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Landslide and Flood Early Warning System

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The Council of Scientific and Industrial Research -National Geophysical Research Institute (CSIR-NGRI) has launched an 'Environmental Seismology' group to develop a 'Landslide and Flood Early Warning System' for the Himalayan region.

The scientists at the NGRI in collaboration with German scientists at GFZ, Potsdam have launched this system.

Key Points

- **About the Early Warning System:**
 - It will be **based on real-time monitoring with dense seismological networks**, coupled with satellite data, numerical modelling and geomorphic analysis.
 - The greatest strength of the broadband seismic network is that it **enables a complete spatiotemporal tracking of the entire disaster sequence** using polarization and back-tracing approaches.
 - Early warning systems **help to reduce economic losses and mitigate the number of injuries or deaths from a disaster**, by providing information that allows individuals and communities to protect their lives and property.

- **Landslide:**

- **About:** It is defined as the **movement of a mass of rock, debris, or earth down a slope**.
 - They are a **type of mass wasting**, which denotes any downward movement of soil and rock under the direct influence of gravity.
 - The term landslide encompasses **five modes of slope movement**: falls, topples, slides, spreads, and flows.
- **Cause:** Slope movement **occurs when forces acting downward** (mainly due to gravity) **exceed the strength of the earth materials** that compose the slope. Landslides are caused due to **three major factors**: geology, morphology, and human activity.
- **Landslide-Prone Areas:** The entire Himalayan tract, hills/mountains in sub-Himalayan terrains of North-east India, Western Ghats, the Nilgiris in Tamil Nadu Konkan areas are landslide-prone.
- **Steps Taken:** **Geological Survey of India (GSI)** has launched and undertook a **national programme on landslide susceptibility mapping** - Macro scale (1:50,000) with an aim to cover the 0.42 million sq. km landslide prone areas of the country.

- **Floods:**

- **About:** These are the most frequent type of natural disaster and **occur when an overflow of water submerges land that is usually dry.**
It is often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical cyclone or tsunami in coastal areas.
- **Types:** There are 3 common types of floods:
 - **Flash floods** are caused by rapid and excessive rainfall that raises water heights quickly, and rivers, streams, channels or roads may be overtaken.
These are highly localised events of short duration with a very high peak and usually have less than six hours between the occurrence of the rainfall and peak flood.
 - **River floods** are caused when consistent rain or snow melt forces a river to exceed capacity.
 - **Coastal floods** are caused by storm surges associated with tropical cyclones and tsunamis.
- **Vulnerability:** The major flood prone regions in India are Punjab, Haryana, most of the Gangetic plains, including Uttar Pradesh, North Bihar and West Bengal, the Brahmaputra valley, coastal Andhra Pradesh and Orissa, and southern Gujarat.
Now-a-days Kerala and Tamil Nadu also feel the fury of the floods.
- **Steps Taken:**
 - **Flood-plain zoning** was initiated in India which provided for taking up surveys and demarcation of flood zones or plains. It prevents indiscriminate development and human settlement in such areas.
 - The **National Water Policy** highlights the provisions for project planning, surface- and groundwater development, irrigation and flood control.
 - The work of **flood forecasting and warning in India is entrusted with the Central Water Commission (CWC).**

Way Forward

- Since climate change is a major player in accelerating ice loss through glacier melt and flash floods caused by glacier retreat, major efforts are needed to maintain the fragile ecosystem in the multi-hazard prone Himalayan region.
- This also had important implications for the planning of infrastructural development of dams, power plants and other projects by governments, which is of great strategic and societal importance to the country.

Source: TH