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# Causes of Flood

## Antropogenic factors

- Poor drainage system in urban area.
- Encroachment of River bank
- Land use change - Conversion of wetlands for other purposes

Urban flood

Urban area

→ Poor drainage

→ non-sponginess of city  
↳ concrete surfaces

↳ no-open space

→ land use change

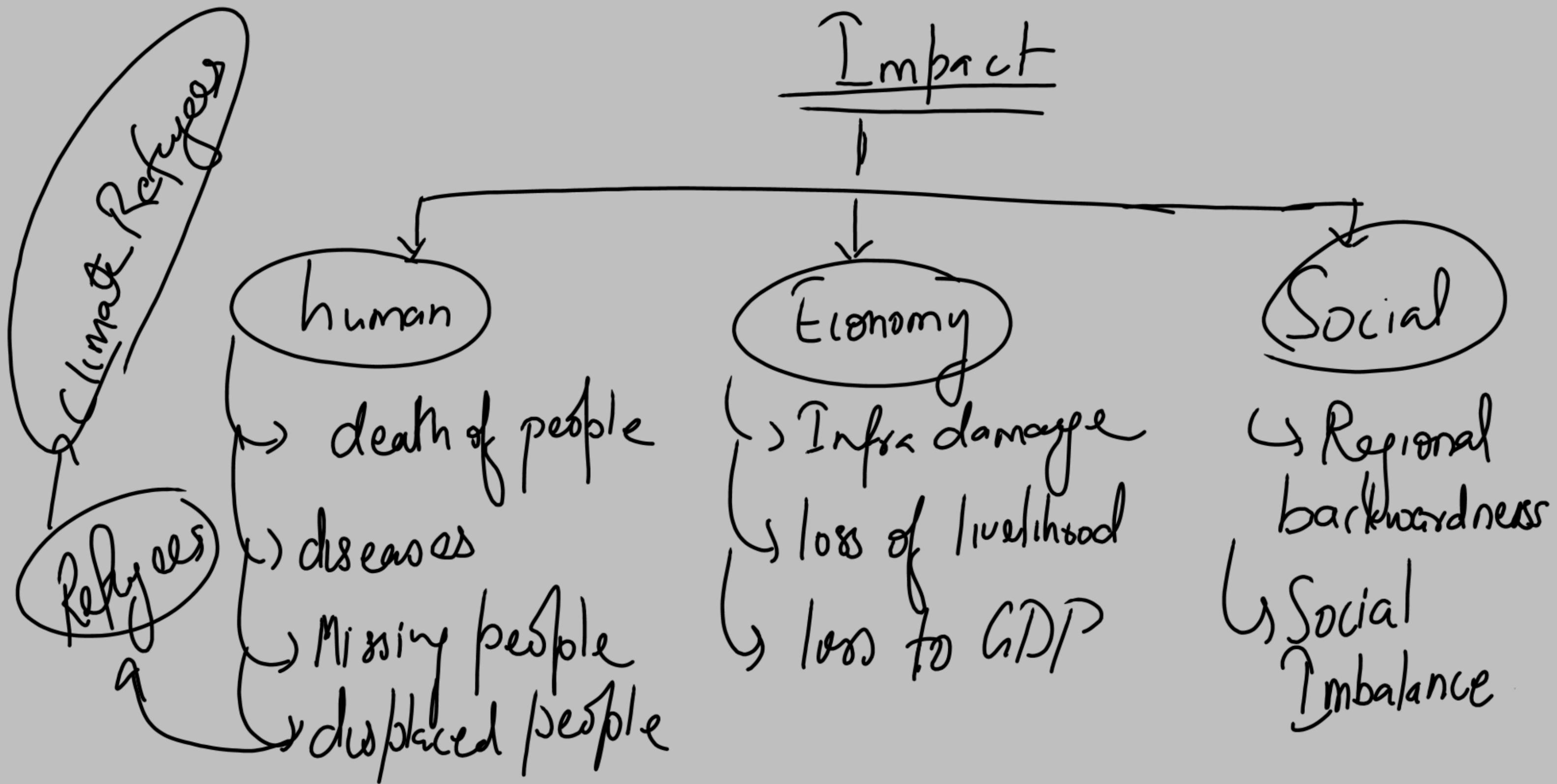
→ Sponge city

↳ open space

→ lakes/ponds etc

→ drainage system

↳ water harvesting structure.



