ASHOKA UNIVERSITY

CENTRE FOR INTERDISCIPLINARY ARCHAEOLOGICAL RESEARCH

Vision, Strategy and Action Plan

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CENTRE FOR INTERDISCIPLINARY ARCHAEOLOGICAL RESEARCH

Executive Summary

MISSION STATEMENT

The Centre for Interdisciplinary Archaeological Research, first of its kind in India, aims to create a state-of-the-art facility that brings archaeology and the sciences together in order to offer new perspectives that will deepen the study of the Indian past. It aims to do this through interdisciplinary field-based projects led by Ashoka faculty and students along with off-site laboratory work. Simultaneously, it seeks to introduce a pedagogy that draws upon both the sciences and the humanities for teaching courses on traditional and modern archaeology that will help impart field knowledge of archaeological sites and diverse landscapes of India.

BACKGROUND

For a nation with an abundance of archaeological riches that can throw light on a range of issues that are of contemporary significance, it is unfortunate that this field of research has not developed in Indian universities in the manner that it has in many parts of the world. For instance, none of the universities in Delhi have departments of archaeology. Even in those universities in India that offer a Master's program in archaeology, history/archaeology departments and the science departments there have functioned as separate silos, with no meaningful cross talk between them. Consequently, scientists and archaeologists/historians of the same university rarely join hands to mutually enrich their own research and disciplines.

There are many institutions in the world where there is an outstanding interleaving of humanities and scientific research in pursuing archaeology. The University College London's Institute of Archaeology (U.K.) is seriously invested in prehistoric and historical studies through cutting-edge scientific research that combines field work with laboratory analysis, conservation and analytical work. The archaeology program of Harvard University (U.S.A.) draws on many disciplines ranging from the social sciences to the natural sciences. There are multiple laboratories and resources there, ranging from the Archaeology Multi-User Laboratory to the facilities at Peabody Museum. Here, much of the laboratory work required for archaeological field projects is done within the university. The state of the subject in India, on the other hand, is entirely different and is most evident from the fact that samples from archaeological sites are frequently sent outside the country because of a lack of facilities here.

ASHOKA UNIVERSITY AND ITS STRENGTHS

Ashoka University is uniquely poised to establish such a centre. Ashoka is India's leading liberal arts research University, a pioneering initiative that is aimed at

transforming India's higher education landscape. The education at Ashoka puts strong emphasis on foundational knowledge, academic research on pedagogy, and hands-on experience with real-world challenges. The aim of Ashoka is to help students think critically about issues from multiple perspectives, communicate effectively and become leaders with a commitment to public service.

Ashoka follows a unique model in which experts in a given discipline ask pertinent unanswered fundamental questions and seek answers for the same with the help of colleagues from across the university with diverse expertise and access to technology. Ashoka trains students in such a way that technology is not seen as an end but a means to provide right answers to academic questions and develop sustainable solutions to societal problems.

VISION AND STRATEGY

The Centre for Interdisciplinary Archaeological Research will host two components which will support each other: field-based work along with teaching, and laboratories where courses will also be taught. Thus, the centre represents true integration of high-quality research and education at the undergraduate and post-graduate levels. The Centre will begin with field-related explorations followed by excavations (the specific details about areas and themes that will be initially taken up, are discussed below). The material collected from the field will be studied in Biology/Physics/Chemistry laboratories, while department of computer science will help in data analytics. There will be a specific emphasis on teaching interdisciplinary courses at the Centre.

The Centre for Interdisciplinary Archaeological Research aspires to inaugurate an era of exciting and successful cooperation among both categories of research workers in the university. The idea is faculty-driven and is a consequence of a sustained and serious conversation between historian-archaeologists and biologists. With its emphasis on interdisciplinarity, this is a conversation that could only be sustained at Ashoka which provides the ideal institutional space for an interface between archaeology and the sciences. This is the first university in India that will meld the research interests of its humanities scholars with the science faculty in order to research and teach the Indian past.

INFRASTRUCTURE

There is already a great deal of scientific equipment and computer-based skills at Ashoka University. However, certain specific microscopes, imaging systems, clean room and necessary equipment for nucleic acid extraction and basic analysis, will be needed. Space for examination and storage will also be required. Compactor based storage with temperature controls for sensitive archaeological material are to be procured.

FACULTY

The Centre for Interdisciplinary Archaeological Research will be mentored by Prof Nayanjot Lahiri and Prof Upinder Singh, world renowned experts in archaeology and ancient history. They were both awarded the prestigious Infosys Prize in recognition of their contribution to these areas. They will be assisted by Prof Alok Bhattacharya and Prof LS Shashidhara in establishing laboratories and protocols and in providing information derived by using science and technology-based methods. The research accomplishments of Profs Bhattacharya and Shashidhara and their contribution to education and science policy in India are recognized by the award of SS Bhatnagar Prize by Govt of India (highest science award in India) and Fellowship by Indian Science Academies. They are assisted Dr Shibani Bose with expertise in Archaeology (post-doctoral fellow) and Dr Kritika Garg (DBT-Ramalingaswami Fellow) who is an expert in ancient DNA isolation and analysis. Soon the centre will appoint two faculty at the assistant-professor level, a senior research fellow for help in documentation, an office assistant for administrative purposes and a technical assistant for archaeological material in the field and for off-field purposes.

EXPECTED OUTCOME

The Centre for Interdisciplinary Archaeological Research is expected to provide an evidence-based narrative of the Indian past, how infectious disease dynamics changed from ancient to modern times and shaped Indian civilization, our evolving relationship with nature and the surrounding environment etc. These discoveries will help framing policies to protect our archaeological sites, our response to climate change, deforestation and environmental degradation and addressing the societal problems in a more integrated and holistic manner.

