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Q16

With reference to National Disaster Management Authority (NDMA) guidelines, discuss the measures to be adopted to mitigate the impact of recent incidents of cloudbursts in many places of Uttarakhand.

UPSC Civil Services Mains 2016 · GS III · 12 marks · Disaster Management

Disaster and disaster management.

Core demand of the question

- Link recent Uttarakhand cloudbursts to NDMA guidance on flash floods and landslides
- List mitigation measures for mountains, rivers, and pilgrimage
- Cover early warning, land use, and response forces

Revision summary

A **cloudburst** over a steep Uttarakhand catchment becomes a flash flood and landslide within minutes.

Damage explodes when hotels and yatris occupy river beds and old slide zones.

NDMA guidelines stress hazard mapping, construction control, and early warning.

Mitigation is Doppler and rain gauges, slope and muck discipline, pilgrimage caps, and pre-positioned NDRF/SDRF.

Rebuild above the flood line; do not restore the same unsafe shop.

Introduction

A **cloudburst** is a sudden, very heavy fall of rain over a small hill catchment - often more than **100 millimetres in an hour**. In Uttarakhand that water becomes a **flash flood** and a **debris flow** within minutes. The **Kedarnath disaster of 2013** and later local bursts showed what happens when rain, a glacial lake or moraine, and a built-up pilgrim town meet. **National Disaster Management Authority** guidelines on floods, landslides, and the hill States' own plans are the checklist for mitigation.

Body**The hazard in Uttarakhand**

- Steep slopes, fractured rock, and thin soil mean rain does not stay; it scours **nalas** and roads.
- **Monsoon and westward disturbances** can stack moisture against the Himalaya.
- **River-bed construction**, hotels on floodplains, and hydropower debris narrow the channel the **cloudburst** will use.
- Pilgrim peaks (**Char Dham**) put tens of thousands on the same narrow road on the same week.
- Landslides block rivers and create **temporary lakes** that burst - a second flood after the rain.

NDMA-linked measures to mitigate impact

- **Land-use zoning:** NDMA landslide and flood guidance asks States to map **hazard zones** and to forbid or strictly limit buildings on river beds, steep cut slopes, and old slide scars. Uttarakhand must enforce this on municipal and forest land, not only print an atlas.
- **Regulation of construction and hydropower:** stable cut-and-fill, no dumping of muck into rivers, and catchment treatment; the 2013 review already named unregulated roads and projects as force multipliers.
- **Early warning:** Doppler weather radar coverage for the hills, dense **automatic rain gauges**, and **nowcast** to district magistrates and temple boards; community watch on **nala** colour and noise as a last local signal.
- **Glacial lake and moraine monitoring** in upper catchments so a burst is not a complete surprise.
- **Watershed and slope work:** afforestation with local species, check dams that are maintained, and drainage of road cuts - as in NDMA landslide documents.
- **Safe pilgrimage:** compulsory registration, daily caps, weather-linked closure of tracks, designated shelters above known flood lines, and **helipad and mule** alternatives when the road goes.
- **Building rules:** two-storey limits where slopes fail, no hotels on the Ganga and Mandakini floodway, and relocation of the most exposed shops over a published timetable.
- **Response structure:** **National Disaster Response Force** and **State Disaster Response Force** pre-positioned in monsoon; **Indian Air Force** helicopters on notice; local police and home guards trained for traffic holds, not only for rescue photographs.
- **Communication:** redundant wireless because mobile towers fall; satellite phones at SDM and major temples.
- **Public awareness:** simple hill-language messages - leave the nala, do not stand on bridges, keep a three-day kit in the yatra season.
- **Insurance, relief, and reconstruction** that does not rebuild the same hotel on the same sandbank (NDMA "build back safer").
- **Inter-State and centre-State:** IMD, **Central Water Commission** where rivers are gauged, and the State disaster authority must share one protocol; the **Disaster Management Act, 2005** already names that chain.

What mitigation cannot claim

- It cannot stop a **cloudburst**. It can stop a town from sitting in the path, and it can give two hours' warning and a drilled exit.

Flow diagram

Cloudburst -> Flash flood debris flow
 Floodplain hotels yatra crowd -> Flash flood debris flow
 NDMA landslide flood guidance landslide flood guidance -> Hazard zoning
 NDMA landslide flood guidance -> Radar gauges nowcast
 Hazard zoning -> Lower impact
 Radar gauges nowcast -> Lower impact
 Pilgrim caps shelters -> Lower impact

Conclusion

Uttarakhand cloudbursts become catastrophes when rain meets unsafe buildings and a packed yatra road. NDMA flood and landslide guidance points to hazard maps, construction control, rain and lake warning, slope care, capped pilgrimage, NDRF/SDRF, and safer rebuilding. Mitigate the path and the crowd; do not pretend the mountain rain will become gentle.

Facts & figures

Cloudburst

Very intense rain over a small area, often taken as about 100 millimetres in an hour, typical of Himalayan catchments.

Kedarnath 2013

June disaster of rain, landslides, and Mandakini flooding that exposed unsafe construction and pilgrimage pressure.

NDMA landslide guidelines

National guidance on mapping, land use, drainage of slopes, and public awareness for hill mass movements.

DM Act 2005

Creates NDMA, SDMA, and the legal duty to plan prevention and response, not only relief.

NDRF / SDRF

National and State disaster response forces that must be pre-positioned in the monsoon, not only flown after the road is gone.

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