
- Land- and/or rockslides
- Storms, tornadoes
- Ozone hole

Headline	
Hoar frost	Single event flood
Gale	Snowmelt flood
Heavy rain	Sand haze
Extreme precipitation	Sand storm
Hurricane	Dust storm
Typhoon	Black carbon
Heavy rain	Brown clouds
Ice Storm	Pollen pollution episode
Snowstorm	Polluted air
Squall	Blizzard
Tropical storm	Dry Spell
Strong gale	Wet Spell
Subtropical Storm	Cold wave
Hydrological drought	Heatwave
Meteorological drought	Landslide/Mudslide
Coastal flood	Mud flow
Estuarine flood	Acid rain
Flash flood	Storm surges
Fluvial (riverine) flood	Tsunami
Ice and debris-jam flood	Avalanche
Multiple event flood	Downburst
Seasonal flood	

List under revision by sub-team of WMO ET CHE

ET CHE: Expert Team on Cataloguing Hazardouse Events

Europe has warmed significantly over the last 30 years



Decadal temperature trends across WMO regions from 1901-2021.
Source: UK Met Office. Data sets: HadCRUT5, NOAAGlobalTemp, GISTEMP, Berkeley Earth, ERA5 and JRA-55

In **1991-2021** period, the temperatures over Europe warmed at an average rate of about **+0.5 °C per decade, more than twice the global average**

It is the fastest warming of all the WMO Regions

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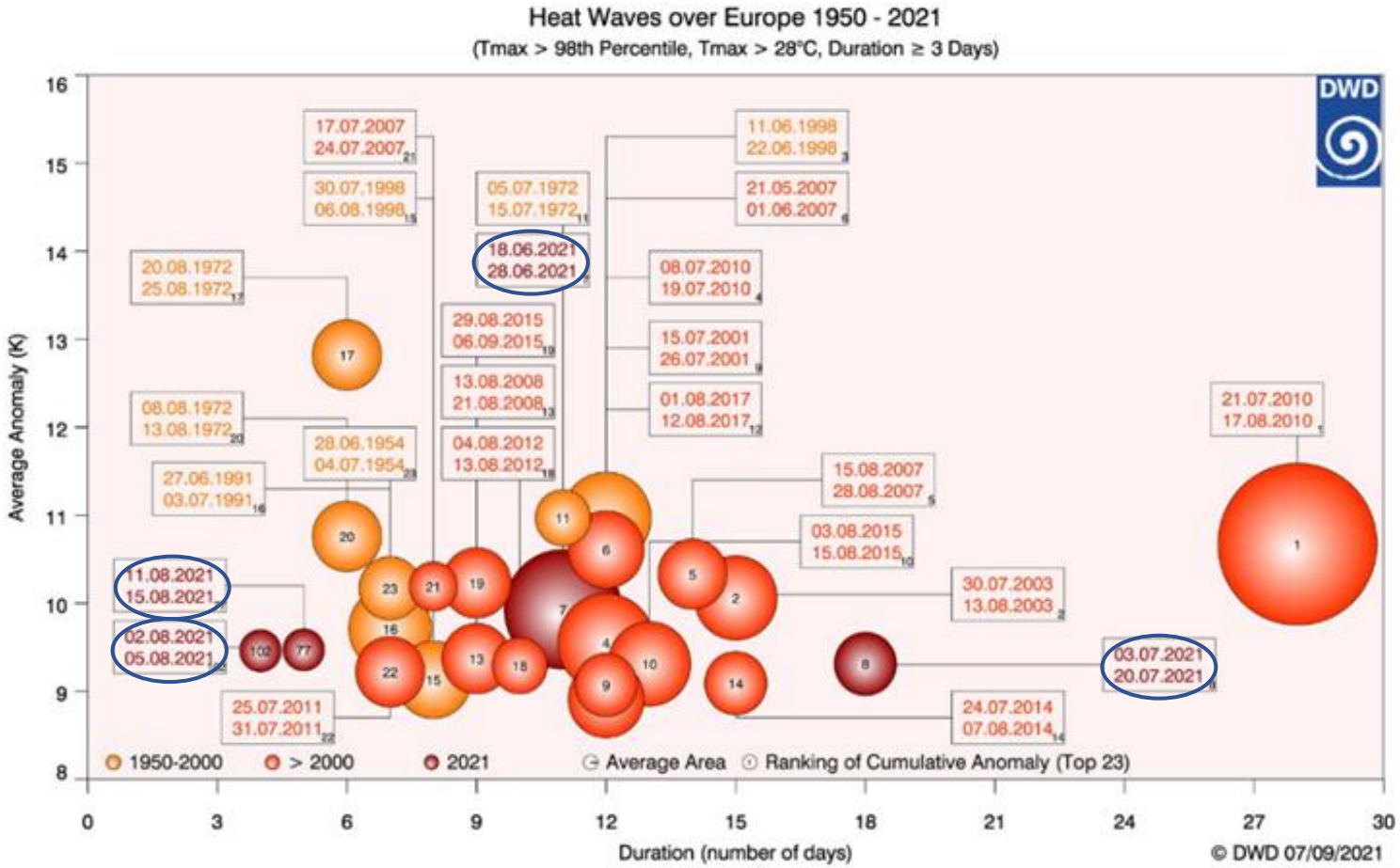
Heatwaves

