

Sedongpu Mass Wasting

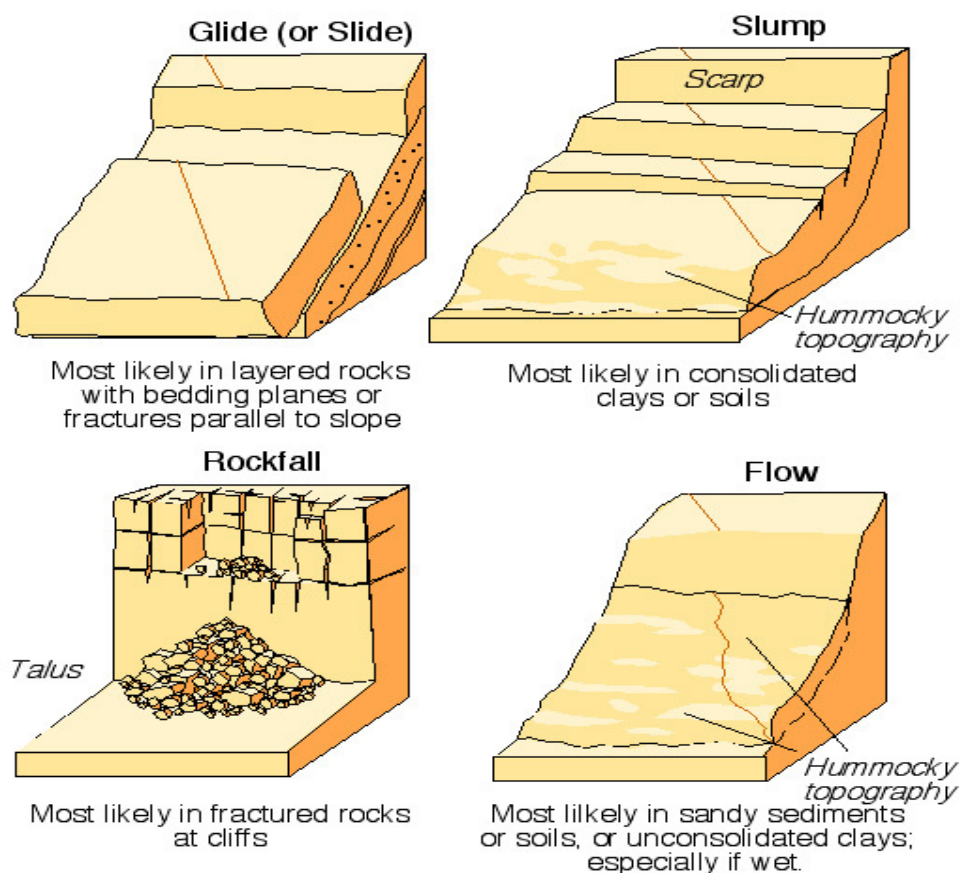
Why in news?

A new study highlighted the impact of high frequency of mass wasting events in the Sedongpu Gully to Northeast India.

What is mass wasting?

- **Mass wasting** - A geological event, of *gravity-influenced movement of rock and soil* down a slope.
- These events may occur very rapidly and move as a flow.
- **Causes** - They are often *lubricated by rainfall* or *agitated by seismic activity*.
- Others includes rapid snowmelt, volcanic eruption, storm waves, rapid-stream erosion, or human activities like grading a new road.
- **Types** - It involves the ***slipping, slumping, falling and flowing*** of soil or rock down a slope.

Styles of Mass Wasting



- **Determining criteria** - There are various factors which increase the *likelihood and rate of different types* of mass wasting
- **Steepness of slope gradient** - The steeper the slope, the greater the influence of gravity on particles.
- **Rock structure** - *Bedding planes and faults* can increase vulnerability to movements.
- **Rock type** - *Sedimentary and unconsolidated sediments* are more vulnerable to movement than igneous rocks.
- **Level of water saturation** - The *greater the saturation*, the lower the friction between particles.
- **Vegetation cover** - Plant roots help to hold surface together
- **Human activity** - Mining can cause vibrations which trigger movement/poor slope management can lead to undercutting slopes

