EXTREME WEATHER EVENTS AND THEIR CAUSES

An Overview of Phenomena, Impacts, and Underlying Factors



INTRODUCTION

Extreme weather events are becoming more frequent and intense across the globe. These phenomena not only disrupt daily life but also have lasting effects on economies, ecosystems and human health. In this presentation, we will explore:

- What extreme weather events are
- The most common types
- Their natural and human-related causes
- Their consequences
- Possible solutions and prevention strategies





DEFINITION

Extreme weather events refer to severe, unusual, or unexpected weather phenomena that deviate significantly from the norm in terms of intensity, duration, or location. **Example include:**

- A sudden heatwave during winter
- A flood in a normally dry area
- These events often exceed the capacity of communities to cope without external assistance



COMMON TYPES OF EVENTS

Extreme weather encompasses a variety of events, each with distinct causes and impacts. **Main types include:**



HEATWAVES



FLOODS



DROUGHTS



HURRICANES AND TROPICAL CYCLONES



TORNADOES



SNOWSTORMS AND BLIZZARDS



WILDFIRES



HEATWAVES

- Prolonged periods of excessively high temperatures.
- Often accompanied by high humidity.
- Linked to dehydration, heatstroke, and cardiovascular issues.
- Particularly dangerous for the elderly, children, and people with chronic illnesses.
- **Example:** Europe’s 2003 heatwave caused over 70,000 deaths.









FLOODS

- Occur when water overflows onto land.
- Triggered by intense rainfall, melting snow, dam failures, or tropical storms.
- Lead to property damage, transportation disruption, and water contamination.
- **Example:** 2022 floods in Pakistan displaced millions and caused massive infrastructure loss.

DROUGHTS

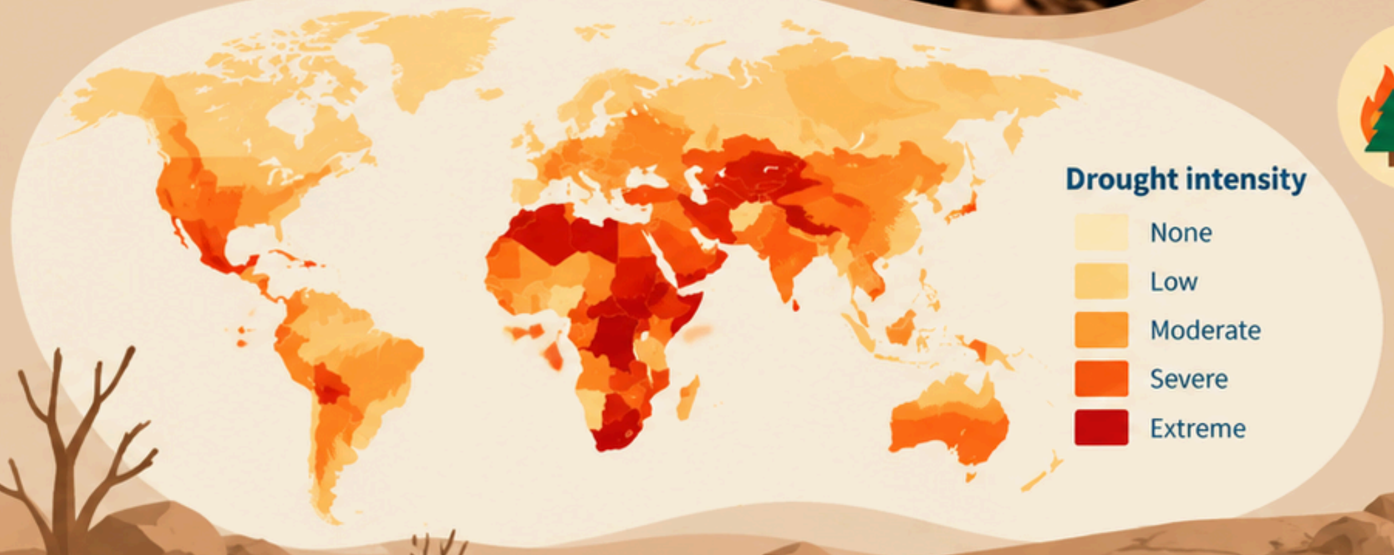


Extended periods of low or no rainfall.

