Lightning in India

For Prelims: State Disaster Response Fund, Lightning, National Crime Records Bureau, Natural disaster, Global warming, Urban heat island effect , Deforestation.

For Mains: Current Scenario of Lightening in India, Factors Behind the Increasing Trend of Lightning Strikes

Source: TH

Why in News?

Lightning has been a cause of concern in India, leading to a significant number of fatalities each year. As demands arise from states like **Bihar and West Bengal** to declare **lightning a natural disaster,** the Union government has taken a cautious stance.

- If approved, victims would be entitled to compensation from the **State Disaster Response Fund (SDRF)**, of which 75% is contributed by the Central government.

Note:

At present **cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, frost and cold waves** are considered disasters that are covered under the SDRF. This does not include lightning yet.

What is the Current Scenario of Lightening in India?

- **About:**
  - **Lightning** is a **powerful and visible electrical phenomenon** that takes place when there is a **buildup of electrical charges within clouds and between clouds and the ground.**
    - The discharge of this electrical energy results in a **brilliant flash of light and a rapid expansion of air,** creating the characteristic thunder that accompanies lightning.
    - **Cloud-to-ground (CG)** lightning is dangerous because it can electrocute people due to its high electric voltage and current.
  - India ranks among the **five countries worldwide** with an **early warning system for lightning.**
    - The system provides forecasts ranging from **five days to as close as three hours before the occurrence of lightning.**
- **Lightning Fatalities: Statistics and Trends**
  - **National Crime Records Bureau (NCRB) Data**: In 2021, **lightning accounted for**

2,880 deaths, comprising **40% of all accidental deaths caused by "forces of nature."**
        - The trend indicates an increase in lightning-related fatalities compared to other natural events.
- **Geographical Distribution in India:**
    - Lightning frequency is highest in northeastern states and West Bengal, Sikkim, Jharkhand, Odisha, and Bihar.
        - However, the number of lightning-related deaths is higher in central Indian states like **Madhya Pradesh, Maharashtra, Chhattisgarh, and Odisha.**
    - Bihar is one of the **most vulnerable states to lightning strikes,** with a significant number of deaths reported annually.
        - In 2023, till July 6, **Bihar recorded 107 deaths due to lightning.**
- **Union Government's View About Lightning:**
    - The **Union government opposes declaring lightning a natural disaster.** The government believes that education and awareness can help prevent lightning-related deaths effectively.

What are the Possible Factors Behind the Increasing Trend of Lightning Strikes?

- **Climate Change: Global warming and** climate change could potentially influence atmospheric conditions, leading to an increase in thunderstorms and lightning activity.
    - As the planet's temperature rises, there may be c**hanges in the distribution of moisture, instability, and convective processes** that could favor more frequent lightning occurrences.
    - Kalbaisakhi is a localised thunderstorm occurrence that is **accompanied by lightning,** typically observed during the **pre-monsoon season in the Indian subcontinent.**
- **Urbanization:** The expansion of urban areas can create what is known as the "urban heat island effect."
    - Cities tend to be warmer than surrounding rural areas due to increased **human activity, energy consumption,** and impervious surfaces.
    - These localized heat islands may lead to the formation of more thunderstorms and, consequently, an increase in lightning strikes.
- **Land Use Changes: Deforestation**, changes in agricultural practices, and alterations of natural landscapes may disrupt local atmospheric conditions.
    - Such changes might contribute to the development of thunderstorms and, consequently, more lightning.
- **Pollution and Aerosols:** Air pollution, including aerosols and particulate matter, can affect cloud formation and electrical activity within storms.
    - **Anthropogenic emissions** might influence the frequency and intensity of thunderstorms, potentially leading to more lightning strikes.

Way Forward

- **Educational Campaigns:** Launch extensive educational campaigns to raise awareness about lightning safety.
    - The focus should be on educating people, **especially in rural areas,** about the dangers of lightning and the precautions they can take to stay safe.
- **Lightning Prediction and Warning Systems:** Develop and implement lightning prediction and warning systems to provide advanced notice of lightning storms. This can help people take necessary precautions and seek shelter in time.
- **Lightning-Resistant Infrastructure:** Encourage the construction of lightning-resistant infrastructure, especially in high-risk areas such as **schools, hospitals, and public buildings.**
    - It can include **installing lightning rods** on tall structures, buildings, and houses to provide a safe path for lightning to travel to the ground, reducing the risk of damage from a direct strike.
    - Also, using surge protectors for electrical equipment and devices. Lightning strikes can cause power **surges that may damage sensitive electronics. Surge protectors can**

divert excess voltage and protect the equipment.

- **Training for First Responders:** Train local emergency services and first responders on **how to deal with lightning-related incidents** and provide them with necessary equipment.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Q.1 During a thunderstorm, the thunder in the skies is produced by the (2013)

1. meeting of cumulonimbus clouds in the sky

2. lightning that separates the nimbus clouds

3. violent upward movement of air and water particles

Select the correct answer using the codes given below:

(a) 1 only
(b) 2 and 3
(c) 1 and 3
(d) None of the above produces the thunder

Ans: (d)