Majuli Island

Prelims: *Current events of national and international importance | Geography*

Why in News?

Scientists from the Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow have carried out a pioneering palaeoecological study on the Majuli Island, Assam.

- The study has reconstructed nearly 4,000 years of climate and vegetation history of Majuli Island, the ***world's largest inhabited river island.***
- **Culture -** It is culturally significant as the settlement of several tribes and as a major centre of ***Neo-Vaishnavite culture***, a reformist Vaishnavism movement.
- **Tribes -** Home to indigenous tribal groups like the Misings, Deoris, and Sonowal Kacharis.
- **Rivers -** It perched between the **Brahmaputra River** to the south and east, the **Subansiri River** to the west, and a branch of the Brahmaputra to the north.
- **Preservation Status -** To protect its fragile ecology and culture, Assam has *banned the sale of land* in Majuli to outsiders (outside families residing there for three generations).

Recent Findings of the study

- **Core Scientific Methodology**
  - **Palynological Evidence -** The study utilizes fossilized pollen records preserved in sediments to reconstruct past plant coverage and vegetation transitions.
  - **Multi-Proxy Approach -** It integrates biological data (pollen analysis) with geological data (grain-size analysis of sediments) to understand the correlation between climate change and river hydrodynamics simultaneously.
  - **Coexistence Approach -** A quantitative paleoclimatic technique

used to estimate precise metrics of past Mean Annual Temperature (MAT) and Mean Annual Precipitation (MAP).

- **Chronological Climate Mapping**

Epoch / Time Frame	Climate & Ecological Status	Synchronicity with Global Events
4040–2260 cal. yrs. BP *(Before Present)*	Early warm and humid phase; dense forest cover. Showed high ecological resilience.	Maintained stability despite the global 4.2 ka dry climatic event (which collapsed several ancient civilizations).
1100–500 cal. yrs. BP	Fluctuating monsoon intensities, highly erratic flood regimes, and a distinct moist period.	Corresponds directly with the Medieval Climatic Anomaly (MCA).
Last 500 years to Present	Dropping temperatures, reduced rainfall, shrinking forests into scattered vegetation.	Aligns with the Little Ice Age (LIA); flags the rise of dominant anthropogenic (human) pressures.

- **Key Environmental & Geomorphological Takeaways**
  - **Hydrodynamic Instability -** Grain-size data indicates a structural shift over the millennia from low-energy to high-energy fluvial (river) conditions.
  - This proves that the Brahmaputra river system has grown increasingly volatile and aggressive over time.
  - **Climate Forcing -** The strong alignment between Majuli's local vegetation changes and global shifts (like the Medieval Warm Period and Little Ice Age) proves that the Northeast Indian River ecosystems are highly sensitive to global climate drivers.
- **Application -** This study presents the first comprehensive multi-proxy (pollen and grain-size) reconstruction of long-term climate-vegetation dynamics and river processes on Majuli Island.
- It could be useful for informed policymaking and climate adaptation strategies, benefiting communities affected by recurrent flooding and land loss.

Reference

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