



CURRENT AFFAIRS



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“CLOUDBURSTS IN INDIA: THE GROWING THREAT OF SUDDEN DELUGE”

This article covers “Daily Current Affairs” and details the topic of Cloudburst and its consequences.

Syllabus mapping: GS-3: Disaster Management: Cloudburst.

For Prelims:

What is cloudburst?

For Mains:

Various factors are responsible for the cloudburst and NDMA guidelines.

Why in the news?

- Recently, a cloudburst incident has caused flash floods in Himachal Pradesh, resulting in the death of many people and many others going missing.
- This sudden flood was so severe that it created a situation of widespread destruction.
- According to officials, many buildings, bridges, and roads were completely washed away due to the impact of floods, causing great difficulty in connectivity and relief operations in the affected areas.
- Local administration and relief agencies are now trying to help the people affected by the floods and control the situation.

What is a cloud burst?



- According to the Indian Meteorological Department (IMD), cloud bursts occur when very heavy rainfall occurs over a small area.
- Generally, this situation occurs when 10 cm or more rainfall occurs in less than an hour in an area of about 10 square kilometers.
- This phenomenon is often seen in hilly areas, especially in the Himalayas.
- In the Indian subcontinent, this occurs when monsoon clouds move north from the Bay of Bengal or the Arabian Sea and cross the plains towards the Himalayas, where rainfall can sometimes be up to 75 millimeters per hour.

Reason for cloud burst:

- Cloudbursts occur when warm winds force raindrops to fall, causing them to grow larger and form new smaller droplets below.
- This causes an accumulation of water in the atmosphere, which suddenly comes out in the form of rain.
- This phenomenon is especially seen in the mountainous regions of the Indian subcontinent, where the complex topography promotes orographic lifting.
- Orographic lifting occurs when air cools as it climbs mountains, leading to the development of clouds and increased intensity of precipitation.



Main differences between rain and cloudbursts:

- Precipitation is condensed water falling from a cloud, while a cloudburst is a sudden and extremely heavy rainfall event. 10 cm per hour. Rainfall over 1000 is called a cloud burst. Cloudburst is an unpredictable and catastrophic natural phenomenon.

Forecasting Challenge:

- Cloudburst forecasting techniques are limited because these events occur over small areas and limited periods. This requires a radar network, which is expensive. Only areas of heavy rainfall can be identified while identifying areas and weather conditions likely to cause cloud burst events can avoid much damage.

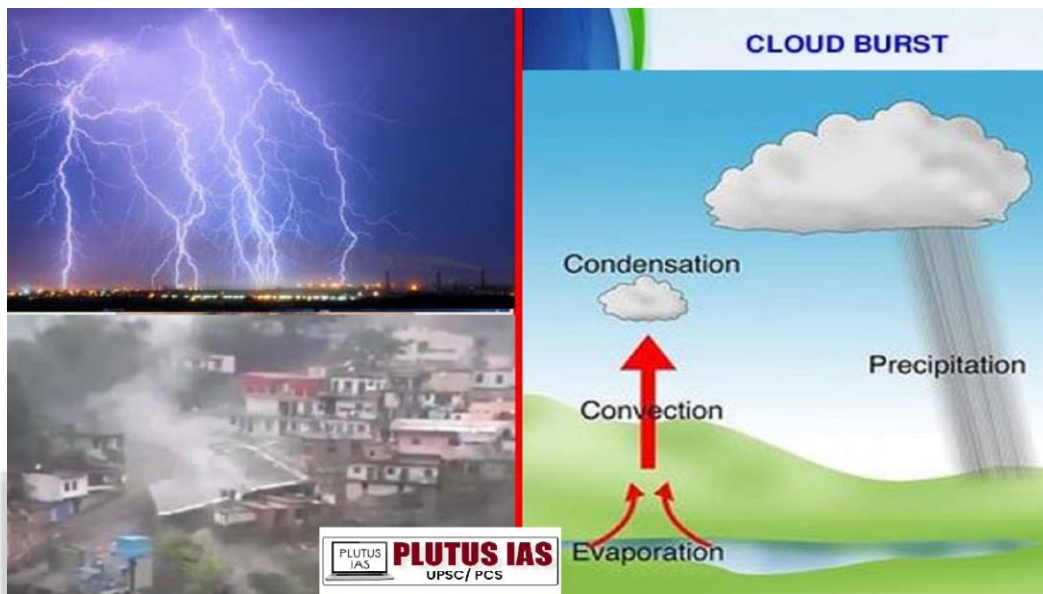
Example :