Background and Objectives

Historical texts and documents have served as the staple source of knowledge about the human past. A major issue is that the conventional historical sources begin only with the introduction of written records around 3000 BCE in West Asia, and decipherable records in India dating back to the first millennium BCE. In contrast, the archaeological remains of the Indian subcontinent go back to more than a million years ago (as in the case of Attirampakkam in Tamil Nadu and the Siwalik ranges in the north-west). In fact, such data constitute our only source for the vast span of ancient India from one million years ago till the second millennium BCE to explore and analyse prehistoric cultures, early food producing societies, pastoralist groups, chalcolithic villages and the Harappan Civilization. So, the study of the Indian past for more than 99 % of that extensive time period depends on archaeology. Even though material remains no longer form the only category of available data as and when textual sources become accessible, it is well recognized that archaeology continues to add dimensions even to the study of texts and epigraphs.

A multipronged approach covering a range of disciplines is required to fill in the gaps in archaeological information for all periods of the human past. The scientific disciplines have significantly contributed to the consolidation of archaeology and the expansion of its frontiers. The invention of radiocarbon (C14) dating, during the World War II, was a major breakthrough in providing a secure chronology. Since then, there has been a growth in archaeological applications of scientific techniques for generating other kinds of radiometric dates, reconstructing past environments, expanding our knowledge of subsistence practices, and analysing the composition and character of artifacts.

Archaeological science, a meeting ground for science and humanities, has resulted in generating richly detailed images of past lives. In India, such information about the diet of Harappan people and animals at Farmana, Haryana, has been recovered from kitchen leftovers and teeth (human and animal), and the data on spore pollen distribution in Rajasthan's salt lakes has helped reconstruct changing patterns of rainfall that deeply affected livelihoods and settlements. Like other nations with long histories, India is particularly rich in archaeological sites and monuments. The official records suggest approximately 15,000 sites within the ambit of the legislative protection of the Centre and the States, while the records of the National Mission on Monuments and Antiquities noted some 500,000 unprotected sites. The quantum of undocumented sites on the ground far exceeds this number.

For a nation with such abundant riches, it is unfortunate that with some honourable exceptions, this field of research lags far behind in comparison to many other parts of the world. For instance, none of the universities in Delhi have dedicated departments for archaeological studies despite the approval by University Grants Commission in 1960 for the same. Among the few universities that have been able to sustain separate departments of archaeology are the Deccan College (a deemed university) Pune, Calcutta University, and Maharaja Sayaji Rao University of Baroda. Some other departments have included archaeology within the ambit of ancient history like the Department of Ancient Indian History, Culture and Archaeology at the Banaras Hindu University. However, even in universities that offer a Master's program in archaeology, history/archaeology departments and the science departments have functioned as separate silos. Consequently, scientists and archaeologists/historians of the same university rarely collude to mutually enrich their own research and disciplines.

The proposed Centre for Interdisciplinary Archaeological Research aspires to bridge these gaps and welcome an era of exciting and successful cooperation among both categories of research workers in the university.

The Centre will host two interdependent components which will support each other: field-based work along with teaching, and laboratories where courses will also be taught. The Centre will begin with field-related explorations followed by excavations (the specific details about areas and themes that will be initially taken up, are discussed in the next section). The data that are generated from the field will be studied in various laboratories which will be research-cum-teaching laboratories. There will be a specific emphasis on teaching interdisciplinary courses at the Centre.

Why Ashoka?

Ashoka is India's leading liberal arts research University, a pioneering initiative that is aimed at transforming India's higher education landscape. The education at Ashoka has strong emphasis on foundational knowledge, academic research on pedagogy, and hands-on experience with real-world challenges. The aim of Ashoka is to help students think critically about issues from multiple perspectives, communicate effectively and become leaders with a commitment to public service.

Ashoka follows a unique model in which experts in a given discipline ask pertinent unanswered fundamental questions and seek answers for the same with the help of colleagues from across the university with diverse expertise and access to technology. Ashoka is an ideal place to train students in such a way that technology is not seen as an end but a means to provide right answers to academic questions and develop sustainable solutions to societal problems.

Ashoka faculty constitute top quality researchers and educators with expertise ranging from natural and social sciences to humanities and performing arts. The Centre for Interdisciplinary Archaeological Research will be mentored by Prof Nayanjot Lahiri and Prof Upinder Singh, world renowned experts in archaeology and ancient history. They were both awarded the prestigious Infosys Prize in recognition of their contribution to these areas. They will be assisted by Prof Alok Bhattacharya and Prof LS Shashidhara in establishing laboratories and protocols and in providing information derived by using science and technology-based methods. Profs Bhattacharya and Shashidhara are well known in their fields of research. Their research accomplishments and contribution to education and science policy in India are recognized by the award of SS Bhatnagar Prize by Govt of India (highest science award in India) and Fellowship by Indian Science Academies.

They are assisted Dr Shibani Bose with expertise in Archaeology (post-doctoral fellow) and Dr Kritika Garg (DBT-Ramalingaswami Fellow) who is an expert in ancient DNA isolation and analysis. Soon the centre will appoint two faculty at the assistant-professor level, a senior research fellow for help in documentation, an office assistant for administrative purposes and a technical assistant for archaeological material in the field and for off-field purposes.

Teaching

Two elective interdisciplinary courses to be launched from the academic year 2021-22 have been visualized:

- A course on archaeology and science to be introduced in 2021 (Monsoon Semester) – Appendix 1 provides its outline.
- A course on 'Know your Neighborhood' (the neighborhood being Sonipat district) that will impart hands-on training in the field and in the laboratory. The material remains of the past in villages and in Sonipat town (whose antiquity goes back to the first millennium BCE), ways of mapping of archaeological remains (from the ancient to the early modern), the changing pattern of the Yamuna river which forms the district's eastern boundary, the documentation of local flora and fauna, and an analysis of the district's agricultural geography are some of the elements that will form part of this course. Collections made in the course of field work will be analysed in the university laboratories. The course will be introduced in 2022 (Spring Semester).

