Tech steps up archaeological efforts to find hidden remains

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By Mihika Basu Mihika Basu , Bangalore Mirror Bureau | Apr 23, 2016, 08.15 PM IST

Research from the National Institute of Advanced Studies (NIAS) Bengaluru, now shows that mod-ern satellite technology can significantly augment traditional archaeological efforts to discover hid-den or buried archaeological remains.

To prove their point, the researchers focused on the world's oldest residential monastic university, Nalanda. While scholars have speculated for a long time that Nalanda must have been much larger than the area that is currently excavated and protected by the Archaeological Survey of India or ASI (approximately 0.3 square km), the study has found evi-dence to support this long-held view. The work, which used GIS and remote sensing, shows the area may have been as large as 5 square km, bounded by a cluster of water bodies or tanks.

"These water bodies may have been fed by a man-made channel from the river Panchana, which our study also identifies. The study reports evidence for three additional temples, in line with known temples (number 3, 12, 13, 14), and additional monasteries, which is again in line with known monasteries. It also presents evidence for a large monastery that is similar in many ways to both Vikramasila in Bihar and Somapura in Bangladesh. This lies about one to two km north of the protected area," principle investigator M B Rajani from NIAS told Bangalore Mirror. The excavated remains by ASI currently comprise 16 large structures. The detailed results of the new study with evidence for several buried features around the presently excavated site of Na-landa, will be published in the spring edition of the journal, Archives of Asian Art.

"Hidden or buried archaeological remains often manifest themselves in the form of patterns on the earth's surface. Sometimes these patterns are indicated by surface vegetation, or land-use boundaries, or topographical undulations. These patterns may be so subtle that they are invisible to the naked eye at ground level, but they may be visible in certain satellite images (natural colour, infrared, microwave, and also 3D models).

For instance, I couldn't see any evidence for the 'large monastery' when I visited its south-east corner, but this corner is plainly visible in one of ISRO's satellite images," she said. Rajani said since it is expensive and potentially destructive to dig up the surrounding area blindly, the key significance is that these findings can help archaeologists narrow-ly focus on particularly promising areas. For example, said Rajani, a tiny corner of the "large monas-tery" was fortuitously exposed on agricultural land, and ASI made a preliminary investigation, which has now been paused. "These findings suggest that exploration at this particular site should be resumed, and should include a larger area. Other scholars, historians, for instance, can also use these findings to bolster or refute existing theories about the site," she added.

According to the research team, in order for their work to be accepted by the academic communi-ty, it was necessary for them to justify how the 'clues' fit the known parts of the 'puzzle'. So the initial challenge was to review past literature. "Finding and understanding old records was a chal-lenge. The accounts of Xuanzang or early British officers are textual commentaries of features that were visible at the time, and these may now be buried or in ruins. It was challenging to understand them and connect them with the remains. Secondly, we needed to undertake detailed field stud-ies to confirm our clues. Our satellite images threw up several potentially interesting findings, but

reaching those spots on the ground sometimes required crossing fields, villages, ASI property, etc. The villagers helped me a lot in this regard," said Rajani.

Features identified by the study are

The pattern of water bodies surrounding Nalanda, possibly indicating the site's extent and spread in south to north direction.

A palaeo-channel that drew water towards the site from river Panchana, which intersects the site at the eastern end of Dighi Pokhar, and could explain why this tank extends significantly further east than other tanks.

Within the proposed extent, there are two separate (northern and southern) clusters of mounds.

Vegetation patterns indicate that along the line of temples 3, 12, 13 and 14, there may have been two additional temples to the north and one additional temple to the south. Similarly, an extension of the main row of monasteries to the south is hypothesised.