Brahmaputra

Adaptation  
and mitigation

Structural

NDMA

⇒ Regular check dams  
and Reservoirs

⇒ dredging of rivers

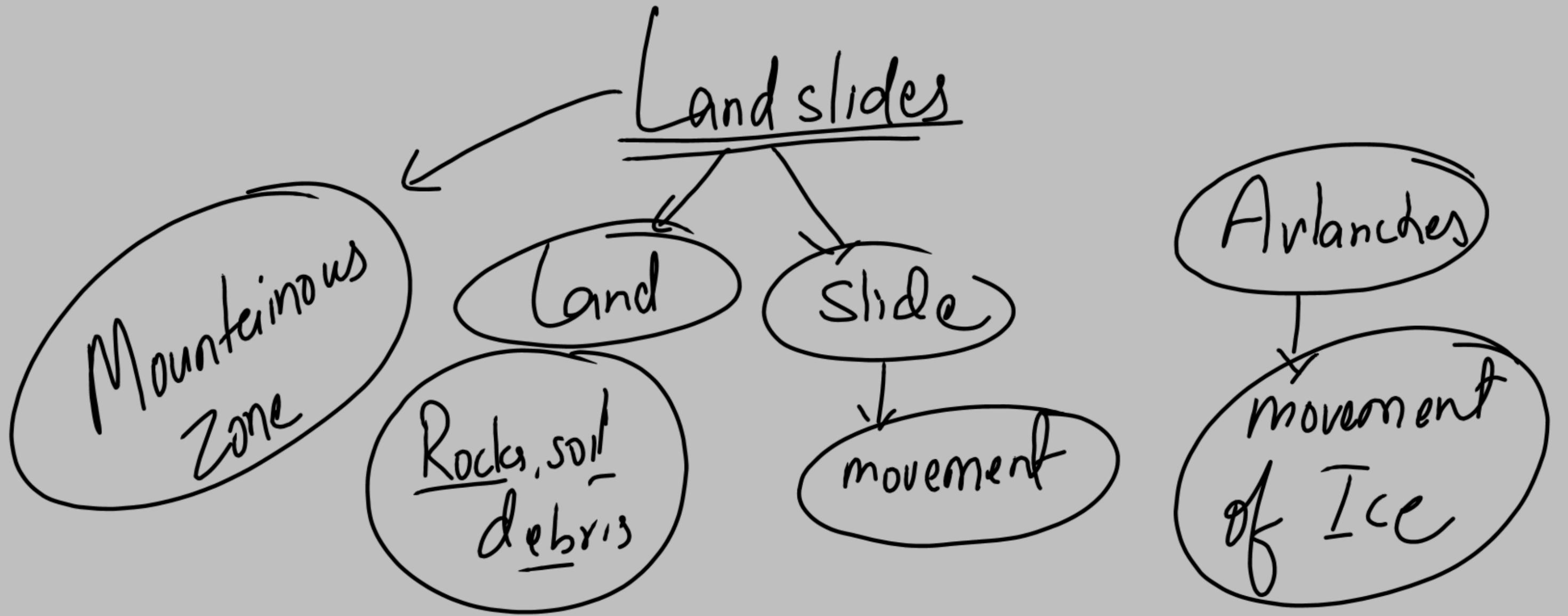
↳ Afforestation → Reducing erosion  
of bank of River.

→ Proper embankments in  
flood prone zone.