- Since 1950 out of the 23 most severe heatwaves 16 occurred after 2000, including four in 2021.

- Heatwaves have become more frequent and also more severe, with serious impacts, for example, on health and mortality.



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Major Extreme Events

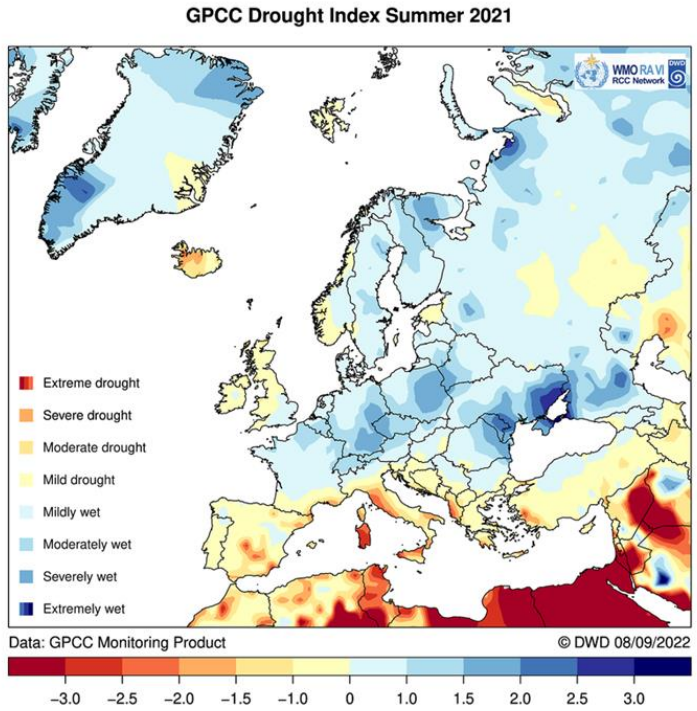
Drought, Heat and Wildfires

Drought

- Moderate to severe summer drought in much of the Mediterranean region.

Wildfires

- Major wildfires across the Mediterranean region, especially southern Türkiye, Italy and Greece.



