

Cloud Burst in Himachal Pradesh

Why in news?

Himachal Pradesh witnessed a heavy rainfall along with landslides in which at least 22 people died.

What is a cloud burst?

According to the Indian Meteorological Department, an event of extremely heavy rainfall is determined as a cloudburst when "10 cm rainfall is received at a station in one hour"

- It is an extremely high amount of precipitation in a short span of time.
- It is a localised but intense rainfall activity that can cause widespread destruction, especially in hilly regions.
- **Region-** It usually occurs over a small geographical region (20-30 sq.km).
- **Criteria-** Rainfall of 10 cm or more in an hour over a roughly 10 km x 10-km area is classified as a cloudburst event.
- By this definition, 5 cm of rainfall in a half-hour period over the same area would also be categorized as a cloudburst.
- **Mechanism-** It happens when saturated clouds are unable to produce rain because of the upward movement of very warm current of air.
- **Cloud formation-** This updraft movement of warm wind along with clouds forms the Cumulonimbus clouds.
- It can grow up to 12-15 km in height through the entire troposphere (occasionally up to 21 km) and can hold huge amounts of water
- Instead of dropping down, raindrops get bigger in size and get pushed up due to the air current.
- Eventually they become too heavy to hold and drop down, leading to more rain than usual.



What are the causes of cloud burst?

- **Monsoon-** It often occurs during monsoon season when the South West Monsoon winds bring in large amount of moisture which fuels the cloudburst.
- **Orographic lift-** It is affected by factors like local topology, wind systems, and temperature gradients between the lower and upper atmosphere.
- **Thunderstorm-** It is caused due to excessive amount of condensation in the cloud during thunderstorm.

- **Climate change**- Global warming is leading to more evaporation of water and because of this dense cumulonimbus clouds are forming, resulting in intense rainfall.
 - Even 1 degree Celsius rise in global temperature can cause change in monsoon extremes and frequent cloudburst.

What are the areas prone to cloudburst?

- **Regions more prone-**
 - The Himalayas
 - Western Ghats
 - Northeastern hill States of India
 - Coastal regions
- **Landslides**- The heavy spells of rain on the fragile steep slopes trigger landslides, debris flows, and flash floods, causing large-scale destruction and loss of people and property.
- **Coastal cities**- They are particularly vulnerable to cloudbursts since the flash floods make the conventional stormwater and flood management policies in these cities dysfunctional.
 - Example- Chennai Floods 2015.

Recent cloudbursts

- *Himachal Pradesh-2003*
- *Ladakh-2010*
- *Uttarakhand-2013*
- *Northeastern states and Western Ghats- 2022 monsoon*

What are the consequences of cloud burst?

- **Landslide**- The movement of rocks or debris on a slope downwards is called as Landslide.
- **Human loss and property loss** - There is a rise in death toll and loss of property due to cloudburst.
- **Spread of communicable diseases** - Waterborne diseases (cholera, typhoid fever etc.), vector-borne diseases (dengue, malaria etc.) spreads rapidly during floods.
- **Impact on agriculture** - It destroys large number of crops and impacts the food security of the country. Livestock also gets displaced during floods.
- **Disruption of communication** - It damages transportation links such as bridges, rail, and power plants thus causing communication disruption.
- **Economic and social disruption** - The economy comes to a standstill as people are forced to move to another place.

What are the challenges associated in detecting cloudbursts?

- **Forecast** - Specific cloudburst events cannot be forecast.
- Possibility of extremely heavy rainfall, which could result in cloudburst kind of situations, are forecast six to 12 hours in advance.

- **Failure of satellite-** They fail to detect cloudburst systems as the precipitation radars are much smaller than the areas of individual cloudburst events.
- **High cost-** Radars need to be installed in wide areas for a wider coverage. Installing radars is expensive.
- **Technological hurdle-** It is difficult for any metrological agency to predict exactly how much rain is likely to fall at any given place.
- Although it is difficult to forecast cloudbursts, doppler radars can be helpful in predicting them.
- **Lack of feasibility** - It requires a very dense network of weather instruments, and computing capabilities that seems unfeasible with current technologies

What lies ahead?

- [Multiple Doppler weather radars](#) can monitor moving cloud droplets and help to provide forecast for the *next 3 hours*.
- Proper community sensitisation regarding the causes, effects and safety precautions of cloudbursts is the need of the hour.

References

1. [Indian Express- Himachal Pradesh cloudburst explained](#)
2. [The Times of India- State declared as natural calamity affected area](#)

