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# CURRENT AFFAIRS

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## HURRICANES

This article covers "Daily Current Affairs" and the topic details "Hurricanes". The topic "Hurricanes" has relevance in the "Geography" section of the UPSC CSE exam.

### For Prelims:

What are Tropical Cyclones and their types?

### For Mains:

GS1: Geography

### Why in the news?

In an unusual event, Hurricane Hilary is on track to be the initial tropical storm to make landfall in Southern California in over 80 years.

### Tropical Cyclones

- A **tropical cyclone** is a **swiftly rotating storm system identified by its central region of low pressure**, enclosed low-level atmospheric circulation, powerful winds, and an arrangement of thunderstorms resulting in significant rainfall and abrupt gusts.

### Nomenclature

The nomenclature assigned to these cyclones varies based on their location and strength, encompassing terms such as hurricane and typhoon, as well as tropical storm, cyclonic storm, tropical depression, and simply cyclone.

- The classification of "**hurricane**" applies to robust tropical cyclones emerging in the **Atlantic Ocean or the northeastern Pacific Ocean**.
- The "**typhoon**" characterises similar storms in the **northwestern Pacific Ocean**.
- In the **Indian Ocean, South Pacific**, and occasionally the **South Atlantic**, these weather phenomena are referred to as "**tropical cyclones**".



## Hurricane

- A hurricane, also known as a tropical cyclone, is a circular low-pressure weather system characterized by well-organized thunderstorms and the absence of fronts, which are boundaries separating different-density air masses.
- **The intensity of a hurricane is gauged using the Saffir-Simpson Hurricane Wind Scale**, which ranges from 1 to 5 and is determined by the hurricane's peak sustained winds. A higher category on the scale signifies a greater potential for causing damage to property.
- Originating primarily in the Atlantic basin, encompassing the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, as well as occasionally in the eastern North Pacific Ocean and central North Pacific Ocean, hurricanes are identified using a six-year cyclic list of names. This list is curated and updated by the World Meteorological Organization.
- The **timeframe known as "Hurricane Season" spans from June 1 to November 30.**

## Parts of a Hurricane

- **Eye:** The centre of the storm is characterised by calm winds and sometimes clear skies.
- **Eye Wall:** A ring of intense thunderstorms surrounding the eye, with the strongest winds and heaviest rainfall.
- **Rain Bands:** Cloudy and rainy bands extending from the eye wall, often containing thunderstorms and occasionally tornadoes.

## Stages of Hurricane Formation

- **Tropical Disturbance:** An area with developing rain clouds over warm ocean waters.
- **Tropical Depression:** A region of rotating thunderstorms with winds up to 62 km/hr (38 mph).
- **Tropical Storm:** Occurs when wind speeds reach 63 km/hr (39 mph).
- **Hurricane:** Achieved when wind speeds reach 119 km/hr (74 mph).

## Necessary Conditions for formation of Hurricanes

- **An existing weather disruption:** Frequently, a hurricane initiates as a tropical wave.
- **Elevated temperature in the ocean:** The storm derives its energy from water that is a minimum of 26.5 degrees Celsius in temperature, extending 50 meters deep.
- **Occurrences of thunderstorms:** Thunderstorms transform the warmth from the ocean into the energy source for the hurricane.
- **Limited wind shear:** Significant variations in wind speed and direction in close proximity to the storm can result in its attenuation.

## More about the news

- According to the latest public advisory released by the US National Hurricane Center, the storm was in close proximity to the western coast of Baja California.
- This occurrence is remarkable since the sole tropical storm accompanied by hurricane-force winds, thought to have impacted Southern California, occurred in October 1858, causing significant impact to San Diego.

## Why is this occurrence remarkable?

The Pacific coast's rarity of tropical storms and hurricanes is due to unique ocean features.

- **Temperature Disparity: East vs. West:**

- The US east coast experiences warm hurricane-season temperatures, but the west coast has colder waters.
- Unlike the Atlantic's warm equatorial waters moving north via the Gulf Stream, the Pacific's cold currents bring cooler water from higher latitudes, making hurricanes unlikely.
- **Role of Vertical Wind Shear:**
  - As hurricanes can extend 16 km high, wind shear disrupts their structure, limits upward air movement, and displaces warm air above the storm's eye.
  - Strong wind shear in the eastern Pacific versus the Gulf of Mexico means fewer western coast hurricanes.
- **Impact of Wind Steering Patterns:**
  - Trade winds guide hurricanes eastward, away from the western coast. Pacific-originating hurricanes often head west-northwest due to these winds, taking them away from the coast.