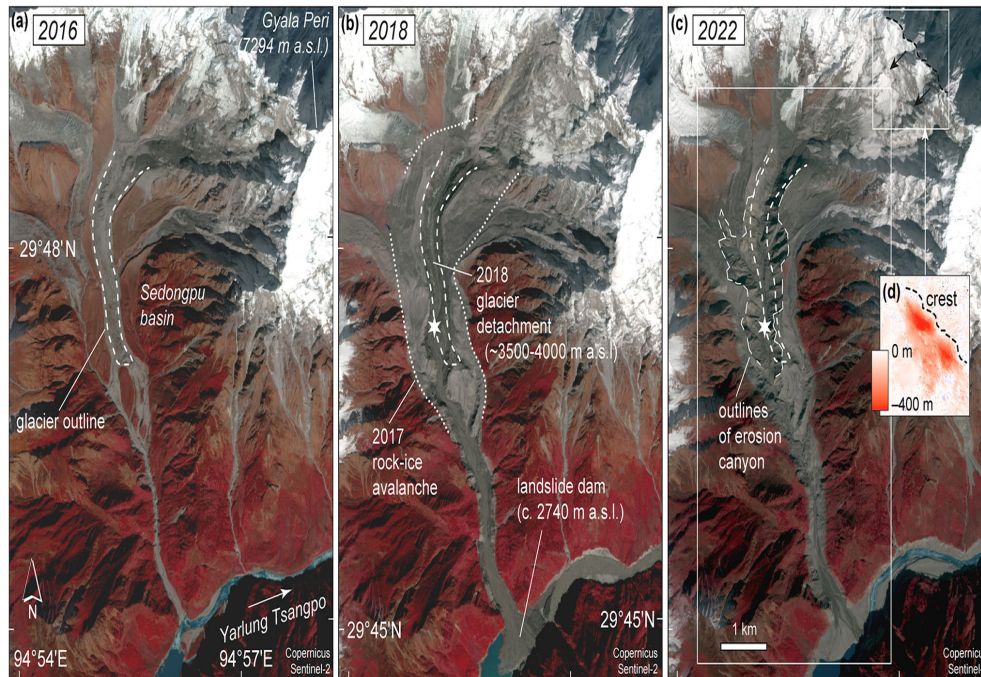
What is sedongpu mass wasting?

Sedongpu Gully



- **Location** - It is located in the catchment of the Sedongpu glacier on the **Tibetan Plateau**.
- Its valley, is 11 km long and covers 66.8 sq. km.
- **Gully** - It is a landform created by erosion from running water, mass movement or both.
- **Great Bend** - Sedongpu river drains into the Yarlung Zangbo, or the Tsangpo River by taking a sharp turn called as great bend.
- It is *close to Tibet's border with Arunachal Pradesh*, where the River Tsangpo flows as the Siang River.
- **Gorges** - It creates a gorge 505 km long and 6,009 metres deep while flowing around Mt. Namcha Barwa (altitude 7,782 metres) and Mt. Gyala Peri (7,294 metres).
 - It is one of the deepest gorges on the earth.

- **Sedongpu wasting** - More than 700 million cubic metres of debris have been mobilised in the Sedongpu gully catchment since 2017.
- **Patterns of sedongpu wasting** - From satellite images, 19 large mass-wasting events were grouped into three sub-patterns
 - Ice-rock avalanche (IRA)
 - Ice-moraine avalanche (IMA)
 - Glacier debris flow (GDF)



A moraine is a mass of rocks and sediment deposited by a glacier.