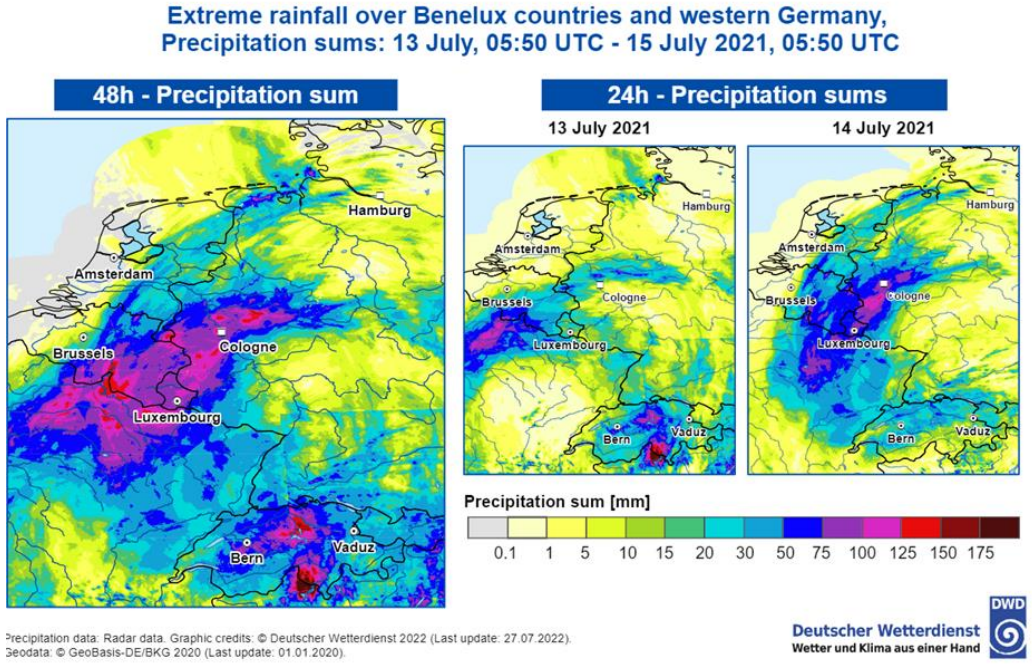
Extreme heat

- Heat waves in many parts of Europe with many new local and some national records.
- New provisional heat record for continental Europe in Sicily (southern Italy) at 48.8 °C in August 2021.
- Heat even in the north (highest ever recorded August temperature in Iceland: 29 °C).

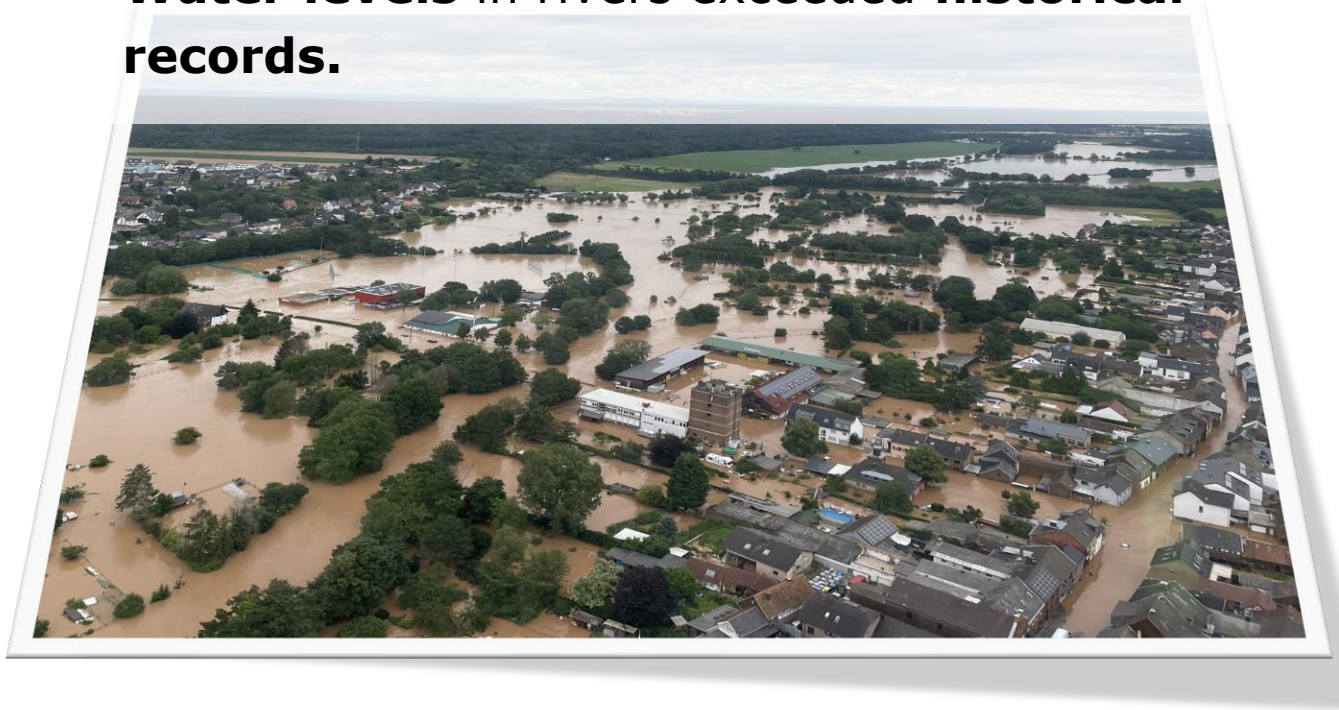
Major Extreme Events

Heavy precipitation and floods

- Central Europe experienced some of its **most severe flooding** on record in mid-July.
- Rainfall up to **241 mm in 22 hours.**



- Worst-affected areas were **western Germany and eastern Belgium.**
- Extreme **river flooding**, many towns inundated.
- **Water levels** in rivers exceeded **historical records.**