### **Role of Climate Change**

- **Scientific Studies:**
  - Scientists predicted that climate change would not only increase the occurrence of such hurricanes but also intensify them.
  - A recent study published in the journal American Meteorological Society, indicated that major hurricane landfalls in the eastern Pacific could become up to 30% more frequent if global temperatures rise by at least 2 degrees Celsius.
- **Ocean's Heat Absorption and Temperature Rise:**
  - Oceans have absorbed 90% of the extra heat generated by greenhouse gas emissions recently.
  - Consequently, the global mean sea surface temperature has risen by nearly 0.9 degrees Celsius since 1850 and around 0.6 degrees Celsius in the last four decades.
- **Amplification of Extreme Weather Events:**
  - Elevated sea surface temperatures lead to marine heatwaves, extreme weather events that can heighten the intensity of storms like hurricanes and tropical cyclones.
  - Warmer temperatures accelerate evaporation and heat transfer from oceans to the air.
  - Storms crossing warm oceans collect more water vapor and heat, resulting in stronger winds, heavier rainfall, and increased flooding upon landfall.
- **Role of El Niño:**
  - The situation has been exacerbated by the occurrence of El Niño, the first in seven years. El Niño weakens vertical wind shear in the eastern Pacific, permitting more hurricanes in the area.
  - El Niño refers to abnormal warming of surface waters in the equatorial Pacific Ocean, known to elevate the likelihood of temperature records being broken and triggering extreme heat both on land and in the ocean.

### **Sources:**

Hurricane Hilary: Why are west coast hurricanes so unprecedented? ([indianexpress.com](http://indianexpress.com))

### **Q1. With reference to tropical cyclones, consider the following statements:**

1. "Hurricane" refers to strong tropical cyclones from the Atlantic Ocean, while the term "typhoon" is used for storms in the northwestern Pacific Ocean.
2. The "Hurricane Season" generally spans from June 1 to November 30.
3. The intensity of a hurricane is measured using the Fujita scale, ranging from 1 to 5.

Which of the statements given above is/are **NOT** correct?

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) None

**Answer: (c)**

**Q2. Consider the following:**

1. The Eye is the central region of a hurricane, consisting of intense thunderstorms and hosting the strongest winds and heaviest rainfall.
2. The Eye Wall is a circular area surrounding the eye, known for calm winds and sometimes clear skies.
3. Thunderstorms play a role in converting ocean warmth into the energy that fuels hurricanes.
4. Limited wind shear, involving significant differences in wind speed and direction close to the storm, can weaken the storm's intensity.

How many of the abovementioned statements are correct ?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All Four

**Answer: (b)**

**Q3. Discuss the stages of formation of a hurricane, highlighting the conditions necessary for its development and the role of climate change in influencing the frequency and intensity of hurricanes.**

**Gaurav Nikumbh**

## METHANE POLLUTION

*This article covers "Daily Current Affairs" and the topic details "METHANE POLLUTION". The topic "METHANE POLLUTION" has relevance in the Environment section of the UPSC CSE exam.*

**For Prelims:**

*About Methane?*

*About Termination-Level Transition?*

**For Mains:**

*GS 3: Environment*

*Methane's Impact on Climate?*

*Initiatives to tackle methane pollution?*

**Why in the news:**

The rapid increase in methane concentrations within Earth's atmosphere has sparked apprehensions regarding the current state of the planet's climate evolution.

**About Methane**

Methane's importance extends beyond its warming potential:

- Methane, the simplest hydrocarbon, is composed of a single carbon atom and four hydrogen atoms (CH<sub>4</sub>).
- It's flammable and widely used as a fuel source globally.
- Its greenhouse effect is over 80 times stronger than CO<sub>2</sub> within the first two decades of its presence in the atmosphere.
- While natural sources emit some methane, human activities like farming and fossil fuel use are the main culprits.