More such courses will be introduced once we progress in faculty recruitment and building the infrastructure. In addition, several focused training workshops will be organized for advanced students of interdisciplinary archaeological research.

Laboratory Facilities

The laboratories will include facilities for analysis of objects, excavation sites and biological material utilizing methods from chemistry, biology, and physics. The facilities will aim to have:

- Archaeogenetic analysis of ancient DNA (human, animals, plants, microbes)
- Physical and chemical dating methods which provide archaeologists with reliable chronologies
- Geophysical, palaeobotanical and remote-sensing techniques for analyzing rivers, soils and sediments, tree rings and pollen, plant remains, sites and surroundings
- Facilities for training in the use of Geographic Information Systems (GIS) platform
- Facilities for study of the micromorphology and sedimentology of archaeological samples
- Different imaging techniques that allow non-destructive visualization of many fragile archaeological sites and objects
- Scientific analysis of metals, glass, pottery and other materials

Apart from providing equipment and space, a priority will be training students and scholars to address issues from an archaeological perspective and using technology as a

means to that end. Motivated science and humanities graduates will be encouraged to do PhDs on interlinking themes of science and archaeology that form part of the projects initiated by the Centre.

Additionally, the laboratories and the Centre will be a shared research space for Ashoka faculty and students, along with visiting scholars and research fellows. Acknowledgement of the use of these facilities at Ashoka University in their publications will give the Centre the required visibility in the academic domain. The Centre also intends to share knowledge and build networks with departments and centres of archaeology and archaeological science in India and across the world to ensure exposure of researchers and students in the latest developments in the field.
Through such links, it will attempt to get Ashoka students and scholars trained in new techniques which, in turn, will help research at the Centre.

Areas of Research

The Centre aims to begin with two projects, based on current expertise and strengths of the faculty, one of which will have a subcontinental reach while the other will be locality-based. With the expansion of the Centre, research in more areas will be initiated.

SONIPAT: UNDERSTANDING ITS LANDSCAPE AND HISTORY

The locality-based project will take up segments of the Sonipat district.

In many parts of the world, locality-based projects have helped promote interest in and study of the surrounding environments where people live and work. In the case of United Kingdom, for instance, apart from universities, such projects have been seeded by hundreds of local societies and amateur archaeology and natural history groups. Often, it is through an involvement at the level of the locality that students develop a deep interest in a grass roots approach to the study of the past which leads to them becoming serious researchers in this field. Such groups and societies also encourage local people to learn about archaeology and history. This is how the Sonipat project is envisaged.

This will be a teaching-cum-research project that will anchor the ‘Know your Neighborhood’ elective course that has been described in the last section. All those students who choose to study that course will, through this project, acquire a working knowledge of how field work is done combined with off-site investigations and analysis. This is the most exciting pathway by which Ashoka students can learn about the Sonipat region, and the range of studies that are central to a more informed understanding of the landscape of its past.

FOREST AS PROTECTORS OF HERITAGE: THE INTERFACE OF ARCHAEOLOGY AND SCIENCE FOR FRAMING PUBLIC POLICY

The India-based project has been visualized around a study of the archaeological heritage of forests and its implications for public policy. It is summarized below. Appendix 2 contains the full project report.

The starting point, universally acknowledged, is that India's forests are central to the sustenance of its natural heritage and its people for a variety of reasons, ranging from protecting wildlife to acting as carbon 'sinks' that help in mitigating climate change. The issue which has not been considered in policy perceptions of their significance is how these have contributed to preserving India's past, ranging from massive monuments and sculpture to near invisible archaeological remnants like charcoals and grain. Some of this has been recovered through the application of scientific techniques, but much more can be achieved by a systematic collaboration between archaeology and the range of sciences – from the biological sciences to the earth sciences. This is what the project aims to do.

The project, specifically speaking, proposes to use this approach to attempt three kinds of research that will:

- provide a South Asia perspective on the theme of the project. This will be done, on the one hand, by compiling all available data on the range of past material remains in forests, and on the other hand, by documenting science-based research that has been done on those remains as also on the landscapes themselves;
- examine ancient skeletal remains and other relevant data to study health and disease, food procurement and consumption in this type of habitat. Such remains have been found in many habitats inside forests as, for instance, in rock shelters in places like Bhimbetka and Panchmarhi in Madhya Pradesh;
- do field work that provides a micro-level perspective on the archaeology of forests. Bandhavgarh in Madhya Pradesh is where this work, at the outset, will begin.

Understanding past societies through modern biological methods

Ancient artefacts, human and other biological remains are rich sources for information about ancient times. These can be used by archaeologists and historians to understand society and living conditions of ancient societies. Extraction of the information present in these objects requires sophisticated scientific experimentation and use of analytical methods. Particularly, recent developments in biological and allied sciences have allowed us to get unprecedented detailed information from a very limited sample size.

Infectious diseases cause large scale morbidity and mortality to not only human but also to animals and other living organisms. There is enough evidence to suggest that

many infectious pathogens have been causing major diseases for a few thousands of years. Tuberculosis bacilli were identified in ancient human remains and there is enough evidence to suggest that plague played a critical role in changing population dynamics by killing a large fraction of the population. With changing societal conditions such as the domestication of animals, zoonotic diseases may have emerged and eventually evolved and caused human epidemics. Some of these diseases are tuberculosis, influenza, whooping cough, measles and smallpox. Clearing of the forests for agriculture led to another set of diseases that also included some of the zoonotic diseases due to contact of some animals with human after the loss of habitat. It is believed that mosquitoes bred extensively spreading malaria when agricultural fields were created.