1. Cloudburst caused floods and landslides in Chamoli, Uttarkashi, and Pithoragarh in Uttarakhand (July 2021).
2. Roads, bridges, and many houses were damaged due to a cloud burst in Kullu, Lahaul-Spiti, and Kinnaur in Himachal Pradesh (August 2020).

Consequences of cloud burst:

1. **Flash Flood:** A sudden and localized rise in water levels during or after intense rainfall, which may result in flooding within 3 to 6 hours. This usually happens due to storms, dam breaking, or mudslides.
2. **Landslide:** A massive slide of rock, soil, or debris down a slope, which may occur suddenly or gradually. Excessive rainfall, erosion, and weathering may be the causes. Landslides in India account for 8% of global deaths, and 13.17% of the area in India is susceptible to landslides.
3. **Mudflows:** A water flow with high density and turbidity, containing high amounts of suspended particles and silt. It transports only coarse materials and flows much shorter distances than regular water streams.

The relationship between cloud burst and climate change:



- **Increase in atmospheric moisture:** An increase in global temperature results in the accumulation of more moisture in the atmosphere. This additional moisture can make cloud formation more intense and increase the likelihood of cloudburst events, especially in mountainous regions, such as the Himalayas.
- **Change in rainfall pattern:** Climate change may cause significant changes in rainfall patterns. This could lead to prolonged drought in some areas, while increasing extreme and intense rainfall events in other areas, which could also increase the risk of cloudbursts.
- **Changes in atmospheric stability:** High temperatures can affect the stability of the atmosphere. This leads to increased convective activity, and more frequent occurrences of storms, which are usually associated with cloudbursts.
- **Glacial retreat and melting of ice:** Due to rising temperatures, glaciers are melting rapidly in areas like the Himalayas. This increases the flow of water, which can lead to more incidents of cloud bursts.
- **Change in land use:** Human activities such as deforestation and urbanization can change local climate and rainfall patterns. This affects the microclimate of mountainous areas and may also affect the incidence of cloud bursts.
- The combination of these various factors leads to complex interactions between climate change and cloudbursts, which can influence the frequency and intensity of natural disasters.

NDMA Guidelines on Cloudbursts

Preparedness and Mitigation

Risk Assessment:

Identification of Vulnerable Areas: Map areas prone to cloudbursts, especially in hilly and mountainous regions. Develop hazard maps that include historical data on rainfall patterns and past cloudburst events.

Infrastructure Evaluation: Assess the vulnerability of existing infrastructure, such as roads, bridges, and buildings, to cloudburst impacts.

Early Warning Systems:

Weather Monitoring: Use meteorological data and weather forecasting tools to detect conditions that might lead to cloudbursts.

Alerts and Warnings: Establish a system for issuing early warnings to communities in vulnerable areas through multiple channels such as sirens, radio, and mobile alerts.

Community Awareness:

Education and Training: Conduct training programs for local communities and officials on recognizing the signs of a cloudburst and understanding emergency procedures.

Public Awareness Campaigns: Promote awareness about the risks of cloudbursts and the importance of preparedness measures.

Response and Emergency Management

Immediate Response:

Emergency Teams: Mobilize local disaster response teams, including fire services, police, and medical teams, to areas affected by cloudbursts.