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Major Extreme Events

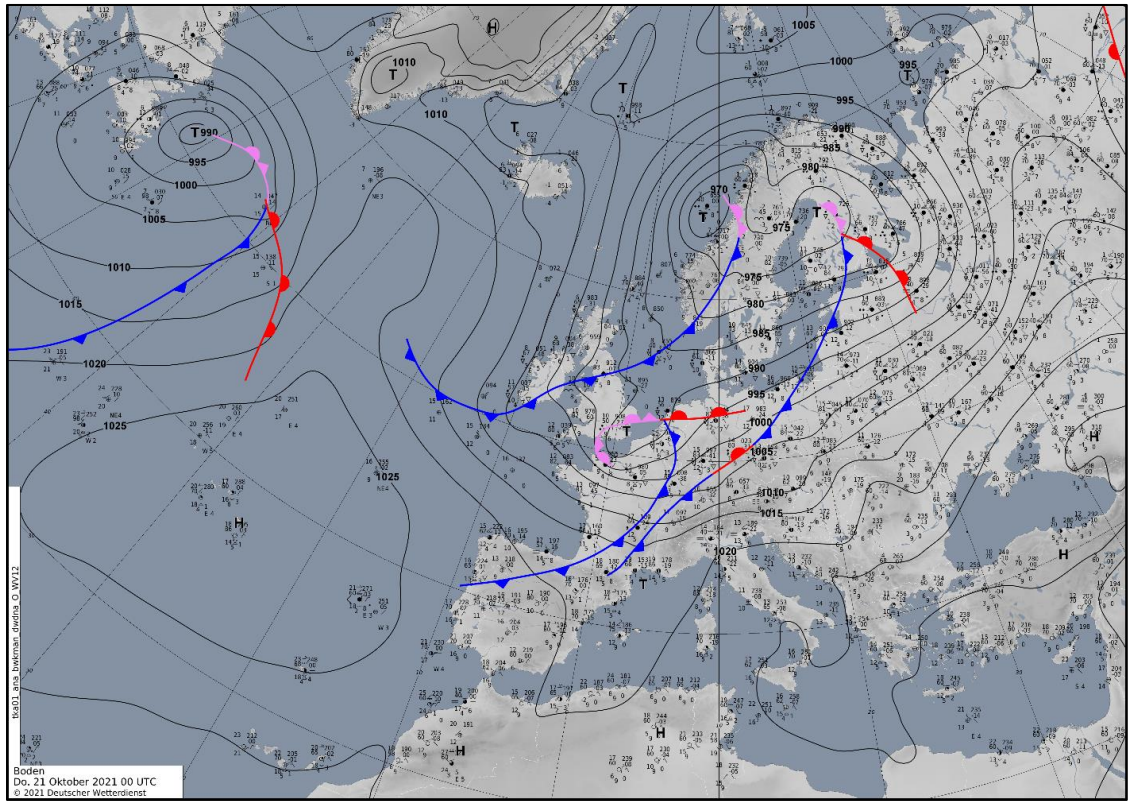
Storms

Storm Zyprian in northwestern France on 5 July 2021. Gusts up to 146 km/h at the west coast of Brittany, new local record for July.

Storm Aurore on 20-21 October in southern England, France, Central Europe. Gusts up to 175 km/h at the English Channel, new October record.

Cyclone Carmel over the eastern Mediterranean in mid-December. Landfall in Israel, gusts up to 110 km/h.

Surface pressure chart, 21 October 2022 00 UTC



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Europe's cryosphere continues to lose mass

Glaciers and ice sheets

- All mountain ranges in Europe are losing glacier mass.
- Alpine glaciers lost 30 meters in ice thickness from 1997 to 2021.
- Unprecedented melt event in summer 2021 in Greenland, coincident with the first-ever recorded rainfall at its highest point, Summit station.

Thawing permafrost

- Inside mountains will enhance risk of rockfalls;
- In the Arctic will severely damage built infrastructure.