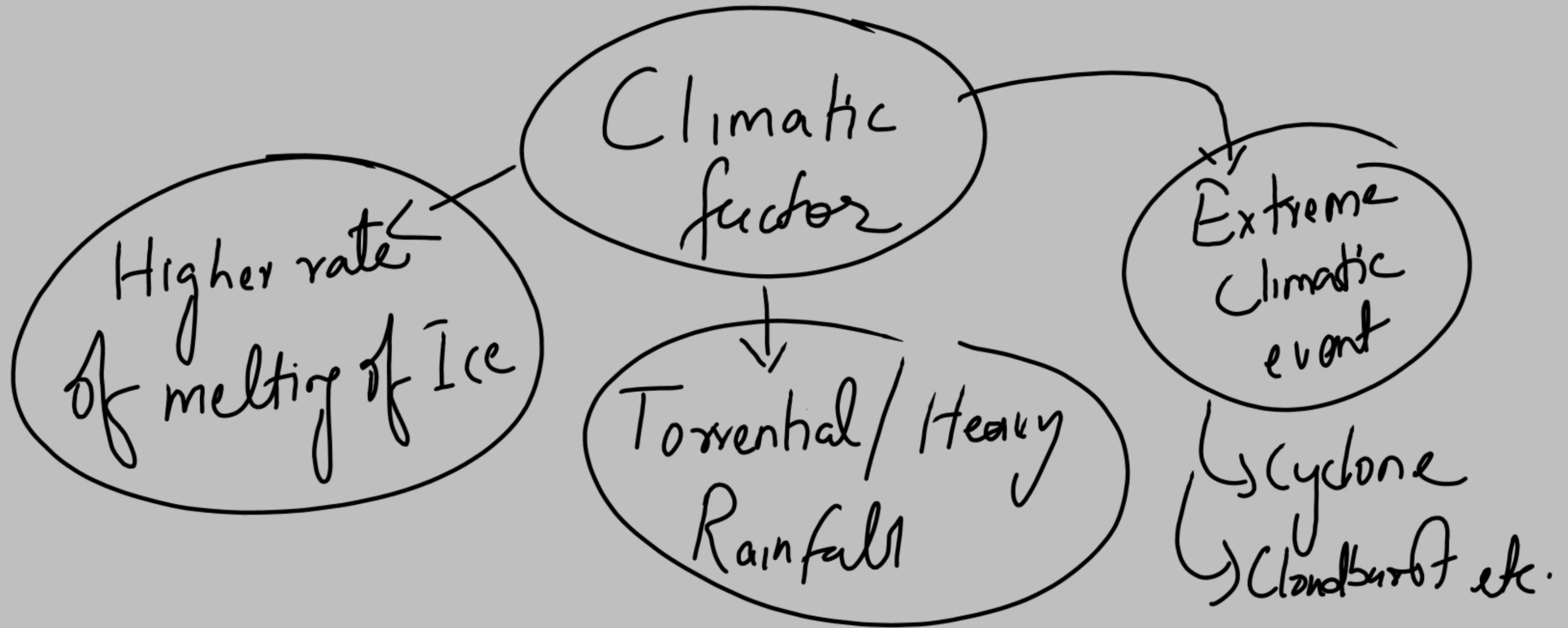


## Non-structural

- flood mapping of different zones.
- land use planning
- flood shelters → places at higher elevation.
- Capacity building - "Apda mitra"



→ Deposition of silt due to  
Obstruction by dams/bridges.  
↳ River has become  
shallow.



