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Threat to Human Habitation in the Highlands of Kerala

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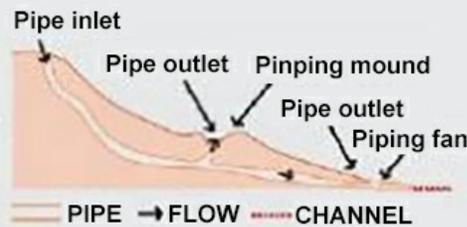
Investigation of **National Centre for Earth Science Studies (NCESS)** scientists in Kerala, in the wake of the **heavy rain and devastating floods in August 2018**, had found that **destabilising geological processes**, coupled with **extreme rainfall events** and **unscientific farming and construction activities**, pose a serious threat to human habitation in the highlands of the state.

- During the investigation in landslide prone areas in Thrissur and Kannur districts of Kerala, the researchers found **huge cracks across farmlands and dwellings**.
In the areas surveyed, most of the slopes were used for raising crops and farmers had **blocked the natural drainage systems**.
- **Land subsidence, lateral spread** and **soil piping** were an immediate threat to life and property in the uplands of the state.
Heavy intense rainfall triggers slope failure in locations where lateral spread and soil piping have occurred.

Destabilising Geological Processes

Soil piping

Refers to the formation of underground tunnels due to subsurface erosion of clay-rich soil by an underground water source, possibly a stream percolating down from the surface through a crack. Soil pipes are known to extend some distance as a continuous channel or as a system of interconnected tunnels that form an extensive, branched network.



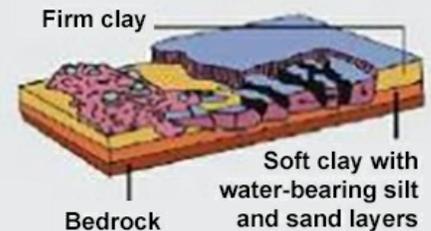
Lateral spread

Occurs when the soil on gentle slopes starts moving downhill. It is caused by a process known as liquefaction. When soil loses strength due to saturation, it behaves like fluid, triggering a flow. Lateral spread is progressive and spreads rapidly, often culminating in a complex landslide.



Land subsidence

Is the sinking of the surface soil caused by subsurface erosion, often triggered by unscientific land use and drainage.



- Any developmental activities like construction of roads and buildings in such vulnerable areas require **remedial measures for slope stabilisation**.
- The team apart from outlining the remedial steps also **recommended the formation of a trained task force** for the highlands to monitor ground signatures like hollows, cracks, and water spouts that often precede land subsidence, lateral spread and landslides.
- Based on the recommendations of the NCESS, the Union Ministry of Earth Sciences (MoES) has initiated steps to establish **a network of landslide monitoring stations** in the highlands.

The units based on acoustic emission technology will also have an **early warning mechanism to alert the local community**.

Landslide

- A landslide is defined as the **movement of a mass of rock, debris, or earth down a slope**.
- Landslides are a type of "**mass wasting**", which denotes any down-slope movement of soil and rock under the direct influence of gravity.

- There are 5 main types of landslides:
 - **Falls** are sudden movements of loads of soil, debris, and rock that break away from slopes and cliffs. They occur as a result of mechanical weathering, earthquakes, and force of gravity.
 - **Slides** are a kind of mass movement whereby the sliding material breaks away from underlying stable material.
 - **Topple** encompasses the forward spinning and movement of huge masses of rock, debris, and earth from a slope. It takes place around an axis near or at the bottom of the block of rock.
 - **Spread** takes place on gentle terrains via lateral extension followed by tensile fractures.
 - **Flow** landslide is categorized into earth flows, debris avalanche, debris flow, mudflows, and creep. The most prevalent occurring landslides are rock falls and debris flow.
- While landslides are considered naturally occurring disasters, human-induced changes in the environment have recently caused their upsurge.
- **Natural Causes of Landslides are:**
 - Climatic changes
 - Seismic activities
 - Weathering (natural procedure of rock deterioration that leads to weak, landslide-susceptive materials)
 - Erosion
 - Volcanic eruptions
 - Steeper slopes
- **Human causes of landslides are:**
 - Mining activities
 - Deforestation

National Centre for Earth Science Studies (NCESS)

- It was established in **1978 by Prof. C. Karunakaran**.
- It operates by the **Earth System Science Organization** under the Ministry of Earth Sciences.
- It **aims to understand the earth in its totality** and gain knowledge on the interactive and competing processes that shape the earth, from its evolution to the present status of ever increasing demand for natural resources.
- NCESS **fosters multidisciplinary research in emerging areas of solid earth science** by utilizing the knowledge for earth science applications .
- It is situated at **Thiruvananthapuram in Kerala**.

Source: TH