The changes in human/animal/microbe genotype through the last few thousand years can help in our understanding of history. In a study done recently on surviving tiger population, it has been concluded that some genotypes have been lost though there is considerable genomic diversity still present[i] Several interesting questions can be asked. Some of these relate to genetic continuity, changes in population structure, genotype admixture and local ancestry, evidence for adaptation and understanding microbial population over time. It is possible to set up a theoretical and experimental group to answer these questions in relation to some of the historical questions being asked.

In last one decade, there has been a major development in biological techniques, particularly those related to the analysis of genetic material of all organisms. These New Generation Sequencing platforms can produce an enormous amount of data with a small amount of material. Computational methods have also evolved along with computer infrastructure for analysis of the large volume of data. Both data generation and data analysis of archaeological samples can face problems due to the degradation of genetic material. Methods for extraction of DNA and processing of samples have also improved extensively and it is now possible to get genetic material that can be analysed using the current sequencing platforms. Using these methods, many ancient human and microbial DNA have been analysed and databases are being created for one window access to all the information. For example, the genomic sequences of Spanish Flu of 1918 and plague bacilli of Black death epidemic of the 14th century are available.

Other biological and chemical methods, such as metabolomic analysis and elemental or chemical structural analysis are also useful in understanding ancient material. The Ashoka project would collaborate with other institutes who are working in this area.

Equipment, Infrastructure, Faculty and Office Staff

There is already a great deal of scientific equipment and computer-based skills at Ashoka University. However, certain specific microscopes, imaging systems, clean room and necessary equipment for nucleic acid extraction and basic analysis, will be needed.

Space for examination and storage will also be required. Compactor based storage with temperature controls for sensitive archaeological material has to be specifically factored in. Soon the centre will appoint two faculty at the assistant-professor level, a senior research fellow for help in documentation, an office assistant for administrative purposes and a technical assistant for archaeological material in the field and for off-field purposes. Currently, Ashoka has recruited one post-doctoral fellow (Dr Shibani Bose; expertise in Archaeology) and one DBT-Ramalingaswami (Dr Kritika Garg; expertise in ancient DNA isolation and analysis) to initiate the research.

APPENDIX 1: COURSE

ARCHAEOLOGY AND SCIENCE

This course is designed to introduce students to a wide array of scientific methods that are used to extend the boundaries of archaeological knowledge beyond the visible archaeological record. Material sciences, dating techniques, satellite remote sensing and ancient DNA analysis are among the topics that will be covered in the course. The course will also include demonstrations of scientific methods in laboratory settings and is pitched at a level suitable for science and non-science majors.

1. Introducing the interface of science and archaeology

Archaeological Science as a meeting ground for collaboration between disciplines; understanding the biological, chemical and physical principles a scientific study of the material past; birth and consolidation of archaeological science

2. Dating cultures and objects

Physical and chemical dating methods which provide archaeologists with absolute and relative chronologies

3. Investigating environments from the perspective of tectonics, climate, and water resources

Studying environments on a global scale; evidence from the oceans and rivers, soils and sediments, tree rings and pollen

4. Landscape as human habitat with special emphasis on flora and fauna and their influence on human settlements; human impact on landscapes

Environmental approaches which provide information on sites and surroundings; remote-sensing and geophysical-survey techniques for studying landscapes

5. Consumption, production and exchange of food, artefacts and other elements of material culture

Using science for studying botanical and animal remains, large and microscopic, to discover what was eaten and how it was prepared; archaeology of nutrition; provenance studies for characterizing and locating sources of raw materials used and exchanged; technological studies for studying artefact manufacture and use

6. Recovering the biological lives and lineages of past people

Palaeoanthropology and human evolution; archaeogenetics as a tool for recovering the past; ways of studying health and disease

APPENDIX 2: PROJECT PROPOSAL

FORESTS AS PROTECTORS OF HERITAGE

1. The Proposed Project

India's forests are central to the sustenance of its natural heritage and its people for a variety of reasons, ranging from protecting wild life to acting as carbon 'sinks' that help in mitigating climate change. The issue which has not been considered in policy perceptions of their significance is how these have contributed to preserving India's past, ranging from massive monuments and sculpture to near invisible archaeological remnants like charcoals and grain. Some of this has been recovered through the application of scientific techniques, but much more can be achieved by a systematic collaboration between archaeology and the range of sciences – from the biological sciences to the earth sciences.

The purpose of this project is to use this approach to attempt three kinds of research: (a) provide a South Asia perspective on the theme of the project. This will be done, on the one hand, by compiling all available data on the range of past material remains in forests, and on the other hand, by documenting science-based research that has been done on those remains as also on the landscapes themselves; (b) examine ancient skeletal remains and other relevant data to study health and disease, food procurement and consumption in this type of habitat.[ii] Such remains have been found in many habitats inside forests as, for instance, in rock shelters in places like Bhimbetka and Panchmarhi in Madhya

Buddhist stupa inside Girnar Reserve Forest (Gujarat)

Pradesh; (c) do field work that provides a micro-level perspective on the archaeology of forests. Bandhavgarh in Madhya Pradesh is where this work, at the outset, will begin.

The data that such work will yield would be of tremendous interest to archaeologists as also to scientists and environmentalists. At the level of policy, it would underline that this is an important reason why such tracts should be protected.

The nature of archaeological remains in forests and their implications for questions relating to policy are described and analysed below. Modern biological methods that are likely to be used for studying past populations form an appendix to this document.

