Tropical Cyclones Need New Category

For Prelims: Tropical Cyclones Need New Category, **Tropical Cyclones**, Hurricanes, Saffir-Simpson (SS) Scale, **Global Warming**.

For Mains: Tropical Cyclones Need New Category, Important Geophysical phenomena such as earthquakes.

Source: TH

Why in News?

Recently, a study has been published in the journal ***Proceedings of National Academy of Sciences***, where researchers have claimed that wind speed during a hurricane can cross 309 km/hour and therefore **wind scale must add a Category 6.**

What are the Key Highlights of the Study?

- **Reconsideration of Saffir-Simpson (SS) Scale:**
  - There are concerns about the adequacy of the Saffir-Simpson (SS) Hurricane Wind Scale, which has been used for over 50 years to communicate hurricane risk based solely on wind speed.
    - There are **five categories on the SS hurricane wind scale — category 1 to category 5** — with category 5 wind speed **exceeding 252 km/hour.**
      - The combined effects of wind, storm surge, and rainfall in a category 5 impact would **completely raze any structure.**
  - The open-ended Category 5 may no longer be sufficient to communicate the **increasing risk of hurricane** damage in a warming climate. //

Cyclones are classified into five different levels on the basis of wind speed. They are further divided into the following categories according to their capacity to cause damage:-

Cyclone Category	Wind Speed in Km/h	Damage Capacity
01	120-150	Minimal
02	150-180	Moderate
03	180-210	Extensive
04	210-250	Extreme
05	250 and above	Catastrophic

- **Introduction of Hypothetical Category 6:**
  - Due to **Global Warming**, there is now a need to **define a category 6 cyclone.**
    - The warming can be observed not only at the sea surface, but also in the depths of the ocean, which increases the heat content of the ocean and thus **favours the intensification of tropical cyclones.**
  - To address the limitations of the existing scale the introduction of a hypothetical **Category 6** to the Saffir-Simpson Wind Scale is **proposed with the wind speed above 309 km/hour.**
- **Impact of Global Warming on Hurricane Intensification:**
  - Increased **greenhouse gas emissions** have caused the Earth to warm by about 1.10 degrees Celsius since pre-industrial times and caused **more intense tropical cyclones in the oceans.**
    - For every degree of warming, the **strongest cyclones are getting 12% stronger,** making them 40% more destructive.

    - As the oceans warm, cyclones also strengthen faster and spend more lifetime over the oceans.
        - In 2023, **tropical cyclone Freddy spent 37 days over the oceans,** making it the longest-lived cyclones ever recorded.
- **Implications for Risk Messaging:**
    - The findings underscore the **importance of revising risk messaging** to better inform the public about the increased risk of major hurricanes due to global warming.
    - SS Scale **does not address issues related to inland flooding** and storm surge, which are also critical components of hurricane risk.
    - Therefore, changes in messaging beyond wind-based scales are necessary to adequately communicate the full spectrum of hurricane hazards.

Note:

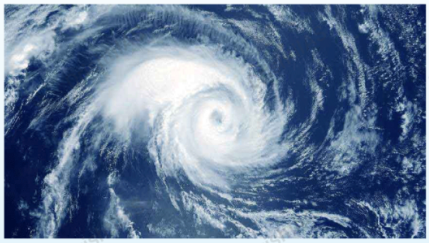
- Once a tropical cyclone reaches maximum sustained winds of **119 km/hour** or higher, it is then classified as a **hurricane, typhoon, or tropical cyclone**, depending upon where the storm originates in the world.
    - In the North Atlantic, central North Pacific, and eastern North Pacific, the term hurricane is used.
- The **Western Pacific basin** is the **most active region for tropical cyclones** and accounts for **about a third of the world's tropical cyclones.**
- The North Indian basin accounts for only about 4% of the global total, although it is one of the **most vulnerable regions in the world** to the effects of such cyclones.

What are Cyclones?

CYCLONE

Drishti IAS

Cyclones are rapid **inward** air circulation around a **low-pressure** area.

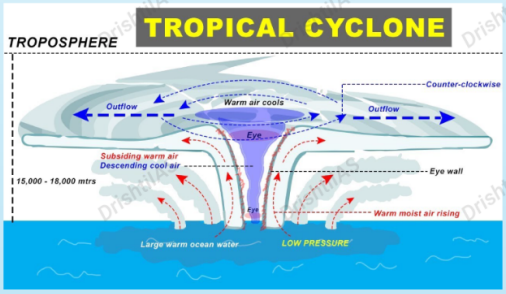


Cyclone v/s Anticyclone

Pressure System	Pressure Condition at the Center	Pattern of Wind Direction	
		Northern Hemisphere	Southern Hemisphere
Cyclone	Low	Anticlockwise	Clockwise
Anticyclone	High	Clockwise	Anticlockwise

Classification

- **Tropical Cyclones;** originate between the **Tropics of Capricorn and Cancer**
- **Extra Tropical/ Temperate Cyclones;** originate in the **Polar Regions**



Conditions for Formation

- Large sea surface with temperature >27° C.
- Presence of the **Coriolis force**
- Small **variations in the vertical wind speed**
- **A pre-existing weak low- pressure area**
- **Upper divergence** above the sea level system

