Harappan Civilization Shrank

Prelims: *Current events of national and international importance | History | Science and Technology*

Why in News?

Recently, A study, used pollen analysis from Deoria Tal to reconstruct vegetation and hydro-climate variability. Findings link the shrinking of the Harappan Civilization to abrupt climate change.

Key Findings

- **Conducted by –** The Birbal Sahni Institute of Palaeosciences (BSIP), supported by the Department of Science and Technology (DST).
- **Timeline –** Weak Indian Summer Monsoon (ISM) between 5100–4000 cal yr BP.

  Cal yr BP – Calibrated calendar years before the present; The present is 1950; to find the approximate historical year (BCE), subtract 1,950 from historical year. 4250 cal yr BP is around 2300 BCE.

- **Evidence –** ***Oak/Pine pollen ratio showed abrupt increase*** around 4250 cal yr BP, ***matching sedimentological records of dry climate at 4200 cal yr BP.***
- **Impact –** Collapse of reliable seasonal flooding along Indus and Ghaggar-Hakra rivers, hence migration started eastwards to Ganga plains.
- **Cause –** Cool-dry climate, weak ISM due to *southward shift of ITCZ*, decreasing Northern Hemisphere summer insolation.

Methodology

- **Sediment Core –** Scientists studied sediment cores from Deoria Tal in the Garhwal Himalaya.
- **Dating –** They dated samples using radiocarbon analysis of *Trapa seed cases*, calibrated with OxCal software.

- **Tools –** Pollen and spores have been used as established tools for reconstructing past vegetation dynamics and contemporary climate change.
- **Collaboration –** The study involved collaboration between universities in India and the USA, using pollen and spores as indicators of past vegetation and climate.

Historical Climate Patterns

- **Roman Warm Period (2500–1450 years ago) –** The Indian Summer Monsoon was strong, leading to high agricultural productivity and what is called the ***"Golden Age of India."***
- **Medieval Climate Anomaly (1050–650 years ago) –** The monsoon remained strong due to a northward Intertropical Convergence Zone (ITCZ) shift, solar activity, and ENSO influence, resulting in wetter conditions.
- **Little Ice Age (650–100 years ago; CE 1350–1850) –** The monsoon weakened because of intensified Asian westerly jets, positive North Atlantic Oscillation, ENSO warm phase, and a southward ITCZ shift.
- **4.2 ka event –** It was a major cooling phase during the Holocene period.
- It provides a natural case study to understand how the Indian Summer Monsoon was influenced by El Niño, ITCZ shifts, Indian Ocean Dipole, and summer insolation in low-latitude regions.

Significance

- **Historical –** Explains Harappan decline through climate stress.
- **Scientific –** Demonstrates pollen as tool for reconstructing past monsoon variability.

Reference

PIB | Harappan Civilization

SHANKAR IAS PARLIAMENT
Information is Empowering