2. Archaeological Sites and Monuments in Forests

There are many archaeological sites and monuments that lie inside forested tracts and grasslands across India, a fact that is not generally realized from the monument lists that have been compiled by the Archaeological Survey of India and the State/Union Territory Departments of Archaeology. Some examples are mentioned below with the details of their location and the significance of their survival. These, it needs to be reiterated, are a mere handful of monuments in jungles and are alluded to here for the express purpose of drawing attention to the range of monumental and archaeological heritage that exist there.

CHATTISGARH

Prehistoric Food-gathering in the Kanger Valley National Park

Located in the Bastar district and covering an area of some 200 kms or so, the Kanger Valley National Park is marked by dense forest with a high biodiversity. This park also has numerous limestone caves, of which there are two cave complexes known as Kotumsar and Dandak which are especially important. The Kotumsar cave is around 330 m in lateral extent with several well-developed chambers and passages up to 20 to 70 m wide. The Dandak cave is located within a five kilometres radius from the Kotumsar cave and has a lateral extent of about 200 m with 15 to 20 m wide passages. In investigations carried out by scholars from the Physical Research Laboratory (Ahmedabad), Birbal Sahni Institute of Palaeobotany (Lucknow) and the Department of Geology (Lucknow University), remains of ancient human occupation were found inside the caves.[iii] These were in the form of burnt earth as also patches of charcoal mixed with soil and grass. The samples that provided organic carbon for dating showed gathering activities by prehistoric people in the area between 7680 – 4030 years before present. Three grasses and two millets were identified. Incidentally, these are of a type that continue to grow in the area and the millets are those that are still gathered by the tribals in the region for their own consumption.

In many ways, the archaeological remains help provide the ancient roots of practices of the tribal people (Dhurva) who inhabit those forests. There are several other caves in the

Surguja forest view from a rock shelter

valley which are likely to yield similar imprints but as it is, this precious archeological evidence of early food gathering in Chattisgarh, has survived undisturbed only because the caves are located in dense forests.

Historic rock-shelters and sculptural remains in the forests of Surguja

Tucked away in the northeastern corner of Chattisgarh, Surguja is marked by sal forest-clad tracts of hills. Of these, the jungles of the Ramgarh hill are of historic significance.[iv] The hill is located close to the Ambikapur-Bilaspur road, not far from Ambikapur. There are third century BCE inscriptions at Ramgarh, in caves with names like Jogimara and Sita Bhenga (sometimes Bhengara). The Jogimara cave has words engraved in Brahmi characters of the time of Ashoka and reveals that commoners too, like royals, did use writing to inscribe something of themselves in stone. This epigraph immortalizes the bond between the lover, Devadinna, and the beloved, Sutanuka. The roof of this cave has remnants of paintings which may possibly have been done by Devadinna who was an artist-sculptor. It is the inscription, though, which is singular because it is the earliest evidence of two real people who formed a couple, perhaps, the first couple of India. This kind of expression is rare in ancient India where one mainly encounters conceptions of love and not real people speaking of their beloveds.

There are other rock-shelters nearby, one of which - the Sita Bhenga shelter - is organized like an ampitheatre and that too bears an epigraph, about poets with garlands of jasmine flowers. There is also an ancient stone gateway in the vicinity of this area, the lintel of

which is carved with the image of Ganesha. On the highest point of the hill, there is still an inner shell of what was the principal temple and the remains of a detached portico of columns. Additionally, a striking feature of Ramgarh hill is a natural tunnel on the northern face, locally called Hathipol or the elephant gate.

GUJARAT

Buddhist remains in Junagadh

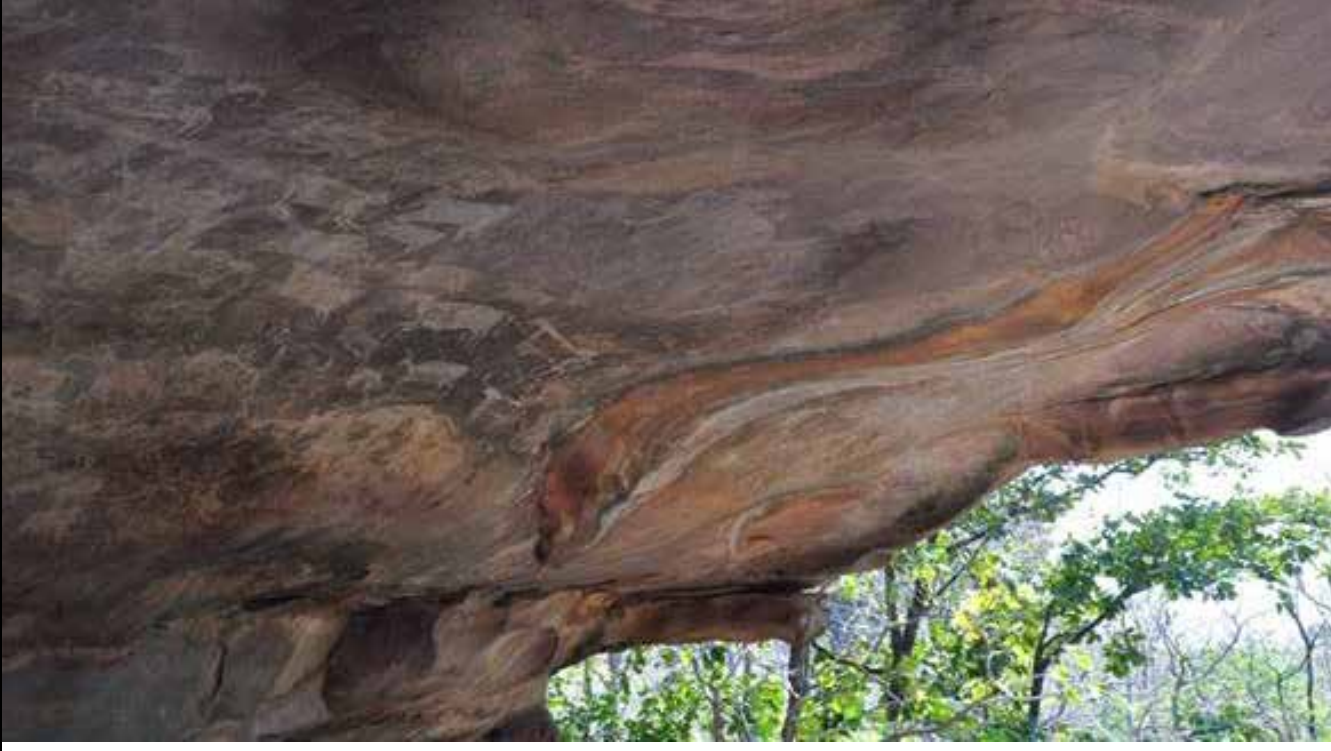
The Girnar reserve forest near Junagadh city in 2012 became the Girnar Reserve Wildlife Sanctuary. It covers some 179 square kilometres and has vegetation which has been described as Southern tropical dry deciduous forest with large tracts of teak. It is home to numerous birds and mammals including lions. This is well known. What is little known is the presence of many ancient monuments in the forests there.[v] Three of them are briefly described here: (a) The most impressive is the Buddhist stupa of Bhoria, also called Lakha Medi stupa. The stupa is built on a rocky knoll, about seven kilometres to the east of Junagadh, in a delightfully secluded valley from where the rugged Girnar and the Datar hill, the highest after Girnar, can be seen. The valley is visited by those who come to pay obeisance at the Bhor Devi temple there. This colossal stupa in the jungle adjacent to the temple was excavated in 1889 by J.M. Campbell. The massive cutting that Campbell left behind at Lakha Medi as a consequence of his excavations at the stupa can still be seen there and has survived practically intact because it is in a forested tract. (b)

