



HYDROCLIMATE WHIPLASH - GEOGRAPHY

NEWS: According to a study by climate attribution group ClimaMeter, three wildfires that have devastated large parts of Los Angeles city are mainly due to a 'hydroclimate whiplash'.

WHAT'S IN THE NEWS?

About Hydroclimate Whiplash:

- It is a rare meteorological condition wherein an **extremely wet season** is succeeded by an **extremely dry season**.

How Hydroclimate Whiplash Happens

1. Warmer Atmosphere:

- As the Earth warms, the atmosphere can hold 7% more water vapor for every 1°C rise in temperature.
- This means the atmosphere can hold moisture for longer before it releases it as rain.

2. Dry Periods Followed by Intense Rain:

- The atmosphere holds onto more water during dry periods, but when it finally releases that moisture, it leads to intense rainfall.

3. Evaporation:

- Warmer air causes more moisture to evaporate from the ground, making dry spells even more intense and longer-lasting.

These factors together lead to more extreme swings between wet and dry periods, creating the conditions we see with hydroclimate whiplash.

Factors in California Wildfires:

- **Wet Season Followed by Dry Conditions:** In early 2024, California experienced a wet season, promoting vegetation growth. This was followed by prolonged dry conditions, with severe drought conditions in Los Angeles by January 2025.
- **Drought Impact:** 36% of California faced moderate to extreme drought, and Los Angeles was under severe to moderate drought. The absence of natural forest regeneration due to lack of rainfall led to overgrown, dry vegetation, increasing fire risks.

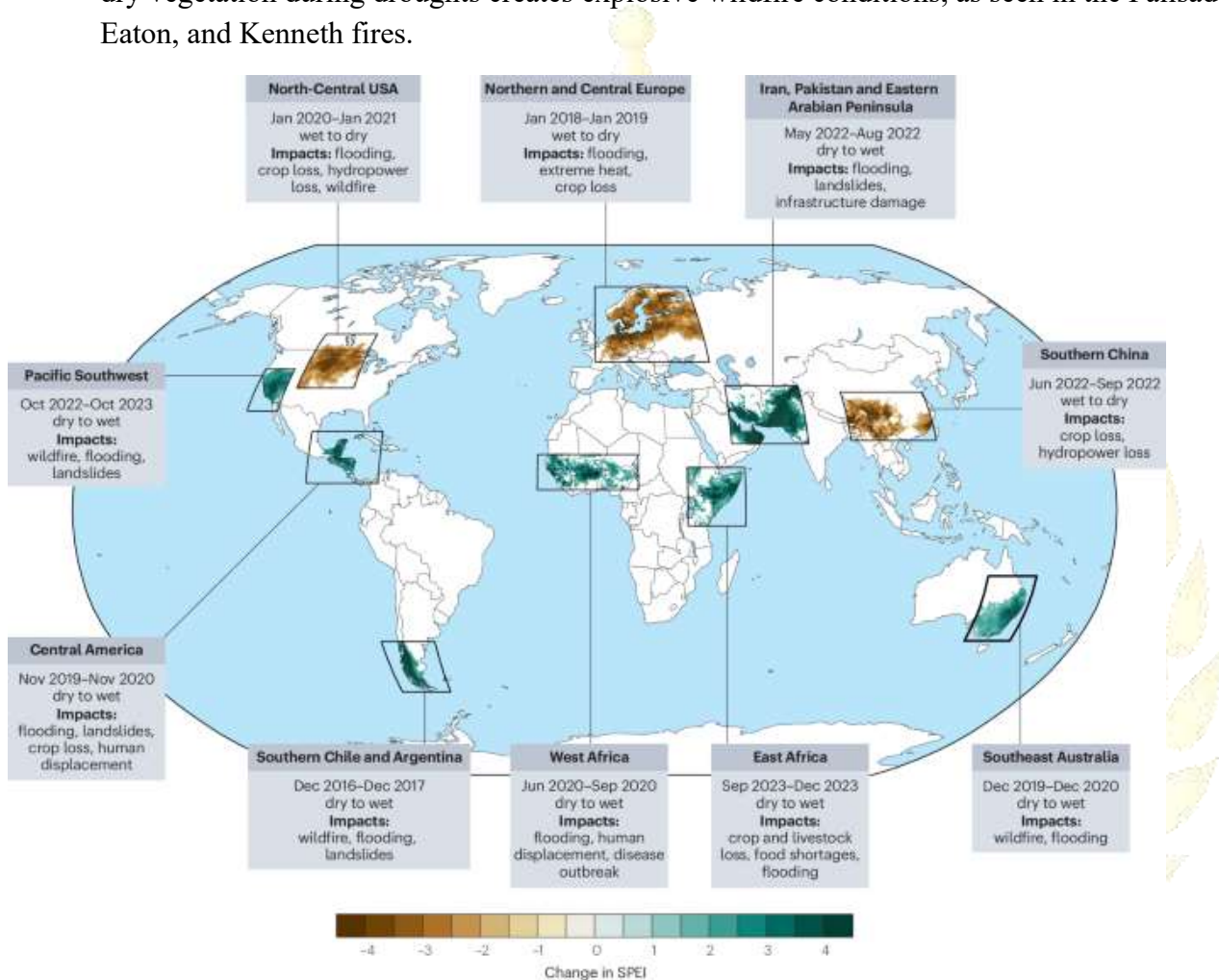
Santa Ana Winds:

