Early Warning System by IIT-Roorkee Researchers

## Why in News?

Recently, researchers from **IIT-Roorkee** have developed a framework to **predict** landslides in the Himalayan region before they occur by **analyzing rainfall patterns,** giving at least a six-hour early warning.

Key Points

- This study has been published in a peer-reviewed scientific journal and is considered the first of its kind in India.
- The combined expertise of specialists in various fields like **meteorology, hydrology, geomorphology, remote sensing, and geotechnical engineering** has led to the creation of a method that combines **meteorological modeling with numerical simulations of debris flows.**
- Researchers will **gather real-time data** on rainfall patterns in the hills from **weather research agencies.**

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Framework to determine rainfall Intensity-Duration (ID) thresholds of debris flows
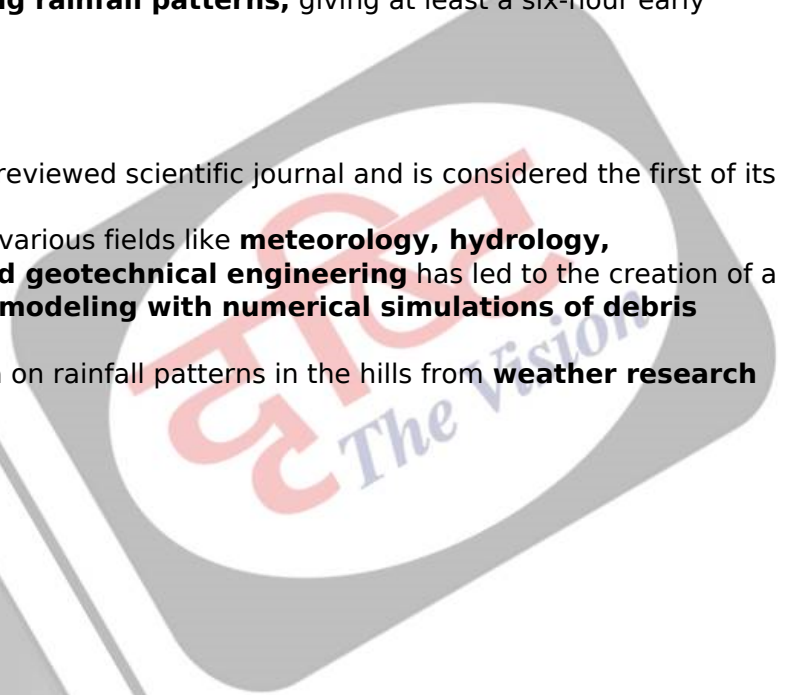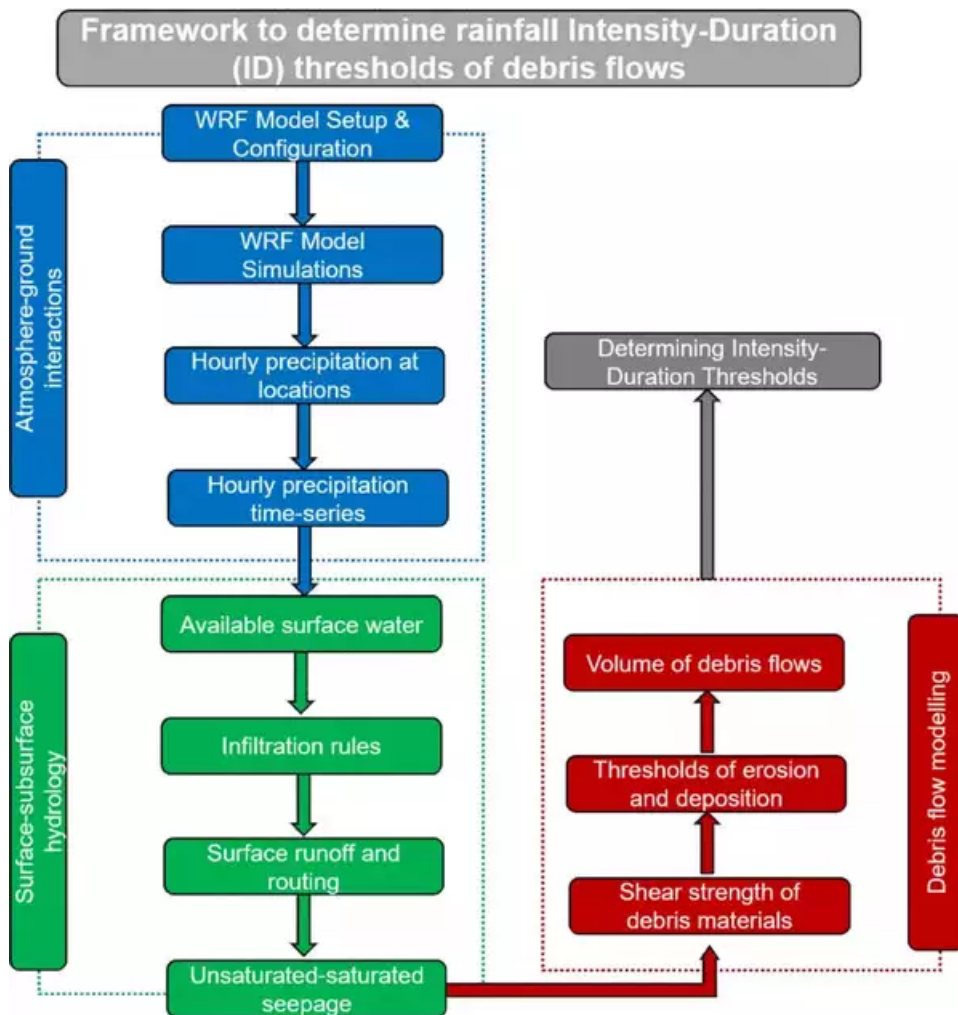
Landslides

- These are **natural disasters occurring mainly in mountainous terrains** where there are conducive conditions of soil, rock, geology and slope.
- A **sudden movement of rock, boulders, earth or debris down a slope** is termed a landslide.
- **Causes:**
  - Natural causes that trigger it include **heavy rainfall, earthquakes, snow melting and undercutting of slopes** due to flooding.
  - They can also be caused by **anthropogenic activities such as excavation, cutting of hills and trees,** excessive infrastructure development, and overgrazing by cattle.
  - Some of the main factors that influence landslides are **lithology, geological structures like faults, hill slopes, drainage, geomorphology,** land use and land cover, soil texture and depth, and weathering of rocks.
  - All these are factored in when a **landslide susceptibility zone is earmarked for planning and making predictions.**