Jogimara cave inscription in a Ramgarh hill rock shelter

Rathakot, like Lakha Medi, is a stupa site and is located near what is locally called the Jina Baba ki Samadhi. The can be approached from the Jambudi forest station (Dungar north range) and is not far from the Hasnapur dam area. Unlike the Lakha Medi stupa, the Rathakot stupa is more or less intact. It appears to have been made of a combination of large bricks and some stone. (c) Intawa is a Buddhist monastic site of the early centuries CE which is situated in the midst of a thick jungle on a hill above Bhavnath A steep ascent leads to this ancient site which was excavated by G.V. Achaya in 1949. The foundations of two vihara (monastery) complexes were revealed here, made of large bricks. Excavation on the eastern outer structure uncovered six rooms (3 m x 3m each) with a verandah in front. A big room which contained two water closets, a prayer room and what appears to be a store room were also excavated. The artefacts range from a mortar stone and weights to earthen lamps, water pots and coins. Intawa also yielded a round clay sealing. With a chaitya symbol in the centre, the legend shows that this seal belonged to the Bhikshu samgha of the vihara of Maharaja Rudrasena. Considering its name, it is likely that the vihara was built by the king who is likely to have been Rudrasena I (199-222 CE). This, incidentally, is an early historic site where, thanks to the clay sealing, a firm date can be assigned to it. There are other structures and sculptures as well inside the sanctuary which include an ancient bricklined well at Surajkund as also concentrations of hero stones at Pathwakotha and near Ramnath Mahadev mandir.

Today, Girnar is a famous pilgrim centre of Jain and Hindu worship. However, as the remains describe above underline, much before this, it was sacred to the Buddhists and possibly, the earliest circuit of worship in and around the great Girnar was a Buddhist one.

Hero stones in Ramnath mandir area



Painted rock shelter at Bhimbetka in the midst of the forest

In fact, the Girnar 'parikrama' which starts annually from November onwards has four traditional halting places: Bhavnath, Jina Baba ki Madi, Bhordevi and Surajkund. All four are marked by ancient relics, three of them being of Buddhist lineage. These monumental ruins that dot the cultural landscape have survived well because they are located in the forested tracts of Girnar.

Similar ancient monuments are also known to dot other forest areas in this district. There are Buddhist monuments, for instance, in the adjacent Gir National Park and Wildlife Sanctuary The Hadmatiya stupa belonging to the 2nd century CE is in the forests, very close to the village of that name in the Talala Taluka. Like the Girnar stupas, this is made of burnt bricks, with an inner filling of stones.

Temples in Polo forest, Sabarkantha

Polo forest (a name that derives from 'pol' or gate) is spread over some 400 square kms in the Sabarkantha district and has impressive ruins of many medieval monuments. There are 15th century Hindu and Jaina temples there. Several of the Jain temples form a cluster known as Lakhena na Dera and have pillars and carvings similar to the Mount Abu temples. There are a number of Shiva temples including the Sarneshwar shrine, which is a three-storeyed temple with a fortification wall and gates.

