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Effects of Changing Groundwater Levels on Himalayas

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Why in News

Recently, researchers from the **Indian Institute of Geomagnetism (IIG)** have found that the Himalayan range subsides and moves up depending on the seasonal changes in groundwater, apart from the normal and common reasons.

IIG is an **autonomous institute** under the **Department of Science & Technology (DST)**.

Key Points

- The **Global Positioning System (GPS)** and **Gravity Recovery And Climate Experiment (GRACE)** data were used to quantify the variations of hydrologic mass. The GRACE satellites, **launched by the US in 2002, monitor changes in water and snow stores on the continents**, enabling the researchers to study terrestrial hydrology.
- The combined GPS and GRACE data suggest a **12% reduction in the rate of the subsurface slip**.
 - The **subsidence rate is associated with groundwater consumption**.
 - **Subsurface slip** refers to **how fast the fault is slipping relative to the foot and hanging wall**.
 - The slip occurs at the **Main Himalayan Thrust (MHT)**, due to hydrological variations and human activities, over which there is the periodic release of accumulated strain.
- Water acts as a **lubricating agent** and in the dry season, the **rate of the slip of the fault in the region is reduced**.

- There are **normal and common reasons** also affecting the Himalayas apart from the groundwater levels.
 - The Himalayan foothills and the Indo-Gangetic plain are sinking because its **contiguous areas are rising due to tectonic activity** associated with landmass movement or continental drift.
 - In the Himalaya, **seasonal water from glaciers** as well as **monsoon precipitation** plays a key role in the deformation of the crust and the seismicity associated with it.
- This is the first study to look at the rising Himalayas from a **hydrological standpoint**.
- Since the Himalayas play an important role in influencing climate in the Indian subcontinent, the study will help in **understanding the effects of hydrology on climate**.

Fault

- It is a **planar or gently curved fracture in the rocks of the Earth's crust**, where compressional or tensional forces cause relative displacement of the rocks on the opposite sides of the fracture.
- When rocks slip past each other in faulting, the upper or overlying block along the fault plane is called the **hanging wall or headwall**; the block below is called the footwall.

Main Himalayan Thrust

The **Indian plate under thrusts the Eurasian plate** along a northerly dipping detachment surface known as Main Himalayan Thrust (MHT) that separates the downgoing Indian plate from the overriding Himalayan wedge.

Source: PIB