### Termination-Level Transition:

- The term "termination-level transition" refers to a sudden and significant climate shift on Earth. These shifts bring about rapid changes in climate factors, impacting ecosystems, weather patterns, and the environment.
- These transitions have occurred throughout Earth's history, often coinciding with the end of ice ages and the transition to warmer periods. Notably, during the Pleistocene epoch (around 2.6 million to 11,700 years ago), the planet experienced global cooling and subsequent warmer interglacial periods.
- Such transitions can be triggered by factors like changes in ocean currents and atmospheric composition.

### Methane's Impact on Climate:

Methane poses a notable threat to our climate due to its unique properties:

- **Potent Greenhouse Gas:** Methane has a higher heat-trapping capability than carbon dioxide (CO<sub>2</sub>). Despite its shorter presence in the atmosphere, its warming effect over a century is much stronger, about 28-36 times that of CO<sub>2</sub>.
- **Rising Methane Levels:** Human activities have raised methane levels from around 0.7 parts per million (ppm) to over 1.9 ppm. This escalation accelerates global warming.
- **Challenges in Temperature Control:** Increasing methane complicates efforts to limit global warming. It adds to the overall greenhouse gas effect, pushing temperatures higher and closer to critical limits.
- **Impact on Ecosystems:** Higher methane levels disrupt ecosystems and biodiversity. Fragile habitats like wetlands are particularly vulnerable to these changes.
- **Sea-Level Rise Concerns:** Elevated methane contributes to melting polar ice and glaciers, accelerating sea-level rise. This endangers coastal areas and worsens climate change effects.



## Taking Action: Initiatives to Tackle Methane

Both India and the world are taking steps to combat methane emissions:

### Indian Initiatives:

- **Harit Dhara (HD):** Developed by the Indian Council of Agricultural Research, HD is a feed supplement that could potentially reduce cattle methane emissions by 17-20% while boosting milk production.
- **India Greenhouse Gas (GHG) Program:** Led by WRI India, the Confederation of Indian Industry (CII), and The Energy and Resources Institute (TERI), the India GHG Program aims to establish a framework for measuring and managing greenhouse gas emissions. This collaborative effort aids businesses in adopting more sustainable practices, minimizing their environmental footprint, and contributing to India's climate commitments.
- **National Action Plan on Climate Change (NAPCC):** Launched in 2008, it raises awareness and outlines strategies to counter climate change.
- **Bharat Stage-VI Norms:** India's transition to BS-VI emission norms aims to cut vehicular emissions.

### Global Initiatives:

- **Methane Alert and Response System (MARS):** This system uses satellite data to alert stakeholders about methane emissions worldwide.
- **Global Methane Pledge:** Nearly 100 countries pledged to reduce methane emissions by at least 30% by 2030 compared to 2020 levels during the 2021 UNFCCC COP 26.
- **Global Methane Initiative (GMI):** This collaboration promotes methane recovery and utilization as a clean energy source.

### SOURCE:

<https://www.downtoearth.org.in/blog/climate-change/rising-methane-could-be-a-sign-that-earth-s-climate-is-part-way-through-a-termination-level-transition-91185>

### Q.1 Which of the following substances are emitted into the atmosphere as a result of burning crop or biomass residue?

- (a) Carbon monoxide and methane only
- (b) Methane, ozone, and sulphur dioxide only
- (c) Carbon monoxide and sulphur dioxide only
- (d) Carbon monoxide, methane, ozone, and sulphur dioxide

**ANSWER: D**

### Q.2 Which of the following assertions regarding 'methane hydrate' deposits is/are accurate?

1. The warming of the planet could potentially induce the liberation of methane gas from these reserves.
2. Vast accumulations of 'methane hydrate' are present beneath the sea floor and in the Arctic Tundra.
3. Methane within the atmosphere undergoes oxidation, transitioning into carbon dioxide within a span of one or two decades.

**Select the correct answer using the code given below.**

- (a) 1 and 2 only

- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**ANSWER: D**

**Q.3 “How does methane pollution contribute to global warming, and what are the measures being taken by countries and international collaborations to mitigate its effects on the environment?”**

**Rishabh**



**Yojna IAS**  
योजना है तो सफलता है