Affect agriculture, water supplies, and power generation.

Can trigger food shortages and economic instability.

Increase risk of wildfires.



Example: Droughts in the Horn of Africa in the 2020s led to a serious risk of hunger.

HURRICANES AND CYCLONES

Intense storms with strong winds, heavy rain, and storm surges.



Called hurricanes in the Atlantic, typhoons in the Pacific and cyclones in the Indian Ocean.

Fueled by warm ocean waters and low atmospheric pressure.

Can devastate coastlines and urban areas.

Example: Hurricane Katrina (2005), Hurricane Ian (2022).



TORNADOES

- Rapidly rotating columns of air extending from thunderstorms to the ground.
- Measured using the Fujita scale (EF0–EF5).
- Causes destruction in its path.
- Common in the central U.S. (“Tornado Alley”).



Example: Joplin, Missouri tornado (2011)

SNOWSTORM AND BLIZZARDS



- Heavy snow with strong winds and low visibility.
- Can paralyze transport, knock out power, and endanger lives.
- Especially dangerous in urban areas without preparation.

Example: 2021 Texas winter storm caused widespread blackout and fatalities.

WILDFIRES



Uncontrolled fires in forest or grasslands.

Caused by lightning, dryness or human actions (campfires, arson).

Aggravated by dry conditions, heatwaves and wind.

Cause air pollution, habitat destruction and mass evacuations.

Example: Australia’s 2019-2020 bushfire season.



CLIMATE VS WEATHER







WEATHER = short-term atmospheric conditions (days/weeks)

CLIMATE = long-term weather trends (decades/centuries)



Extreme events are weather phenomena, but their frequency or intensity can reflect climate change.

Extreme weather events can arise from:



Natural variability in Earth’s systems.



Human-induced changes in atmosphere, land use, and emissions.

CAUSES OVERVIEW



Often, both factors combine and interact.

NATURAL CAUSES



VOLCANIC ERUPTIONS: release aerosols that cool the atmosphere



OCEAN-ATMOSPHERE INTERACTIONS (El Niño, La Niña): alter rainfall and temperatures



SOLAR CYCLES: impact Earth’s energy balance

These natural processes occur independently of human activity.

HUMAN-INDUCED CAUSES

- Greenhouse gas emissions from burning fossil fuels
- Deforestation reduces the planet's ability to absorb CO_2
- Urbanization increases surface temperatures and affects local climates
- Air pollution can influence rainfall patterns and cloud formation



GLOBAL WARMING

The planet’s average temperature has risen by over 1.1 °C since pre-industrial times.

Warmer temperatures increase evaporation, storm energy and heat extremes.

Contributes to the amplification of natural weather patterns.



GREENHOUSE GASES

Main contributors:



