



# Seismometers Defunct in Earthquake-Prone Zones

## Why in News

20 out of 35 **seismometers and accelerographs** in earthquake prone zones (Seismic zone III and IV) of [Maharashtra were found defunctioning.](#)

- The **seismometer** is an instrument used to measure and record earthquakes, whereas **accelerographs** prints the **intensity of earthquakes**.
- The **seismic zone III and zone IV** fall under **moderate and strong** earthquake categories under Earthquake prone zones in India.

## Seismic Waves

- Vibrations from an earthquake are categorised as P or S waves. They travel through the Earth in **different ways and at different speeds**. They can be **detected and analysed**.
  - **P-waves (P stands for primary)**
    - These are the first waves detected by **seismograph**.
    - These are **longitudinal waves** i.e. they vibrate along the same direction as it travels.
    - Other examples of longitudinal waves include sound waves and waves in a stretched spring.
  - **S-waves (S stands for secondary)**
    - These waves arrive at the detector **after primary waves**.
    - These are **transverse waves** i.e. they vibrate at a right angle to the direction in which they travel.
    - Other examples of transverse waves include light waves and water waves.
- **Both types of seismic waves** can be detected near the earthquake centre but only P-waves can be detected on the other side of the Earth.
  - P-waves can travel through solids and liquids (since they are longitudinal waves) whereas S-waves can only travel through solids (as they are transverse waves). This means the liquid part of the core blocks the passage of S-waves.
- The earthquake events are **scaled either according to the magnitude or intensity** of the shock.
  - The **magnitude scale** is known as the **Richter scale**. The magnitude relates to the energy released during the earthquake which is expressed in absolute numbers, 0-10.
  - The **intensity scale or Mercalli scale** takes into account the **visible damage** caused by the event. The range of intensity scale is from **1-12**.

## Earthquake Prone Zones in India

- **Earthquake** is the violent shaking of the ground due to the release of accumulated stress of the moving lithospheric or crustal plates.
- Over **59 % of India's land area** is under threat of **moderate to severe** earthquakes.
- **Bureau of Indian Standards**, based on the past seismic history, divided the country into **four seismic zones**, viz. **Zone II, III, IV and V**.

- The regions away from the Himalayas and other inter-plate boundaries were considered to be relatively safe from damaging earthquakes.
- However, occurrence of the **Killari earthquake in Maharashtra (1993)** resulted in **revision** of the seismic zoning map in which the low hazard zone or Seismic Zone I was **merged** with Seismic Zone II. Thus **Zone I does not appear** in mapping.
- **Zone V** is the **most seismically active** region, while **zone II** is the **least** active region.
- The **zones** are divided on the basis of **Modified Mercalli (MM) intensity**, which measures the **impact of earthquakes**.
- The area covered under different seismic zones include,

- **Zone II:**

- It falls under **low intensity zone**.
- It covers **40.93% area** of the country.
- It comprises of major parts of peninsular region and Karnataka Plateau.

- **Zone III :**

- It falls under **moderate intensity zone**.
- It covers **30.79% area** of the country.
- It comprises of Kerala, Goa, Lakshadweep islands, remaining parts of Uttar Pradesh, Gujarat and West Bengal, Parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Odisha, Andhra Pradesh, Tamil Nadu and Karnataka.

- **Zone IV :**

- It falls under **severe intensity zone**.
- It covers **17.49% area** of the country.
- It comprises of remaining parts of Jammu and Kashmir, Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, Northern Parts of Uttar Pradesh, Bihar, West Bengal, parts of Gujarat, small portions of Maharashtra near the west coast and Rajasthan.

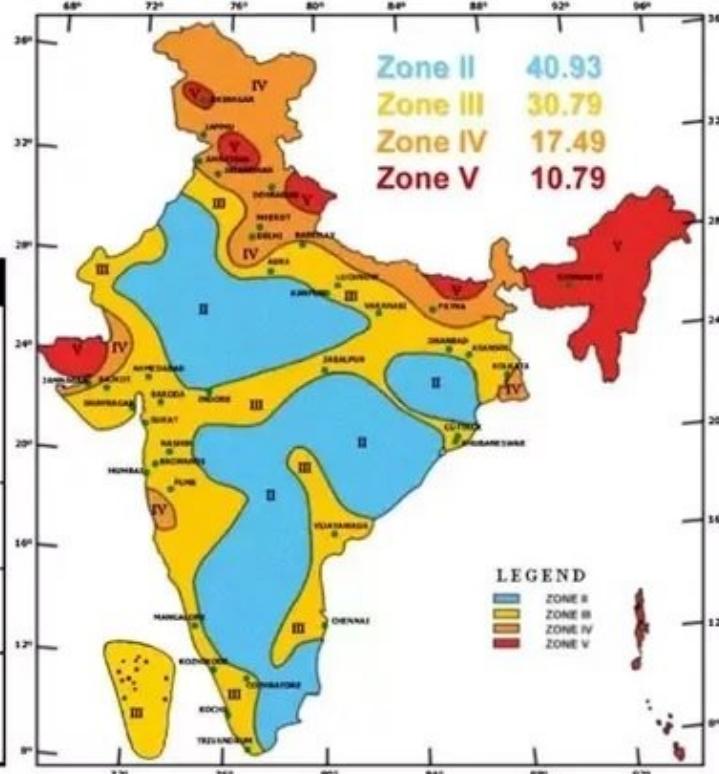
- **Zone V :**

- It falls under **very severe intensity zone**.
- It covers **10.79% area** of the country.
- It comprises of the entire northeastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands.

## 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	<b>Very High Risk</b> Zone Area liable to shaking Intensity IX (and above)
Zone IV	<b>High Risk Zone</b> Intensity VIII
Zone III	<b>Moderate Risk</b> Zone Intensity VII
Zone II	<b>Low Risk Zone</b> VI (and lower)



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