Short Communication

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Application of Remote Sensing in Archaeology and Agro-tourism: A Concept

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One of the applications of remote sensing in archaeology is gaining momentum in the conservation of various heritage sites at the global level. This new discipline called space archaeology is still in its infancy in India. To stitch the story of the past the use of modern technology in this particular field has a huge potential to facilitate tourism industry. The fusion of past and present in the form of space archaeology has been conceptualized in this article which might pave the way for tourism and agro-tourism to help the rural people.

The remote sensing provides a wide range of information available in the electromagnetic spectrum in a synoptic and more frequent manner to detect and map the natural resources in spatial domain.

Archaeologists uncover the past by digging through layers of civilization. Gradually, sand or layers of soil, dirt can cover a lost city. Vines, grass, and trees can grow over an ancient town or a village. In many cases archaeological sites are difficult to reach. Using remote sensing techniques it is possible to study the site from satellite data. Using such modern techniques to visit the past and build its stories comes under the purview of space archaeology.

Space archaeology describes how archaeologists use diverse remote sensing datasets from lasers to space based imaging systems to map partially to totally invisible ancient features, from small walls to entire cities. This branch of archaeology is also termed as satellite archaeology, and/or satellite remote sensing. It is the study of the material culture relevant to space exploration that is found on earth and in outer space (*i.e.* atmospheric material) and that is clearly the result of human behaviour. Space archaeology uses historical archaeological techniques in combining the study of the documentary record and oral histories with survey, excavation and artefact analysis.

In recent years, remote sensing application has immensely grown and has received considerable attention because it can assist archaeology in various ways along with other sciences, in order to have good information to the researchers based only on non-destructive and non-contact techniques.

Remote sensing has opened up new horizons and opportunities and possibilities for archaeology. For example, there are certain kinds of photography which helps detect phenomena on the surface associated with subsurface relicts such as oblique or vertical aerial photography. Also infrared and thermal electromagnetic radiation can be used in order to detect underground archaeological remains. Having both blended *i.e.* satellite remote sensing techniques with GIS, the controlling process of archaeological sites can be definitely supported in a reliable, repetitive, non-invasive, rapid and cost-effective way. A few other advantages include i) Estimating archaeological parameters including surface and/or subsurface properties without coming in direct contact with the object of study, ii) Economic since reduces costs of *in-situ* investigations and easy monitoring and using temporal spatial data analysis (Tapete 2018).

India is developing space archaeology and to discover archaeological sites. For various archaeological purposes India can be divided into four regions a) The Indus basin with its affinity with Persia and Central Asia; b) The Indo-Gangetic Plains (Bhattacharyya *et al.* 2004) with its link to the Central Asia; c) Barren hills and deserts acting as a barrier running across the whole country from the north-west corner of the Bay of Bengal on the east almost to the Indian Ocean on the west, and d)

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The peninsular of India (Anonymous 2020 a).

In fact archaeologists have started using satellites proving their effectiveness in site detection. Sites need to be detected rapidly and over large areas as India's landscapes are varied and massive (Ambekar *et al.* 2014).

Space archaeology with the advent of GIS and other software techniques can be made open to an online platform to launch citizen archaeology for easy access of historical sites and benchmark spots for informing the monitoring agencies about i) Existence of new sites not yet mapped and listed, ii) Extent of damage caused for future conservation, and iii) Educating locals to understand the importance of these historical sites built many years ago and cannot be rebuild (Figure 1).

