



CURRENT AFFAIRS



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CLOUDBURST DISASTERS: LESSONS IN PREPAREDNESS AND RESILIENCE

WHY IN THE NEWS?

On April 20, 2025, a severe cloudburst struck the Ramban tehsil of Jammu and Kashmir, leading to torrential rains, hailstorms, and strong winds. This sudden deluge caused flash floods and landslides, resulting in the tragic loss of at least three lives, including two children. Over 100 people were rescued, and approximately 40 houses were damaged in the Dharam Kund village. The Jammu-Srinagar National Highway was also blocked due to landslides, disrupting transportation and daily life in the region.



WHAT IS CLOUDBURST?

A cloudburst is an intense and localised burst of heavy rainfall, often accompanied by thunder and hail. It occurs when cumulonimbus clouds, which are filled with moisture, release their contents suddenly due to rapid changes in atmospheric conditions. It's likened to "a huge bucket of water being tipped over" due to the sudden release of accumulated rainwater.

CAUSES OF CLOUDBURST

- 1. Orographic Lift (Mountain-Induced Rainfall):** Ramban, located in the Himalayan foothills, experiences orographic uplift, where moist air is forced to rise due to mountainous terrain. This cooling leads to rapid condensation and intense rainfall in a short span.
- 2. Sudden Temperature Variation:** Unseasonal warming in early April caused an unusual surge in moisture-laden air. This warm air, when lifted, cooled rapidly, triggering a violent downpour characteristic of cloudbursts.
- 3. High Moisture-Laden Winds from Western Disturbances:** A strong western disturbance over North India brought heavy moisture from the Mediterranean region, increasing the potential for intense, localised rainfall.
- 4. Localised Convection:** Rapid heating of the Earth's surface in hilly areas like Ramban led to powerful upward convection currents, forming cumulonimbus clouds that eventually burst.
- 5. Formation of Thunderclouds (Cumulonimbus Clouds):** The presence of tall, dense clouds capable of holding large amounts of water was observed in satellite data. These clouds release massive rainfall in a very short duration when destabilised.
- 6. Climate Change & Extreme Weather Variability:** April is not typically prone to such extreme events. This early occurrence hints at broader climatic shifts, altering seasonal rainfall patterns and increasing the unpredictability of weather.
- 7. Snowmelt Combined with Rainfall:** As seen in the Ramban incident, recent warming and light snow accumulation in the upper reaches melted rapidly, adding to runoff and amplifying flood risk alongside heavy rain.
- 8. Lack of Vegetative Buffer and Urban Pressure:** Deforestation and construction in ecologically sensitive zones of J&K reduced natural drainage capacity, increasing vulnerability to runoff and landslides post-cloudburst.
- 9. Repeated Western Disturbances Without Intervals:** Back-to-back weather systems have been affecting North India in 2025, with little time for atmospheric stabilisation, making regions like Ramban prone to extreme precipitation.

CONSEQUENCES OF A CLOUDBURST

- 1. Flash Floods:** Sudden, intense rainfall leads to the overflowing of rivers and streams within minutes. In Ramban, villages like Dharam Kund were inundated, triggering emergency rescues.
- 2. Landslides and Soil Erosion:** Torrential rain loosens soil on mountain slopes, causing landslides that damage roads, homes, and farmlands. The Jammu-Srinagar Highway was blocked due to landslides post-event.
- 3. Loss of Human Lives:** Cloudbursts often strike without warning, leaving people with little time to evacuate. In the April 2025 event, at least three people, including children, died.
- 4. Damage to Infrastructure:** Bridges, roads, electricity lines, and communication networks are often destroyed. Ramban experienced road blockages and power disruptions.
- 5. Livelihood Disruption:** Agriculture, animal husbandry, and small businesses suffer losses due to crop damage, loss of livestock, and washed-away property.
- 6. Displacement and Homelessness:** Families living near rivers or hillsides are forced to evacuate, often losing their homes. Over 40 houses were damaged in the recent J&K cloudburst.
- 7. Water Contamination and Health Hazards:** Sewage and debris mix with drinking water sources, increasing the risk of waterborne diseases post-event.
- 8. Disruption in Transportation and Connectivity:** Highways and rural roads get cut off, delaying rescue efforts and disrupting supply chains—Jammu-Srinagar Highway being a key example.