Carbon dioxide (CO_2)
from fossil fuels



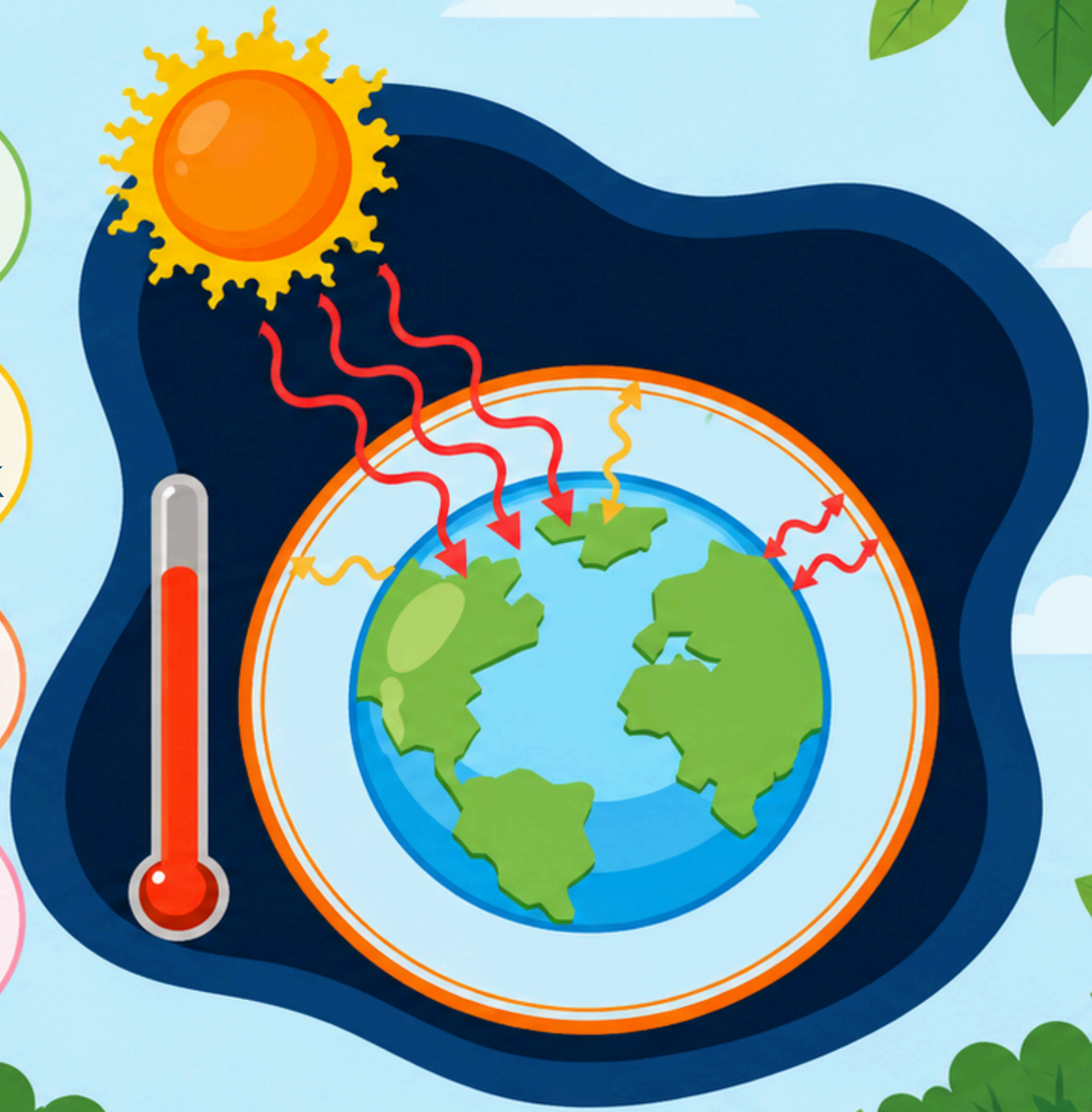
Methane (CH_4)
from agriculture and livestock



Nitrous oxide (N_2O)
from fertilizers



These gases trap heat, disrupting Earth's energy balance and influencing weather patterns.



DEFORESTATION

Trees absorb CO_2 and regulate local temperatures and humidity.





Deforestation leads to:

- Increased CO_2 levels
- Loss of rain regulation (especially in the Amazon)
- Desertification and altered rainfall patterns

URBANIZATION



Concrete and asphalt retain heat = urban heat islands.



Poor drainage systems increase flood risk.



High energy demand increases emissions.



Cities are more vulnerable to extreme weather impacts.



IMPACT ON SOCIETY



- **Human health:** heatstroke, disease spread, trauma
- **Economic loss:** infrastructure damage, crop loss, reduced productivity
- **Migration:** climate refugees increasing globally
- **Inequality:** poorer communities hit hardest



IMPACT ON NATURE





Ecosystem collapse



Species extinction



Coral bleaching
(e.g. Great Barrier Reef)



Agricultural shifts:
Some regions become unsuitable for traditional crops

WHAT CAN WE DO?



Reduce emissions: renewables, energy efficiency

Reforestation

Individual actions: sustainable choices, awareness



Adaptation strategies: better urban planning, early warning systems

International cooperation: Paris Agreement, COP summits

CONCLUSION

Extreme weather events are no longer rare. They are becoming part of a new normal driven by human influence on the climate. To reduce future risks, we must:

- Understand the science
- Act globally and locally
- Invest in sustainable, resilient systems





Thank you for your attention!
Any questions?