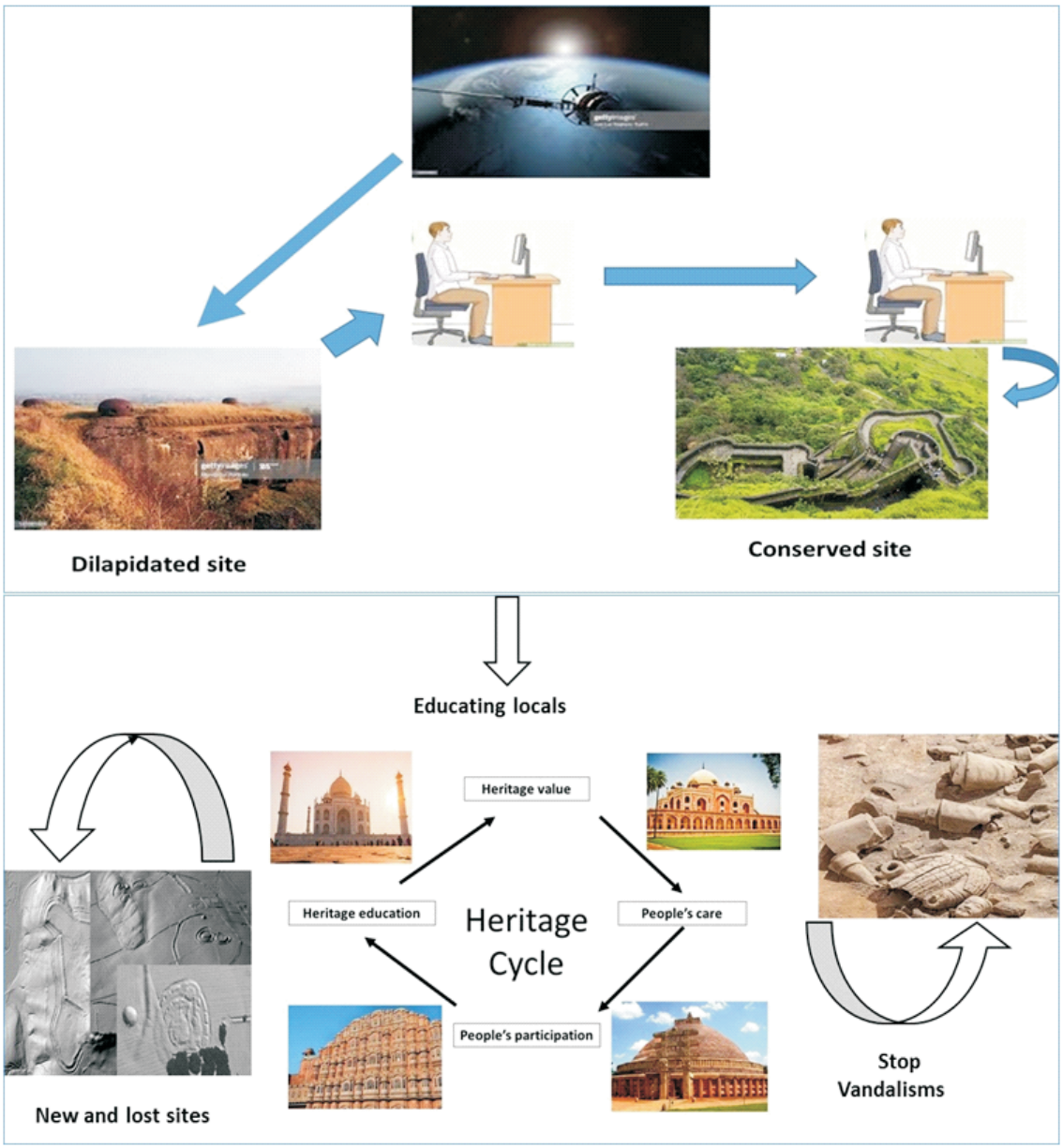

Fig. 1. Space archaeology and its usefulness for the society

This will lead the conservation and maintenance of archaeological sites as a people's movement and would serve tremendously to boost tourism and may thus generate revenues for both the state and central governments.

It may be mentioned that space archaeology is beneficial for the archaeologists to discover various sites, and monuments. However, ground truth collection through a proper protocol of archaeological techniques is essential to validate remote sensing data. Space archaeology in India can indeed prove a better tool to discover all those buried cities and sites which will help the future generation to know more about their ancestors. The Archaeological Survey of India has recently tied up with other experts from abroad to harness the power of satellites and the uses remotely sensed data to discover archaeological sites. (Anonymous 2020 b).

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