# Landslides

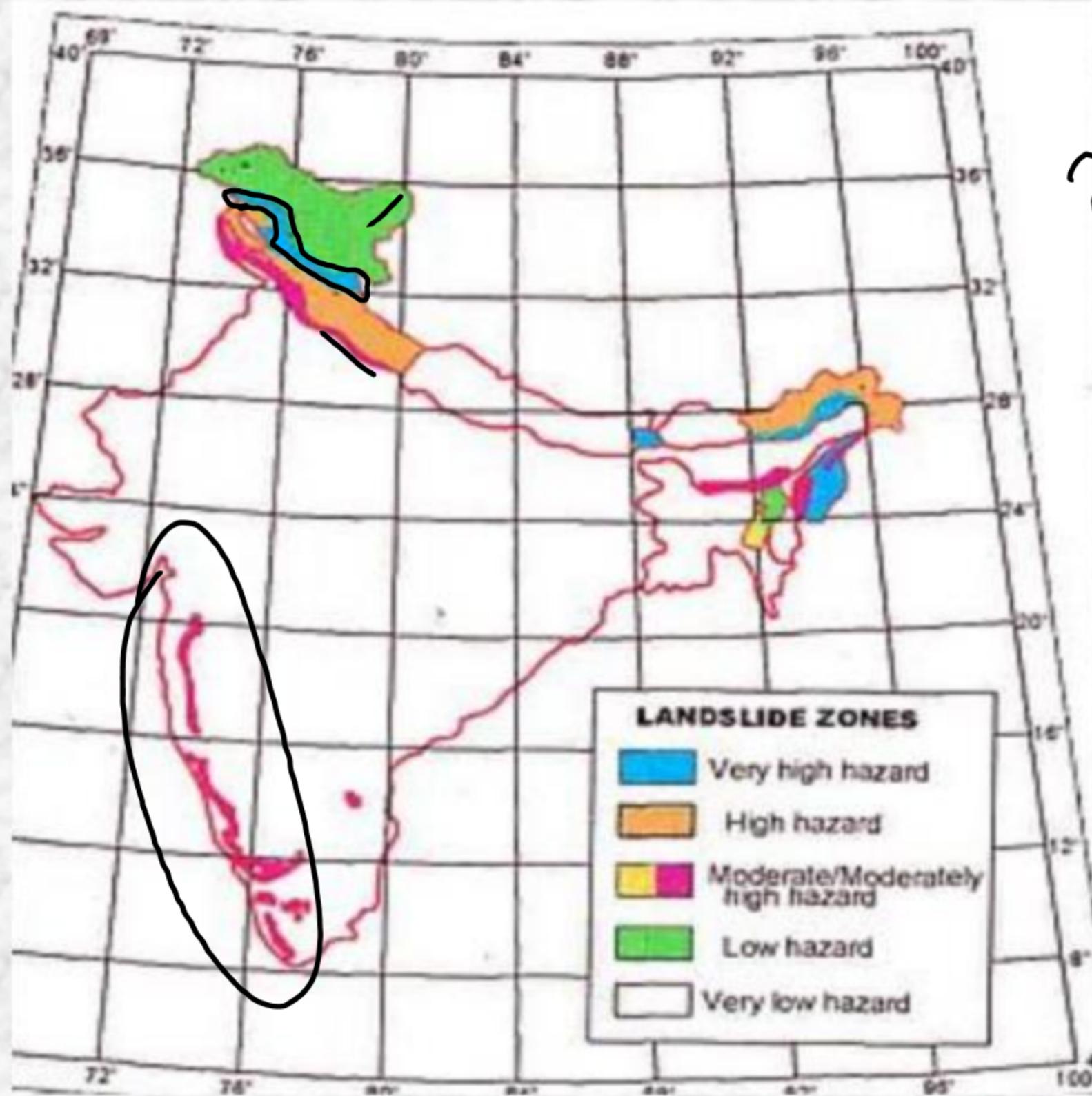
12.6% → Landslides

- As per the Geological Survey of India (GSI), about 0.42 million km<sup>2</sup> (covering nearly 12.6% of the land area of our country) is prone to landslides
- The mountainous region of the north-western Himalayas (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), the sub-Himalayan terrain of the north-east (Sikkim, West Bengal-Darjeeling, Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura), the Western Ghat areas (Maharashtra, Goa, Karnataka, Kerala) and the Eastern Ghat areas (Araku area of Andhra Pradesh, Tamil Nadu) are prone to landslides.
- India is considered among the top five landslide-prone countries globally, where at least one death per 100 sq km is reported in a year due to a landslide event.

# Landslides

- Rainfall variability pattern is the single biggest cause for landslides in the country, with the Himalayas and the Western Ghats remaining highly vulnerable.
- Landslides have caused deaths in India, including 380 in 2021, 48 in 2021, and 25 in 2019. In 2014, there were nearly 500 deaths due to landslides
- In 2022, a landslide in Manipur killed ~~58~~ people, injured 18, and left three people missing. In 2023, landslides in Himachal Pradesh have killed at least 361 people and injured 342 others
- An international database of fatal landslides prepared by the University of Sheffield, England shows that with close to 11,000 deaths due to landslides in 12 years, India tops a global list of nearly 56,000 casualties from 4,800 landslides around the world between 2004 and 2016.

- Q1. We can't predict earthquakes, but we can estimate its ability of becoming a disaster. Discuss. (250)
- Q2. The tropical cyclone management in India showcases that government's will and people's participation can transform the disaster landscape in India. Elucidate. (150)



JK, Ladakh  
Himachal  
Sikkim  
Arunachal  
Nagaland

# UPSC

State	Total no. of landslide events	State	Total no. of landslide events
Mizoram	12,385	Nagaland	2,132
Uttarakhand	11,219	Sikkim	1,569
Tripura	8,070	Himachal Pradesh	1,561
Arunachal Pradesh	7,689	Karnataka	1,904
Jammu and Kashmir	7,280	Tamil Nadu	690
Kerala	6,039	West Bengal	172
Manipur	5,494	Haryana	100
Maharashtra	5,112	Ladakh	23
Meghalaya	2,639	Goa	03
Assam	2,569	Total	80,933

Landslide hotspot areas in India (1998-2022). (Source: Landslide Inventory of India, Landslide Atlas of India, ISRO)



# KHAN GLOBAL STUDIES

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**THANKS FOR WATCHING**