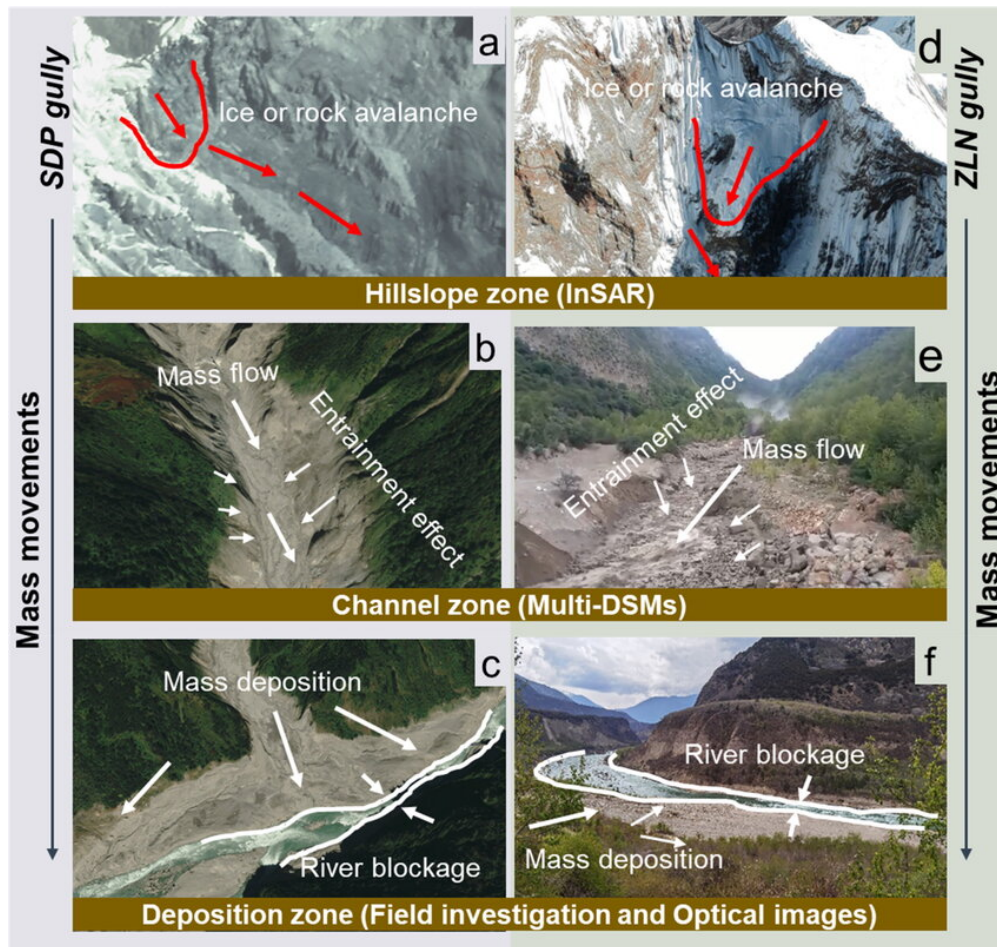
What are causes for Sedongpu mass wasting?

- **Long-term warming** - *Annual temperature in this area increased* at rates of 0.34° to 0.36° C during 1981-2018, which is higher than the global average.
 - Sedongpu basin consists mostly of Proterozoic marble whose land surface temperature ranges from -5° to -15° C, rarely exceeding 0° C before 2012.
- Thus, there is extensive *permafrost degradation* occurring in the catchment, resulting in the progressive *destabilisation of the slopes*.
- **Dams** - Big dams such as the *Zangmu on the Tsangpo* accentuate the threat of mass wasting.
 - China plans to set up a 60-GW project on the Tsangpo, which will have thrice the capacity of the Three Gorges project on the Yangtze, the world's largest hydropower plant.
- **Steep Topography** - Due to its *steep topography*, it is one of the most *landslide-prone locations* on the planet.
- **Geographical Instability** - It is prone to earthquakes.
- The **2017 Nyingchi earthquake** destabilised the slopes and *initiated the current period of instability*.
- **Other factors** - They have a *highly fractured rock mass* and the presence of *large volumes of sediments* from recent glaciations.

What are its impacts in India?

- The Sedongpu mass wasting has *serious transnational implications* for the Tsangpo-Siang-Brahmaputra-Jamuna basin, especially in India and Bangladesh.
- **Sedimentation** - Addition of major amounts of sediments to the course of the river.

- River Brahmaputra carries more than 800 tonnes of sediment at Pandu in Guwahati, becoming more than a billion tonnes at Bahadurabad in Bangladesh.
- **River Blockage** - Added sediments blocks the river at different locations.



Debris flows have occurred in two adjacent gullies, namely Sedongpu Gully (SDP) and Zelongnong Gully (ZLN), since the 1950s.

- **River bank erosion** - Increasing sedimentation may make the river more intensely braided in the Assam plains, which could lead to more bank erosion.
- **Flooding Hazard** - The sedimentation can elevate the river beds more, accentuating flood hazards.
- **Glacial Lake Outburst Flood**- Breaching of the blockages leads to catastrophic flash floods in the downstream.
- These floods were triggered by the outburst of a dam created by the glaciated debris and rock materials generated during landslides.
- **Livelihood Impact** - The channels of the river in Assam and Bangladesh may get choked with sand and silt in the lean season making navigation difficult and also affects fishing.

What lies ahead?

- Monitor the status and trends of geophysical events leading to landslides, rock falls

and other erosional processes.

Reference

[The Hindu| Frequent mass wasting in Tibet could Impact India](#)

