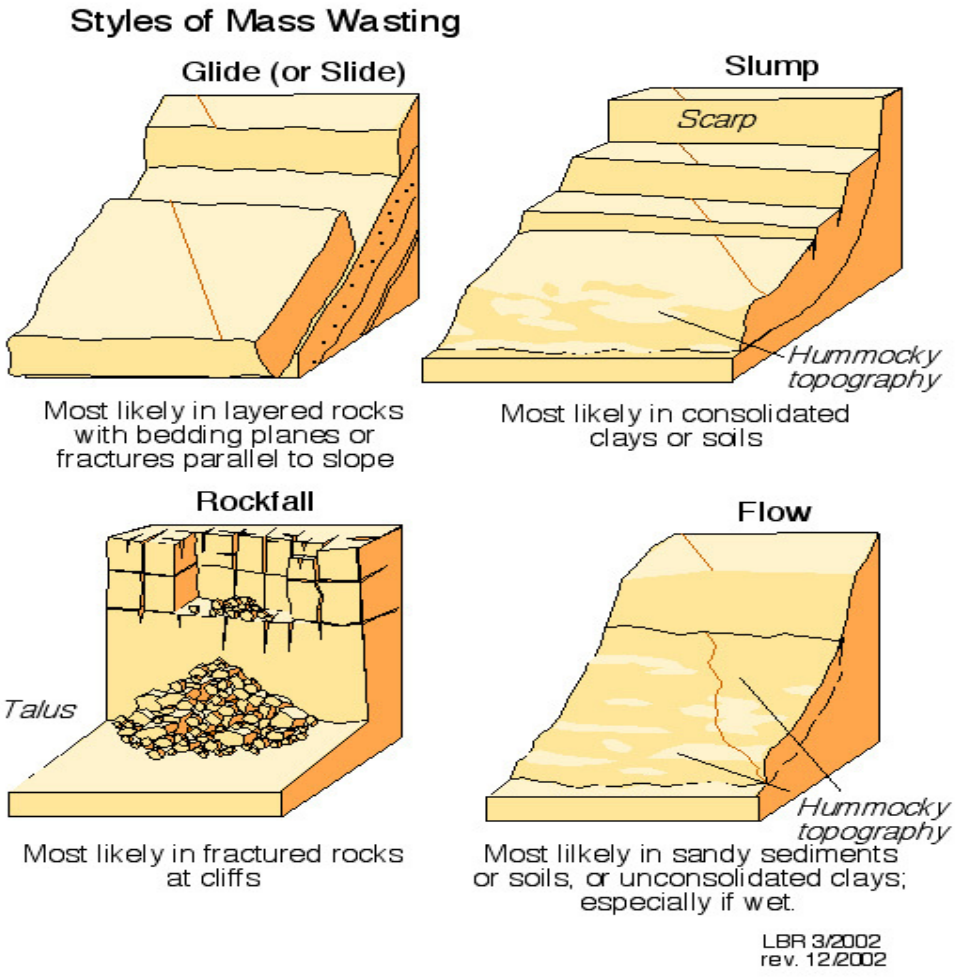
Sedongpu Mass Wasting

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.



- **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

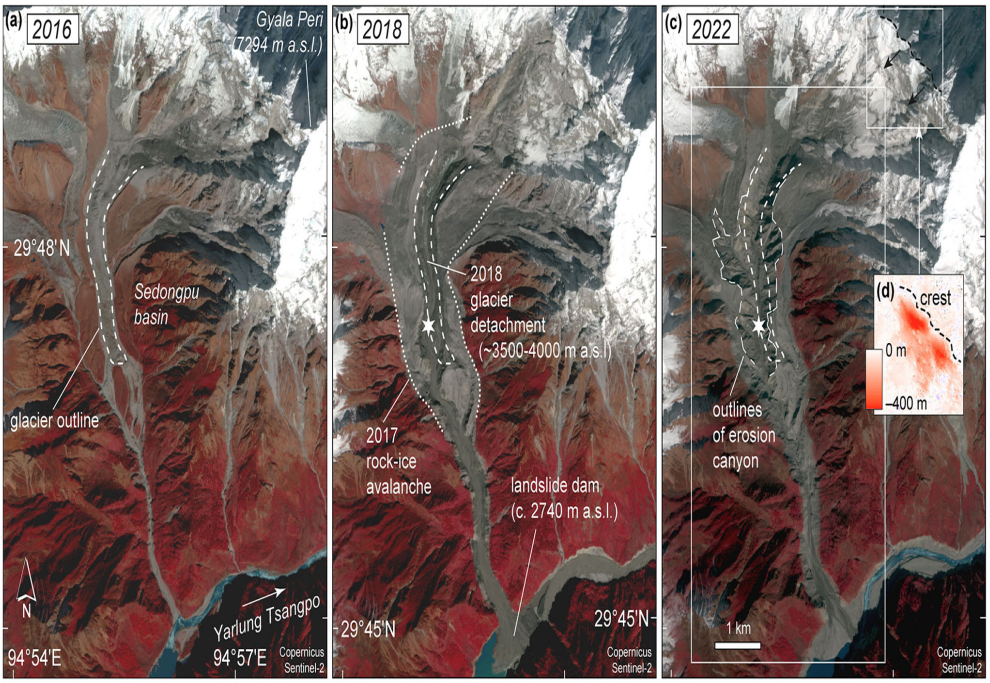
What is sedongpu mass wasting?

