

RECURRING LIGHTNING DISASTERS IN BIHAR - GEOGRAPHY

NEWS: 80 people were killed in 72 hours due to thunderstorms and lightning across Bihar.

WHAT'S IN THE NEWS?

1. Historical Pattern of Disasters:

- Bihar has witnessed a **recurring pattern of fatal natural disasters**, particularly **lightning events** during pre-monsoon and monsoon months.
- For instance, **over 90 deaths were recorded in June 2020** due to a lightning strike event, highlighting the **intensity and regularity** of such occurrences.

2. Pre-Monsoon Vulnerability:

- Lightning events are **frequent between April and June**, coinciding with pre-monsoon and early monsoon thunderstorms.
- These are often accompanied by **squall winds**, increasing the potential for destruction and loss of life.

3. NCRB Data on Lightning Fatalities:

- According to the **National Crime Records Bureau (NCRB)**:
 - **Lightning accounts for 39%** of all deaths from natural disasters in India.
 - **Bihar ranks second** in the country in terms of lightning-related deaths.
 - The state reports **around 250 deaths annually** due to natural disasters—many of them due to lightning.

Understanding Lightning

1. What is Lightning?

- Lightning is a **natural electrical discharge** that occurs during thunderstorms.
- It is caused by **charge imbalances** between clouds or between a cloud and the ground.

90 DEAD IN 3 STATES

Understanding the Norwesters

Behind a string of deaths due to lightning strikes, uprooted trees and structure collapses triggered by strong winds and sudden thundershowers was a phenomenon known as Norwesters. Here's what we know:

What happened?

On Thursday, severe pre-monsoon thunderstorms (norwesters) swept across multiple Indian states, causing at least 90 deaths

Why did it happen across such a large area at once?

Western disturbance

UP Bihar Jharkhand

Jet Streams

Moisture incursion from Bay of Bengal

Bihar (Deaths)	63
Uttar Pradesh	23
Jharkhand	4

Many fatalities resulted from lightning strikes, with additional deaths from hailstorms, strong winds, and related incidents like wall collapses

According to experts, a perfect storm intensified the effect of the Norwesters

- Heat:** Intense surface heating created unstable air
- Moisture:** Influx from Bay of Bengal provided fuel for storms
- Trigger:** Upper-level cold air from jet streams created extreme instability
- Geography:** The Indo-Gangetic plains and surrounding terrain channeled storm development

Are they unusual?

No. These storms, locally known as "Kal Baisakhi" in eastern India, are common during March-May, but this event was particularly widespread and severe.

Why was it so deadly?

The storms produced multiple conditions:

- Lightning strikes
- Hailstorms
- Squally winds (40-80kmph)
- Heavy rainfall (up to 25.2mm in Sultanpur)
- Flash floods (waterlogging reported in Patna)

Human vulnerability

Many victims were:

- Working in open fields
- Grazing cattle
- Collecting firewood
- Taking shelter in inadequate structures

WHAT EXPERTS SAY

Temperatures soared above 40°C across central India and approached 40°C in eastern regions. A trough positioned over the Indo-Gangetic Plains, combined with moisture from the Bay of Bengal and a cyclonic circulation over sub-Himalayan West Bengal, created atmospheric instability. These conditions led to cumulonimbus clouds, resulting in severe thunderstorms

- Mahesh Palawat, Skymet Weather

2. Formation Mechanism:

- When **positively and negatively charged particles** in the atmosphere build up sufficient difference, the resulting **discharge** produces a **bright flash** and thunder due to rapidly expanding air.

3. Types of Lightning:

- Cloud-to-Ground:** Most dangerous and causes human fatalities.
- Cloud-to-Cloud:** Between two separate clouds.
- Intra-Cloud:** Occurs within the same cloud.

4. Impact of Lightning:

- Causes:
 - **Fires and structural damage**
 - **Power outages**
 - **Deaths and injuries**, especially in rural or open areas

5. Government's Classification:

- **Lightning is not officially classified** as a natural disaster under the **Disaster Management Act, 2005**, which limits the scope of state support and compensation.

Why is Bihar Highly Vulnerable to Lightning?

1. Climatic and Geographic Conditions:

- **Humid subtropical climate** and **monsoonal rains** promote frequent thundercloud formation.
- The **flat Indo-Gangetic plains** and proximity to the **Himalayas** increase storm activity due to the clash between cold mountain winds and warm lowland air.
- **Moisture influx from the Bay of Bengal** further intensifies storm systems.

2. Rural Exposure:

- A large part of Bihar's population is **agriculture-based**, with people often working in **open fields** during thunderstorms.
- This significantly increases **exposure to lightning**.