- The winds, which descend from **dry desert areas, compress and warm as they move westward, exacerbating wildfire conditions**. Combined with low humidity, high temperatures, and dry vegetation, they facilitate the rapid spread of fires.



Role of Hydroclimate Whiplash in Intensifying Fires:

- Vegetation Growth Followed by Drying: The initial wet season created abundant vegetation, which then dried out due to the subsequent heat drought, creating a large fuel load for fires.
- Strong Winds: Santa Ana winds are notorious for driving fire spread. Their combination with dry vegetation during droughts creates explosive wildfire conditions, as seen in the Palisades, Eaton, and Kenneth fires.



Why Hydroclimate Whiplash is Dangerous

1. Wildfires:

- Wet periods encourage the growth of vegetation, which dries out during dry spells and becomes fuel for wildfires.
- This cycle is especially common in places like **California**, where wet winters are followed by dry summers.

2. Flooding and Landslides:

- After long dry spells, intense rainfall can cause **flash floods** and **landslides**, as the soil becomes unstable.



3. Impact on Agriculture:

- Crops face alternating **flooding** and **drought**, making it harder for farmers to grow food and maintain food security.

4. Health Risks:

- **Wildfires** produce smoke that worsens **respiratory** and **cardiovascular diseases**.
- **Flooding** can create conditions for waterborne diseases like **cholera** and **leptospirosis**.

5. Water Management Issues:

- The unpredictable availability of water makes it harder to manage **reservoirs** and **water supplies**, affecting people and ecosystems.

Global Trends and Future Projections:

- Increase in Hydroclimate Whiplash: Hydroclimate whiplash has increased globally by 31%-66% since the 20th century. Climate change is accelerating this, and with a 3°C rise in global temperatures, hydroclimate whiplash could increase by 113% in sub-seasonal periods.

Impacts

- Increases the number of **droughts and floods**.
- Fires created by the dry condition exacerbate respiratory and cardiovascular diseases through their polluting smoke.
- **Human health:** Flooding creates conditions for waterborne illnesses such as cholera, leptospirosis
- Such 'hydroclimate whiplash' conditions have increased by 31-66 per cent in three-month periods (sub-seasonal) and by 8-31 per cent in 12-month periods (inter-annual) across the world since the middle of the 20th century.

Source: <https://www.downtoearth.org.in/climate-change/what-is-hydroclimate-whiplash-and-how-did-it-fuel-the-los-angeles-wildfires>