9. Psychological Impact and Trauma: Sudden destruction causes long-term mental health issues among survivors, especially children and the elderly, due to the fear and loss experienced

NDMA GUIDELINE ON THE CLOUDBURST

1. Landslide Risk Management Strategy (2009): Focuses on monitoring and early warning systems for areas prone to landslides, which can be triggered by cloudbursts, ensuring better preparedness.

2. Management of Floods (2008): Stresses the importance of preparing Flood Management Plans (FMPs) to address flash floods caused by cloudbursts, ensuring effective responses.

3. Urban Flooding Management (2010): Provides guidelines for managing urban flooding worsened by cloudbursts, including urban planning, drainage systems, and community preparedness.

4. National Disaster Management Plan (NDMP) 2019: Offers a comprehensive disaster management framework, highlighting integrated planning, capacity building, and community involvement to address cloudburst-related risks.

5. Afforestation and Soil Conservation: Emphasises the need for afforestation and soil conservation in vulnerable catchment areas to reduce runoff and prevent landslides after cloudbursts.

6. Improved Infrastructure Resilience: Encourages the construction of flood-resistant infrastructure such as drainage systems, flood barriers, and resilient buildings in areas at high risk of cloudbursts.

CLOUDBURST MEASURES AND MITIGATIONS

1. Early Warning Systems (EWS): Deploy Doppler radars, weather satellites, and real-time data analysis tools to detect intense rainfall and issue timely warnings to vulnerable regions.

2. Improved Weather Forecasting: Enhance the capabilities of agencies like IMD (India Meteorological Department) to provide localised and accurate forecasts using high-resolution models.

3. Disaster-Resilient Infrastructure: Construct buildings, roads, and drainage systems that can withstand flash floods and heavy rainfall, particularly in hilly and urban areas.

4. Afforestation and Catchment Area Treatment: Promote afforestation and soil conservation in upper catchment areas to reduce surface runoff and improve water absorption.

5. Community Awareness and Training: Conduct public awareness campaigns and mock drills to prepare local communities for emergency response during cloudburst-induced floods.

6. Zoning and Land Use Planning: Avoid construction in flood-prone and landslide-prone areas by enforcing stricter land use regulations and urban planning norms.

7. Rainwater Harvesting and Water Management: Implement decentralised rainwater harvesting systems to reduce waterlogging and mitigate the sudden surge in surface runoff.

8. Emergency Response and Relief Mechanism: Strengthen the capacity of local disaster management authorities with trained personnel, rescue equipment, and rapid response teams.

CONCLUSION

The recent cloudburst in Ramban, Jammu and Kashmir, is a stark reminder of the increasing frequency and intensity of extreme weather events driven by climate change and ecological imbalances. The loss of lives, damage to infrastructure, and displacement of communities highlight the urgent need for a robust disaster preparedness and climate-resilient development framework. While cloudbursts cannot be prevented, their impacts can be significantly reduced through science-based early warning systems, sustainable land use planning, ecosystem restoration, and community-centric disaster management strategies. Integrating NDMA guidelines with local action plans, strengthening weather forecasting systems, and promoting environmental stewardship are essential to safeguard lives and livelihoods.

PRELIMS QUESTIONS

Q. Which of the following conditions are conducive to the occurrence of a cloudburst?

1. Presence of Cumulonimbus clouds
2. Rapid cooling of moisture-laden air
3. High-pressure atmospheric conditions
4. Orographic uplift in mountainous regions

Select the correct answer using the code below

- A. 1, 2, and 3 only
- B. 1, 2, and 4 only
- C. 1, 3, and 4 only
- D. All of the above

Answer: B

MAINS QUESTIONS

Q. Discuss the causes and consequences of cloudbursts in India. Suggest a multi-dimensional mitigation strategy in line with the NDMA guidelines.

(250 words, 15 marks)

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