

Jhamarkotra and Zawar: geoheritage sites of India

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In news– To draw the attention of local governments, industries, and the public to potential sites, the Society of Earth Scientists (SES) and other stakeholders gathered to scout a fossil park at Jhamarkotra and the metallurgical remains at Zawar.

About Jhamarkotra-

- A short, dusty climb from the Jhameshwar Mahadev pond, with no wall, fence or signboard, lies a stromatolite fossil park: **it hosts stromatolites dating back 1.8 billion years, exhibiting a variety of textures and sizes.**
- **A stromatolite is a layered sedimentary rock created by microorganisms.** As such, stromatolite fossils preserve records of cyanobacteria, commonly known as blue-green algae – the earliest life on the planet.
- **These organisms developed the ability to photosynthesise and make their own food.** By doing so, they **pumped large quantities of oxygen into the atmosphere of primaeval earth**, allowing most other life to evolve and flourish.
- **Cyanobacteria** live in shallow waters; their quest for sunlight, for photosynthesis, caused them to trap sediments and deposit them as lens-like layers.
- The resulting stromatolites allowed their colonies to expand and flourish – almost like microbial reefs.
- **Jhamarkotra's fossils are phosphate-rich because the trapped sediments** were mainly phosphate minerals.
- These fossils are part of the reason why the region is a thriving mining hub today: the phosphate is mined for use as agricultural fertilisers. But as mining operations in the region have expanded, the industry has

presented a double-edged sword: it can identify and preserve the fossils or it can damage or destroy these records of our geological past.

- For now, local bodies have cemented these specimens together, in the hopes of preserving them for scientific value and posterity.

About Zawar-

- Another interesting geoheritage site lies some **40 km south of Udaipur: Zawar, the world's oldest known zinc-smelting site. It is of archaeological and metallurgic importance.**
- **The landscape around Zawar bears numerous traces of zinc mining and smelting operations in ancient times,** including open stopes, trenches, chambers, galleries, shafts, and open-pit mines.
- **The discovery here of earthen retorts – brinjal-shaped, long-necked vessels – is particularly significant:** their presence here suggests Zawar had a unique **zinc-smelting legacy.**
- Before the advent of high pressure technology, extracting zinc was a considerable challenge.
- **Zinc has low boiling and melting points,** so heating it forms a vapour, which readily oxidises in contact with the atmosphere.
- However, the people of Zawar extracted zinc using a distillation process that required the use of a retort and an external condenser.
- This is why, of all metal extraction techniques, the one employed to obtain zinc represents the height of metallurgical prowess.
- Zawar's zinc-smelting operations date back 2,000 years. **In 1988, the American Society of Metals acknowledged it to be the earliest zinc-smelting site in the archaeological record.**
- Written records also trace the use of zinc in ancient

medicine and in mediaeval weapons of war. The people in the region also traded it with their counterparts in China and Japan.

Note: Apart from its **World Heritage list**, **UNESCO also has criteria for 'Global Geoparks': sites with geological heritage of international value. Both Jhamarkotra and Zawar may qualify if they meet a few other conditions as well.**

What is geoheritage?

Geodiversity is the **variety of rocks, fossils, minerals, and natural processes that shape our landscapes while geoheritage refers to sites that offer insights into the evolution of the earth** and can be used for research, reference, and awareness.

The Geological Survey of India has recognised a number of geoheritage sites around the country, but there are more that deserve the recognition yet haven't.

Background-

- To draw the attention of local governments, industries, and the public to potential sites, the Society of Earth Scientists (SES), a group of independent researchers bridging the gap between earth science and society, anchored a national programme for International Geodiversity Day in October 2022, followed by three field workshops to look for potential sites across India.
- The first workshop was about dinosaur fossils in Bagh, Madhya Pradesh, and the second one in the Kachchh region of Gujarat focused on Jurassic life and tectonic features, and highlighted what each state has to offer for tourism, science, and education.
- For the third workshop, earlier this March, a group of field geologists, geology professors, archaeologists, and mining industry representatives gathered to scout a fossil park at Jhamarkotra and the metallurgical remains

at Zavar, around 20 km southeast of Udaipur, Rajasthan.