Nomenclature

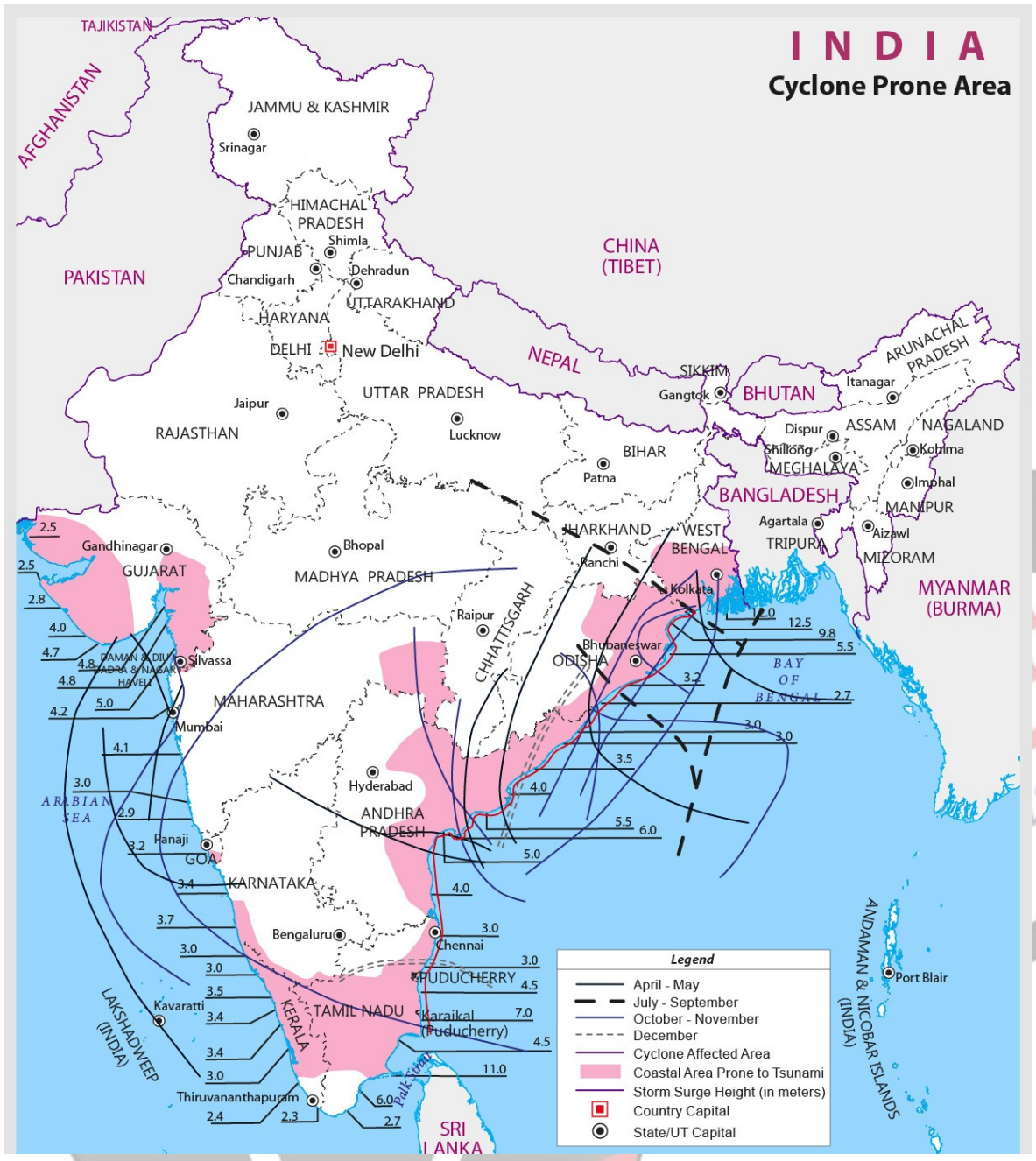
- Nodal Authority - **World Meteorological Organization (WMO)**
- Indian Ocean Region - **Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka** and **Thailand** contribute to naming cyclones that occur in this region.

Different Names for Tropical Cyclones

- **Typhoons** - Southeast Asia and China
- **Hurricanes** - North Atlantic and eastern Pacific
- **Tornados** - West Africa and southern USA
- **Willy-willies** - Northwest Australia
- **Tropical Cyclones** - Southwest Pacific and Indian Ocean

Cyclones in India

- **Bi-annual Cyclone Season** - March to May and October to December
- Recent Cyclones - **Tauktae, Vayu, Nisarga and Mekanu** (in Arabian Sea) and **Asani, Amphan, Fani, Nivar, Bulbul, Titli, Yaas and Sitrang (in Bay of Bengal)**



Drishti Mains Question:

Q: Examine the limitations of the current Saffir-Simpson (SS) Scale and elucidate how the introduction of Category 6 can address these limitations.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Consider the following statements: (2020)

1. Jet streams occur in the Northern Hemisphere only.
2. Only some cyclones develop an eye.
3. The temperature inside the eye of a cyclone is nearly 10ºC lesser than that of the surroundings.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 and 3 only
(c) 2 only
(d) 1 and 3 only

Ans: (c)

Q. In the South Atlantic and South-Eastern Pacific regions in tropical latitudes, cyclone does not originate. What is the reason? (2015)

(a) Sea surface temperatures are low
(b) Inter-Tropical Convergence Zone seldom occurs
(c) Coriolis force is too weak
(d) Absence of land in those regions

Ans: (b)

Mains:

Q. Tropical cyclones are largely confined to the South China Sea, Bay of Bengal and Gulf of Mexico. Why? **(2014)**