

What is a lineament?

A lineament is a linear feature in a landscape dictated by an underlying geological structure such as a fault.

Context:

According to a recent study, an unfamiliar lineament is one factor behind frequent earthquakes in northern Assam's Sonitpur area.

Why there are frequent earthquakes in Assam?

According to the Geological Survey of India (GSI), Sonitpur district lies within a tectonically complex triangular area bounded by the east-west trending Atherkhet Fault, the northwest-southeast trending Kopili Fault and a north-south trending lineament.

Why North east is vulnerable?

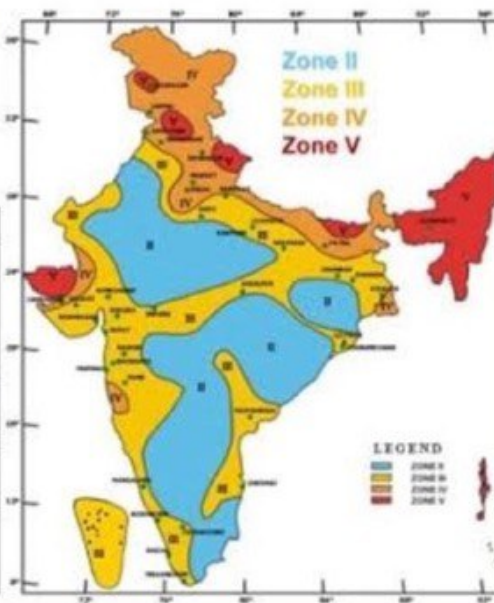
- The Siang Fracture, Yemla Fault, Namula Thrust and Canyon Thrust are spread across the northeast and are active along with Main Himalayan Thrust, Main Boundary Thrust, Main Central Thrust and several subsidiary faults.

- The northeast is demarcated as Seismic Zone V, which indicates a zone with high vulnerability.
- The Indian plate is moving northeast toward the Eurasian plate in the Himalayan region, their oblique collision and release of stress and strain accumulated in the local tectonic or fault environments lead to earthquakes.

**Seismic Zone
Map of India: -2002**

About **59 percent** of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)



Seismic Zones in India

Spotlight on dams after Chamoli disaster

Hydroelectricity in India:

- In the 25 MW-plus category, there are projects with a combined capacity of 12,973.50 MW under installation. Of this, eight projects totalling 2,490 MW are in Uttarakhand.

- The hydroelectric power qualifies as a renewable energy source and is cheaper compared to coal and gas plants due to lack of recurring costs.

Concerns over hydroelectric projects in Uttarakhand:

1. Geological nature of Uttarakhand:

- Uttarakhand is geologically unique.

- It being a part of the lesser Himalaya, it has numerous earth faults and hence it remains active in terms of deep movement of rock assemblages. It remains fragile from a geological point of view.

- Along the Main Central Thrust (MCT), running east-west along the Himalaya, the Indian and Eurasian plates converge. The northward moving peninsular India presses the lesser Himalaya rock assemblages under the huge pile of the Great Himalayan rocks. As a result of the high

geological stresses being induced in the region there is a weakening of rocks in the area.

- In fact, many locations in a 50-km area within the MCT zone have witnessed several earthquakes of varying intensity, including those with magnitudes of over 5.

2. Induced seismic effects of dams:

- Despite the claim by dam builders that their structures can withstand even high-intensity earthquakes, most designs fail to incorporate the aspect of induced seismic effects of dams, especially in case of large dams.

- Studies associated with Tehri dam has shown that there are concerns about induced seismic effects caused by the repeated filling and emptying of the reservoir, may deform the area around the dam making it vulnerable to earthquakes.

3. Vulnerable terrain:

- The region being mountainous with its steep slopes remains vulnerable to landslides induced with even low intensity earthquakes.