Search and Rescue: Deploy search and rescue operations to locate and assist people trapped or stranded due to flooding and landslides.

Relief Operations:

Shelters and Aid: Set up temporary shelters for displaced individuals and provide essential supplies such as food, water, and medical assistance.

Infrastructure Repair: Prioritize the repair of damaged infrastructure to restore normalcy and prevent further disruption.

Rehabilitation and Recovery

Damage Assessment:

Impact Analysis: Conduct a thorough assessment of the damage caused by the cloudburst, including infrastructure damage, loss of livelihoods, and environmental impacts.

Data Collection: Gather data on the extent of the damage to inform recovery efforts and future planning.

Restoration and Reconstruction:

Rebuilding: Focus on rebuilding infrastructure with improved designs that consider cloudburst risks and enhance resilience.

Support Programs: Implement programs to support affected individuals and communities in recovering their livelihoods and property.

Long-Term Planning

Urban Planning and Development:

Land Use Planning: Incorporate disaster risk reduction into land use planning to avoid construction in high-risk areas and improve drainage systems.

Building Codes: Enforce building codes and standards that enhance the resilience of structures to extreme weather events.

Research and Development:

Scientific Research: Promote research into cloudburst phenomena and develop innovative technologies for prediction and management.

Policy Formulation: Update policies and guidelines based on lessons learned from past events and ongoing research.

Coordination and Collaboration

Institutional Coordination:

Inter-Agency Cooperation: Ensure coordination between various agencies and departments involved in disaster management, including meteorological, emergency response, and health services.

Community Involvement: Engage local communities in disaster preparedness and response activities to enhance local resilience and response capabilities.

National and Regional Support:

Central and State Government: Facilitate collaboration between central and state governments to ensure effective implementation of disaster management plans and resource allocation.

Measures to reduce the destructive effects of cloudbursts:

- **Developing early warning systems:** Effective early warning systems should be developed that can predict cloud bursts and give timely warnings. These types of systems provide people with the opportunity to prepare for evacuation ahead of time and move to safe locations if necessary.
- **Promoting sustainable land use practices:** Land use practices that reduce the risk of cloudbursts should be promoted. This includes avoiding construction in flood-prone areas, controlling deforestation, and implementing soil conservation measures.
- **Urban planning and creating infrastructure:** Attention should be paid to shock-resilient urban planning and infrastructure to reduce flooding and excess water management. This includes investments in stormwater drainage systems, retention ponds, and green spaces.
- **Educate and provide public awareness about potential hazards:** It is essential to educate communities about the potential dangers of cloudbursts and train them on response and evacuation procedures. This will ensure that people can take appropriate precautions in emergencies.
- **Managing watershed areas:** Special practices should be adopted for effective management of watersheds, such as reducing soil erosion and increasing soil infiltration. This will help in controlling water flow and reducing the impact of cloud bursts.
- **Reforestation and creating green infrastructure:** Trees should be planted and green areas maintained to absorb excess water, reduce soil erosion, and stabilize slopes. This will reduce the impact of cloud bursts.
- **To develop international cooperation:** India should cooperate with its neighboring countries and international organizations to manage cloudburst events, especially in shared river basins. This will enable the exchange of best practices, technology, and resources to deal with the threats posed by cloudbursts.

Prelims Question:

Q. With reference to the cloudburst, consider the following statements :

1. Cloudbursts are characterized by sudden and intense rainfall
2. The rainfall duration is very long during cloudbursts.
3. cloudbursts can cause extensive flash floods and landslides

Which of the statements given above are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only

D. 1, 2 and 3

Answer: C

Mains Question:

Q1. What do you understand by cloud burst and why are some areas of India susceptible to it? Discuss the guidelines given by the National Disaster Management Authority (NDMA) to deal with cloud bursts in India? (UPSC CSE - 2019 Word Limit - 250 Marks - 15)

Munde Dhananjay Navnath

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