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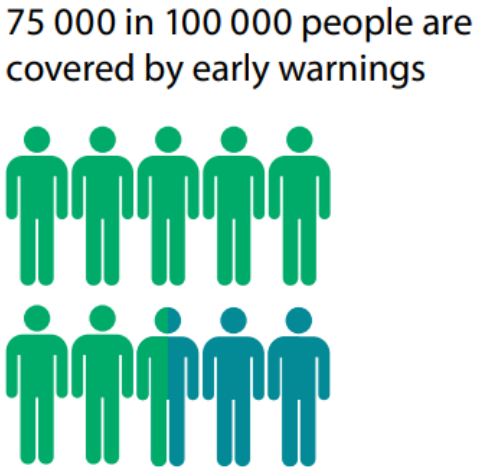
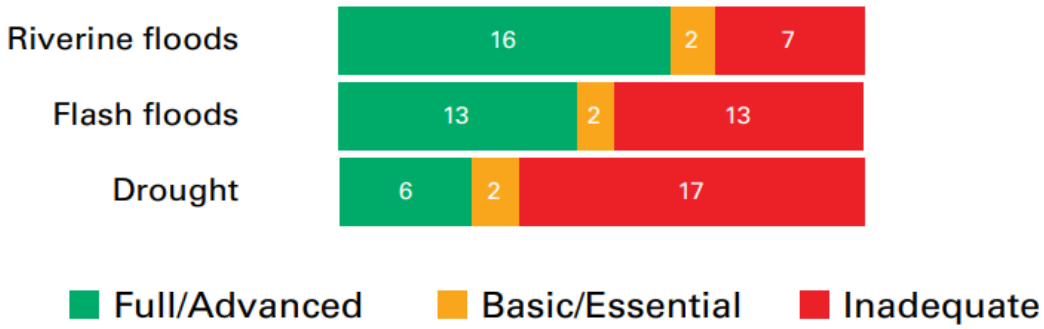
75% of people in Europe are covered by early warnings, although some hydrological capacities need improving



Number of WMO Members in Europe with early warnings available to the population at risk, by hydrological hazard type (data reported by 34 Members)



Why is it important to improve?

In the last 50 years (1970–2019) from all weather, water and climate disasters in Europe:

- 38% were floods
- 6 of Top 10 largest economic losses were related to floods

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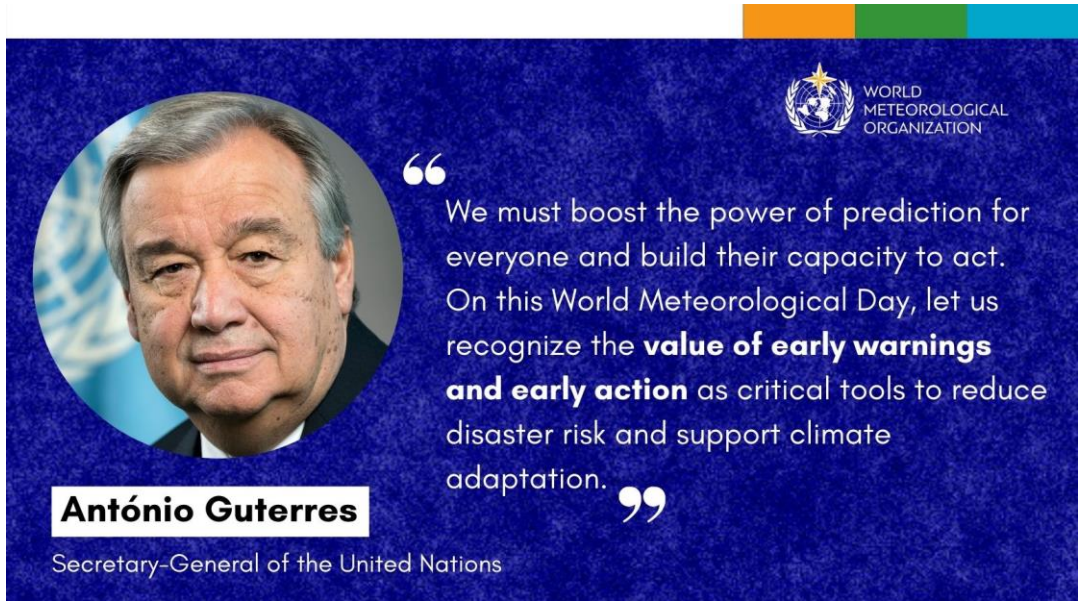
Globally, EWS must protect everyone within five years



UN Secretary-General António Guterres has tasked **WMO to lead the effort and present an action plan to achieve this goal** at the UN climate change conference, COP 27, in Sharm el-Sheikh, Egypt, 6-18 November 2022.

The **new plan** seeks to build on existing WMO activities and partnerships, including:

- WMO Global Multi-hazard Alert System (**GMAS**)
- The Climate Risk and Early Warning Systems Initiative (**CREWS**)
- Global Framework for Climate Services (**GFCS**)
- Systematic Observations Financing Facility (**SOFF**)

شكرا لكم

Thank you

Gracias

Merci

Спасибо

谢谢

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