

Impacts of Climate Change on Hurricanes

Why in news?


As Earth's climate warms, more storms are undergoing rapid intensification, growing quickly from relatively weak tropical storms to Category 3 or higher hurricanes in under 24 hours.

What is a hurricane?

- Tropical storms that form over the Atlantic Ocean or central and eastern North Pacific, with sustained winds of at least 74 mph are called "hurricanes".
- **Hurricane formation** - When warm seawater evaporates, its heat energy is transferred to the atmosphere.
- This fuels the storm's winds to strengthen and intensifies hurricanes.

Categories of hurricane

	Category 1	Category 2	Category 3	Category 4	Category 5
Wind	74-95mph	96-110mph	111-130mph	131-155mph	Over 155mph
Storm surge	4-5ft	6-8ft	9-12ft	13-16ft	Over 18ft



Minimal: No real structural damage; some flooding

Moderate: Material damage to buildings; small craft break moorings

Extensive: Structural damage to small houses; inland flooding

Extreme: Major structural damage & heavy flooding; evacuation necessary

Catastrophic: Massive damage to buildings; small structures blown over or away

Source: Saffir Simpson scale PA

How climate change intensifies tropical storms?

- **Warming oceans** - More than 90% of the excess heat from human-caused global warming over the past 50 years has been absorbed by the oceans.

Since 1901, sea surface temperatures have risen an average of 0.14 degrees Fahrenheit per decade.

- Higher surface temperatures allow hurricanes to reach higher levels of maximum sustained wind.
- **Rate of intensification** - Warmer oceans makes the rate of intensification more rapid.
- Rapid intensification refers to an increase of at least 30 knots, or 35 mph, in the maximum sustained winds over a 24-hour period.
- For example, in 2021, Hurricane Ida strengthened from a Category 1 with 85 mph winds into a near-Category 5 hurricane with 150 mph winds less than 24 hours later.

The likelihood of a hurricane undergoing rapid intensification has increased to 5% from 1% since the 1980s.

- **Vertical wind shear** - It is a measure of how much the wind changes in speed or direction at increasing heights in the atmosphere.
- Strong vertical wind shear can inhibit the development of hurricanes by tilting the structure of a storm and by forcing cool, dry air into its core.
- Warming temperatures may lead to weakening vertical wind shear, allowing hurricanes approaching the East Coast of the United States to intensify more rapidly.

How it impacts forecasting and preparedness?

- The increase in the number of hurricanes that intensify quickly and unpredictably presents a problem for forecasters.
- The window of time to make a decision gets smaller.
- Short notice raises the stakes and can affect a community's preparedness.

How else is climate change affecting storms?

- As climate warms, the typical season for hurricanes is shifting and more months of the year are conducive to storms.
- The Seasons for tropical storms are usually between June and November, but now they start three weeks earlier.
- Hurricanes are also shifting its landfall pattern farther north than in the past.
- Owing to the rising global air and ocean temperatures, there is a poleward shift in the landfall of hurricanes.

References

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