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.

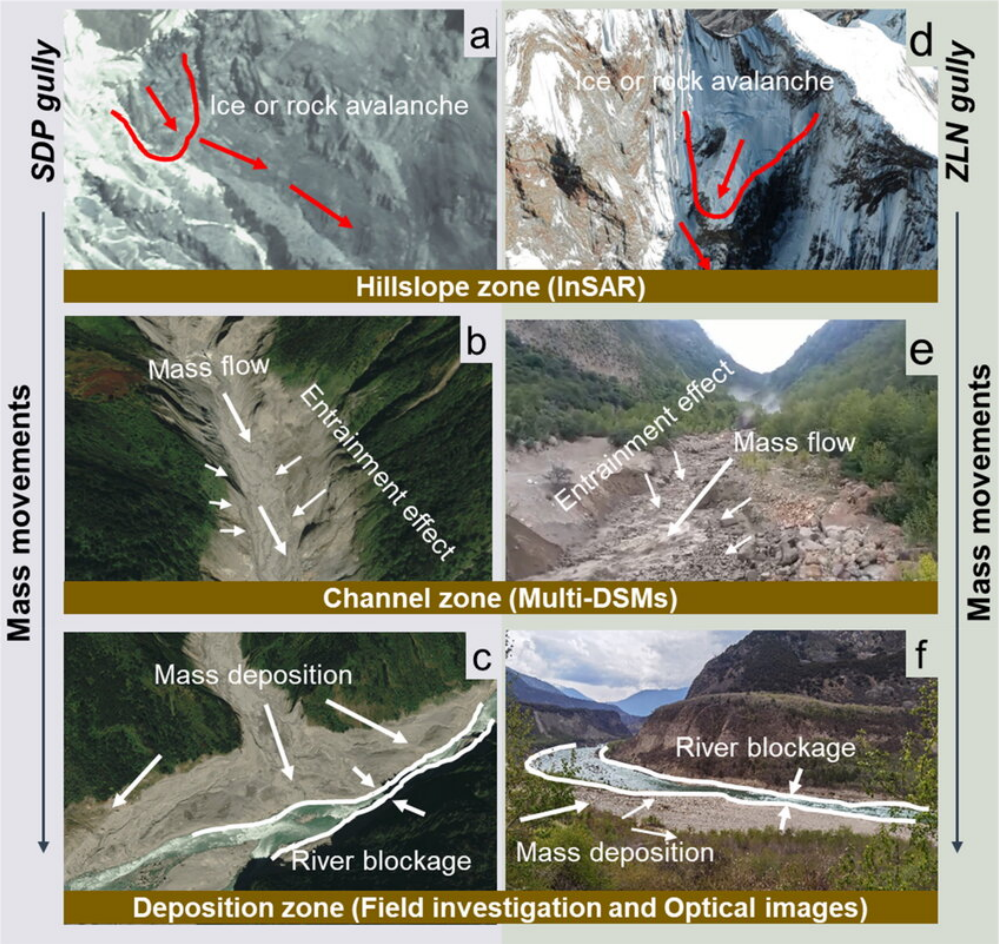
What are causes for Sedongpu mass wasting?

- **Long-term warming** - *Annual temperature in this area increased* at rates of 0.34º to 0.36º C during 1981-2018, which is higher than the global average.
    - Sedongpu basin consists mostly of Proterozoic marble whose land surface temperature ranges from -5º to -15º C, rarely exceeding 0º 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