MADHYA PRADESH

Prehistoric rock shelters in Vindhya and Satpura hills

This state is home to spectacular painted rock shelters going back to prehistoric times and continuing into the historic period.[vi] The Bhimbetka rock shelters located in the Raisen district is a UNESCO World Heritage site, with over 750 rock shelters. Situated

at the southern edge of the Vindhya hills, they are sheltered by forests in large parts. Sometimes, these stand out above the tree line and others are found in deep gorges around streams. It is the vegetation that has protected them. To the south of the Narmada river, almost parallel to the Vindhya hills stands the long chain of the Satpura hills. The highest part of this range is called the Mahadeo hills and on an elevated tableland between the high peaks lies the Panchmarhi cantonment town. There are many rock art sites in its vicinity and most of the hills have now been declared a national nature reserve and sanctuary. These are in forested areas and often located at considerable heights. The earliest rock pictures here compare to the earliest paintings in the Vindhya hills with the most numerous ones belonging to historic times – with weapons and tools, horse equipment, and armouries of the riders and warriors. It is through the survival of paintings in rock shelters like these – Bhimbetka and Panchmarhi being two examples of scores of other places - that we know of India's first artists being prehistoric hunter-gatherers. There is nothing tentative or gradual about the beginnings of Indian art here. Hills like these have yielded hundreds of pictures made from slugs of coloured earth, all painted on the walls and ceilings of stunningly shaped rock shelters. The rocks provided a natural canvas and the forests around them have ensured that the pictures made with local pigments can still be seen today.

Historic caves, sculpture and fort in Bandavgarh National Park

This national park, marked by over thirty hills and overgrown with jungle, is home to many historical monuments.[vii] Supreme among them is the medieval fort of Bandhavgarh, the pride of the old Rewa State, which is located at the centre of the Bandhavgarh National Park. It was historically considered to be virtually impregnable and survived many sieges and one of these reportedly lasted for twelve years. This is because the defenders lived off crops grown on the hilltop. Around the fort are numerous sculptures, of which the most famous is a gigantic sleeping Vishnu in his 'shesha shaiya' form, with hooded serpents adorning the deity. At the same time, there are a number of historical layers antedating the fort. In the second century CE, Magha rulers and princes from Kausambi in present day Uttar Pradesh, their ministers, merchants, and others excavated over fifty shelters from the soft sandstone rock on the lower slopes of Bandhavgarh and other hills. One inscription describes the cave-shelter as sarthika lana: one made for traders from a merchant caravan. Perennial streams provided water, and traders or those whom they hired hunted animals for food. One of the shelters on the Ganesh Pahar shows animals in relief and an inscription terms the cave as a mrgaya saila. These cave-shelters have remained practically intact because they are located in a national park.

Buddhist Stupas and epigraphs of Emperor Ashoka in the Rehti range of the Sehore Forest Division: Within the tropical dry deciduous mixed forest of the Rehti range, there is a range of rock shelters and other historic remains.[viii] There are paintings in these rock shelters along with edicts of the third century BCE Maurya Emperor Ashoka. The area is known in archaeological literature as Panguraria while the Saru-Maru cave (or

Buddhist stupa inside Rehti forest

'gufa) is what the edict- bearing shelter is locally called, in the midst of jungle foliage. Ashoka directly addressed the local governor, a Kumara called Samva and we learn that the emperor was journeying to reach a Buddhist monastery 'Upunita-vihara in Manema desha'. Apart from these epigraphs and paintings, there are a large number of stupas and monastic cells spread across the hillside. A stunning architectural remnant from Panguraria is a stone umbrella and an umbrella shaft that supported it, belonging to Maurya times. It is entirely possible that this was the very Upunita- vihara mentioned by Ashoka. The Panguraria complex was discovered in the 1970s in the middle of the forest which ensured its durability.

WEST BENGAL

The Sundarbans National Park which is part of the Sundarbans on the Ganga delta is densely covered by mangrove forests and is one of the largest reserves for the Bengal Tiger. This area is known to yield archaeological and sculptural remains. Sajnekhali is marked by sculptural remains while from places like Alasdvipa and Chulkati, remains of hearths, burnt earth, structural remains and ring wells were documented. In the Dhonchi island reserve forest, extensive forest remains of hearths have been reported by fishermen. Their collection contains potsherds, ceramics of different type, both decorated or otherwise, terracotta objects, terracotta three-tiered stupa-like votive objects, beads

of semi-precious stones, polished stone tools, stone sculptural relics, bone tools, clay sealings and a terracotta slab with many impressions of legends for making inscribed seals.[ix] A Times of India report of 2016 noted that:[x] 'the artefacts collected from the Dhonchi and Bijiara forests in the tiger reserve area of the Sundarbans over the last 22 years include several terracotta human and animal figurines, dating back to the early centuries of the Christian era and earlier, terracotta lumps bearing impressions of seals dating back to the early historic period, terracotta rattles, roys and pendants, ivory gamesmen, miniature pots, semi-precious stone beads, net sinkers, and potsherds. Biswajit Sahoo, according to the report, has collected more than 15,000 artefacts and continues to collect more during fishing trips to the different islands of the Sundarbans core area. Sahoo's collection includes a large number of black, red, and grey earthenware sherds and among the stand out artefacts are carinated handis, bowls, miniature pots, and spouted vessels. A large number of skeletons, bone fragments, skulls, and teeth of wild, domesticated, and aquatic animals are also in Sahoo's collection.' The archaeological significance of parts of the world's largest tide delta has been recovered because it is a mangrove forest area.

In concluding this section, it is pertinent to point out the many instances of similar remains being poorly preserved in areas outside forested zones. The state of rock art in the Kumaon Himalayas is a case in point. There are some sixty-eight sites of rock art there, where ten sites bear impressions of colour and paintings while the remaining sites are marked by deliberated excavated cups/cupules of small or big sizes. Hundreds of rock shelters in the vicinity of Almora and other localities that bear paintings and cup-marks have been quarried for roofing materials and pebbles.[xi] Rocks bearing deep cup-marks have also been removed and transported to villages for day-to-day pounding purposes. The same story marks the presence of kos-minars which were medieval distance markers. The kos-minar in the Delhi Zoological Park is well preserved but those at Mujesar, Faridabad and at Shahabad, Kurukshetra are untraceable. The state of

Dholavira Reservoir

Ashoka's inscriptions also bears this out. While the Panguraria rock edicts in the Rehti forest have survived well, the minor rock edicts of Ashoka in Delhi, at Srinivaspuri, are no longer legible, partly because the protected monument was for years a defecation site. Details can be multiplied but the point that is worth remembering is this: monuments and sites will survive well if their surrounding landscapes protect them. Unlike a great deal of our rich heritage which remains vulnerable and compromised because of 'development' across India, thanks to the wealth of forests, there are large swathes where these are better protected. Forests, to put it another way, have functioned as natural guardians of India's archaeological heritage.