3. Lack of Infrastructure:

- Many villages **lack tall buildings, lightning rods, or concrete shelters**.
- As a result, people have no place to take refuge during a storm.

4. Low Public Awareness:

- Despite the deployment of **early warning systems** and the dispatch of **12 crore SMS alerts**, awareness and response remain low.
- Many villagers **do not act on warnings** or are unaware of safety protocols.

5. Moist Soil and Water Bodies:

- Bihar has an **abundance of rivers and wetlands** (e.g., Ganga basin).
- Moist soil **enhances electrical conductivity**, increasing the risk of **ground strikes** during lightning.

6. Role of Climate Change:

- **Rising temperatures, changing rainfall patterns, and erratic wind flows** are contributing to a **rise in severe weather events**, including lightning.
- This trend is expected to **worsen with global warming**.

NDMA Guidelines for Lightning and Storm Preparedness

1. Early Warning Systems:

- **Accurate, timely alerts in local languages** are recommended via TV, radio, SMS, and mobile apps.
- Alerts should be **location-specific** and easily understandable.

2. Public Communication – Do's & Don'ts:

- The NDMA emphasizes **clear safety guidelines**, especially in rural regions.
- Example: Avoid open fields, trees, and metal objects during thunderstorms.

3. Hazard Mapping and Prevention:

- NDMA calls for **detailed hazard maps** to identify vulnerable areas.
- Such maps help in **early preventive action** and targeted awareness campaigns.

4. Disaster-Resilient Infrastructure:

- **Building codes** must incorporate lightning protection, especially in schools, hospitals, and community buildings.
- Installation of **lightning arrestors** is encouraged.

5. Underground Cabling:

- In dense urban and high-risk areas, **electrical and telecom cables** should be installed underground to reduce exposure.

6. Community-Level Disaster Management:

- **Local volunteer groups** and **panchayat-level disaster committees** are essential for **last-mile communication** and response.

7. Hospital Preparedness:

- Hospitals should have:
 - **Emergency kits**

- **Standard Operating Procedures (SOPs)**
- **Triage areas** for handling mass casualties from disasters like lightning or storms.

Steps Taken to Prevent Lightning-Related Deaths in India

1. Advanced Early Warning Systems:

- India is among the **top 5 countries** globally with the capability to **forecast lightning events 3 hours to 5 days in advance**.

2. Lightning Detection Networks:

- The **Indian Institute of Tropical Meteorology (IITM), Pune** has established a **network of 83 lightning sensors** nationwide to monitor and locate lightning activity with high accuracy.

3. Damini App:

- Developed to provide **real-time alerts** using GPS.
- Features:
 - Warns users when lightning is within **20–40 km**
 - Provides **40-minute advance alerts**
 - Shares **safety tips and advisories**

4. State Lightning Action Plans:

- Similar to Heat Action Plans, states are being encouraged to formulate **Lightning Action Plans** with **local strategies** for awareness, infrastructure, and quick response.

5. Lightning Resilient India Campaign:

- Led by the **Climate Resilient Observing-Systems Promotion Council (CROPC)**.
- Supported by:
 - **NDMA**
 - **India Meteorological Department (IMD)**
 - **Ministry of Earth Sciences**
 - **Indian Meteorological Society**
- Focus: **Community engagement**, awareness, and resilience building.

6. Public Education and Awareness Campaigns:

- **TV (Doordarshan) and Radio (All India Radio)** are used to promote behavioural changes:
 - Avoid using phones or umbrellas in storms.
 - Stay indoors or in concrete shelters.

Way Forward

1. Official Recognition of Lightning as a Natural Disaster:

- Including lightning under the **Disaster Management Act, 2005** will:
 - Unlock **better funding**
 - Improve **preparedness frameworks**
 - Ensure **efficient relief and rehabilitation**

2. Strengthen Last-Mile Communication:

- Leverage **panchayats, self-help groups, and local governance** to ensure **timely action** by farmers, fishermen, and outdoor workers.

3. Lightning Atlas & Hotspot Mapping:

- Developing a **Lightning Atlas** with **micro-level hotspot data** can:
 - Enable **targeted risk reduction**
 - Guide **resilient infrastructure planning**
 - Inform **educational campaigns** in high-risk zones

Conclusion

- Lightning, though natural, is **increasingly becoming a man-made disaster** due to inadequate preparation and awareness.
- With **climate change worsening weather extremes**, India must invest in:
 - **Stronger early warning systems**
 - **Community awareness**
 - **Resilient infrastructure**

- While lightning activity decreases post-monsoon, **long-term, climate-resilient planning** remains the need of the hour.

Source: <https://www.newsonair.gov.in/bihar-on-orange-alert-as-lightning-hailstorm-thundering-heavy-rainfall-expected-over-next-5-days/>