3. Awareness of the Archaeological Significance of Forested tracts

Generally speaking, in India, there is little awareness of the archaeological significance of forests and sanctuaries. There are various reasons for this.

First, to most people, a country's natural heritage and architectural heritage seem to be completely different spheres. Those interested in trees and wildlife seem to inhabit a world entirely different from those who are concerned with monuments. Consequently, this fractured vision obscures how these two spheres are linked to each other. Secondly, monumental remains in and around cities and villages – in the form of epigraphs and sculpture, temples and churches, ancient settlements and medieval forts, water reservoirs and city fortifications - are visible to inhabitants and also pilgrims. In many cases, where they are or nationally or state protected lists, they are also visited by tourists. On the other hand, forests are visited by those interested in wildlife and biodiversity. Identifying trees and sighting animals is what naturalists do and naturally, the ways in which forests have provided shelter to archaeological relics and monuments remains little known.

Finally, the government has different cadres and ministries looking after forests and monuments. There is no synergy between them - with the Ministry of Environment, Forest and Climate Change and the Ministry of Culture functioning in separate silos. Panguraria Ashokan edicts in rock shelter inside Rehti forest

The situation in India, it is necessary to point out, is qualitatively different from many other parts of the world, where forestry and archaeological resources represent an important cultural resource management issue that has been integrated into political and legal agendas on a regular basis. Canada is an example of this, with its provinces having created legal and policy frameworks for management of cultural heritage in the context of forests. The Forest Management Planning Manual in Ontario, for instance, contains the requirement for the collection and consideration of Aboriginal values information to be considered in the preparation of forest management plans.[xii] Additionally, the Ontario Ministry of Natural Resources/Sustainable Forest License Holders has provisions for archaeological potential area mapping and archaeological assessment reports. In

British Columbia, the Forest Practices Code which carries the force of legislated law, aims to ensure that forest practices are well-planned and incorporate values relating to cultural heritage resources.[xiii] There is an obligation to conduct an Archaeological Impact Assessment and actions necessary to manage and conserve archaeological sites. The Code recognizes that development would take place but specifies ways to deal with cultural resources in such areas, including ways to mitigate any possible disturbance to archaeological sites.

Similarly, preserving and enhancing the social and cultural dimensions of forests is well recognized in Europe. The British Isles woodland cover, compared to most countries in Europe, is far less. However, the UK Forestry Standard that represents the governments approach to sustainable forestry, recognizes that woodlands, particularly those on ancient woodland sites, can be of historic value.[xiv] Historic features include internal and external banks and ditches, charcoal hearths and saw-pits as also veteran trees and pollarded trees. Both natural and man-made features, thus, are included in in the description of the historic environment of forests there. Additionally, the UK Forestry Standard considers it important that all significant heritage features, and not just designated ones, are protected. Very specifically, it speaks of managing forests in a way that the historical character and cultural values of the landscape are taken into account: "The primary responsibility for land managers in relation to historic features is to ensure they are conserved and not accidentally or unknowingly damaged. This will involve an appropriate evaluation of the site, and an assessment of features of importance – whether scheduled or not – as part of the forest management plan. A range of measures can then be set out in the operational plan to ensure the features are protected, and these will extend to a reasonable area of their settings."[xv]

Sweden is another example of an archaeologically sensitive approach to forests. In 1991, management of the cultural heritage was taken into the Forestry Act. From 1995 onwards inventory projects on 'Forest & History' started. In 1999, its parliament adopted fifteen national environmental quality objects of which interim target 3 in environmental quality objective 'Sustainable Forests' deals with cultural heritage. It reads as follows: 'By 2010 forest land will be managed in such a way as to avoid damage to ancient monuments and to ensure that damage to other known valuable cultural remains is negligible.'

4. Suggestions for a more sensitive policy:

In India, it is urgent that an implementable policy is devised for identifying and protecting archaeological sites and monuments in forested areas. In the first instance, the following are recommended:

Communication between archaeology and forestry must be established in order to facilitate a direct form of contact and consultation between archaeologists and foresters.

In the short term, there should be archaeological surveys of forest reserves and sanctuaries. This should be done by trained archaeologists under the guidance of foresters who know the forests. Local people should also be involved in such surveys since they are usually aware of ancient relics in such zones. The purpose of these surveys should be to generate an archaeological assessment which summarizes the current state of knowledge for the forest area or designated sanctuary, incorporate local and site type information and produce data which allows maps to be created. Creating a data base of archaeological sites and monuments in forests would help a proper assessment of the situation and would facilitate management policies in the medium term. The lists that result from this work should be distributed to all those who manage and control forests and forestry activities. Updates of the archaeological overview assessment should be prepared every ten years.

The monument lists prepared by the ASI, State Departments and Union Territories must add a column that mentions if the concerned monument is in a forested area.
In the case of compensatory afforestation through CAMPA (Compensatory Afforestation Fund Management and Planning Authority), there should be a requirement that this poses no danger to archaeological sites within the plantation area.

In conclusion, the proposed project is a new kind of approach to forests, where the focus will be to flesh out the archaeology of such landscapes. At the same time, this research will hopefully underline how a wide range of issues related to academic scholarship on the history of forests can provide for better policy making.

ENDNOTES

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