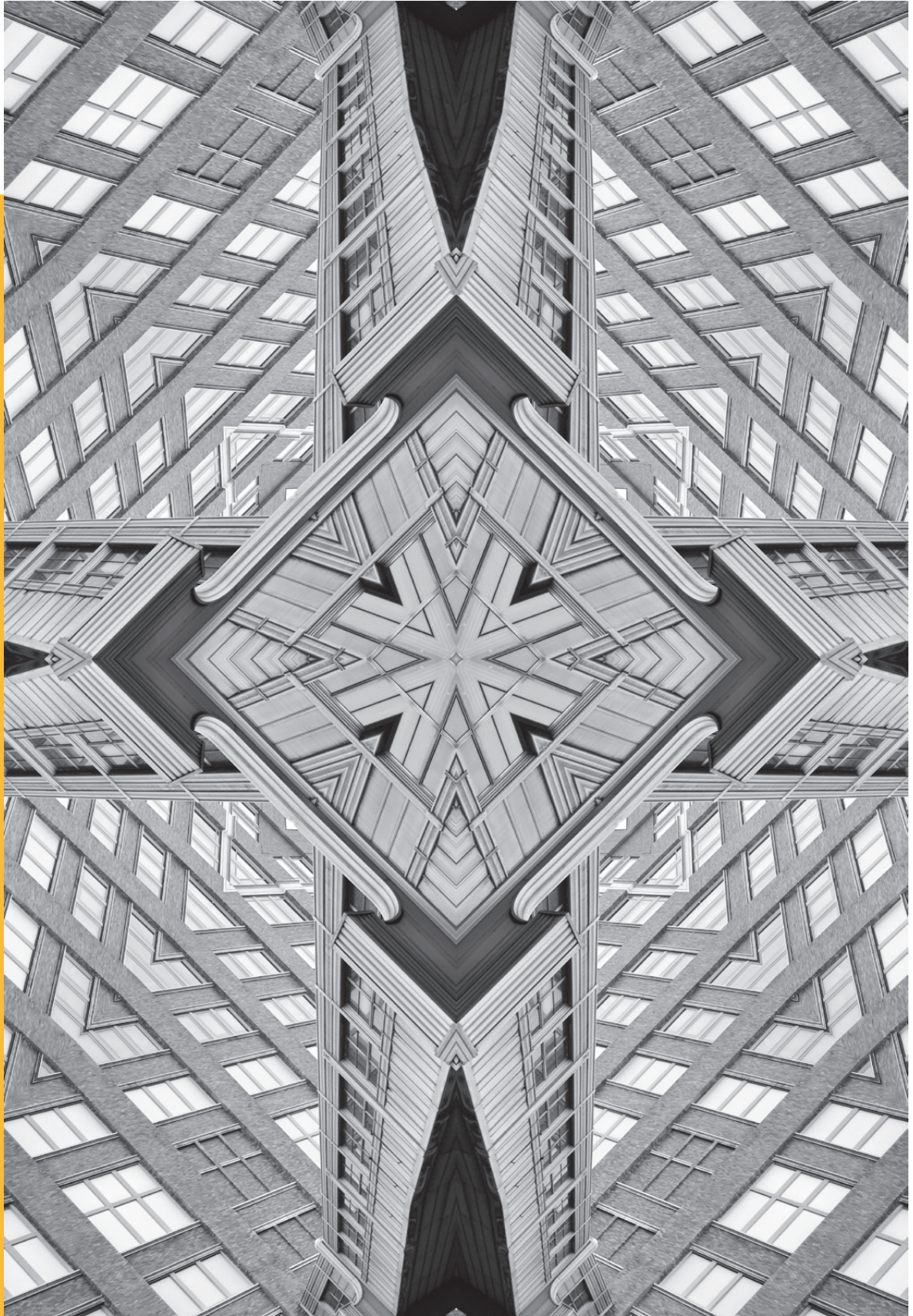


Occasional Paper



ISSUE NO. 458 DECEMBER 2024

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The Role of Digitalisation in Heritage Conservation

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Abstract

Digital realities have become analogous to lived experiences, easing governance and systematising processes. They have also helped in the reimagination of approaches to heritage conservation, making diverse cultures more accessible and easier to engage with. Heritage, once regarded as a “national” public good, has evolved into a commodity with immense tourism and economic potential. India, in its quest to exploit this potential, has implemented policies and schemes that have prioritised heritage conservation to boost tourist footfalls, often overlooking foundational challenges like inadequate documentation and record-keeping. This paper examines the concept of heritage, highlights the challenges in heritage management and conservation in India, evaluates global initiatives leveraging digital technologies for the task, and recommends collaborative and technology-led initiatives to preserve India’s past.

Heritage tours and storytelling are central to travel itineraries, contributing significant amounts to tourism revenues.¹ India, with an estimated 30,000 heritage sites in its urban areas alone, holds immense potential to harness the soft power of its ancient civilisation.^{2,3} Indeed, countries across the world are leveraging indigenous cultures as tools for soft power. Growing populism and the nostalgic harking back to a distilled past contribute to digital permanency by generating e-footprints in the conservation process.⁴ The evocation of nostalgia, culture, and heritage and the subsequent digital practices around their conservation call for mainstream policy attention. Digital archiving enhances global engagement and accessibility, presenting heritage as an effective tool for soft diplomacy.⁵

Cultural tourism also contributes to a country's gross domestic product (GDP). According to consulting firm KPMG's 2024 report on heritage tourism, the global heritage tourism market reached US\$587.1 billion in 2023 and is estimated to touch US\$813 billion by 2032, with a compound annual growth rate (CAGR) of 3.69 percent from 2024 to 2032.⁶ In India, the post-COVID-19 recovery in the tourism industry has shown steady progress.⁷ Table 1 shows how revenue generated from ticket sales at heritage sites maintained by the Archaeological Survey of India (ASI) are steadily climbing to their pre-pandemic levels.

Table 1
Ticket Revenues at ASI Sites

Financial Year	INR (billion)
2017-2018	2.7
2018-2019	3.17
2019-2020	3.36
2020-2021	0.48
2021-2022	1.01
2022-2023	2.53

Source: KPMG Heritage Tourism Report, 2024.⁸

To grow a US\$1-trillion tourism economy by 2047, the Indian government aims to attract 100 million international tourists annually by 2047, the 100th year of independence.⁹ Achieving this goal requires innovative urban heritage planning and infrastructural development in Indian cities. However, current heritage conservation schemes prioritise economic gain over preserving evolutionary markers of emotional, cultural, and national identity.

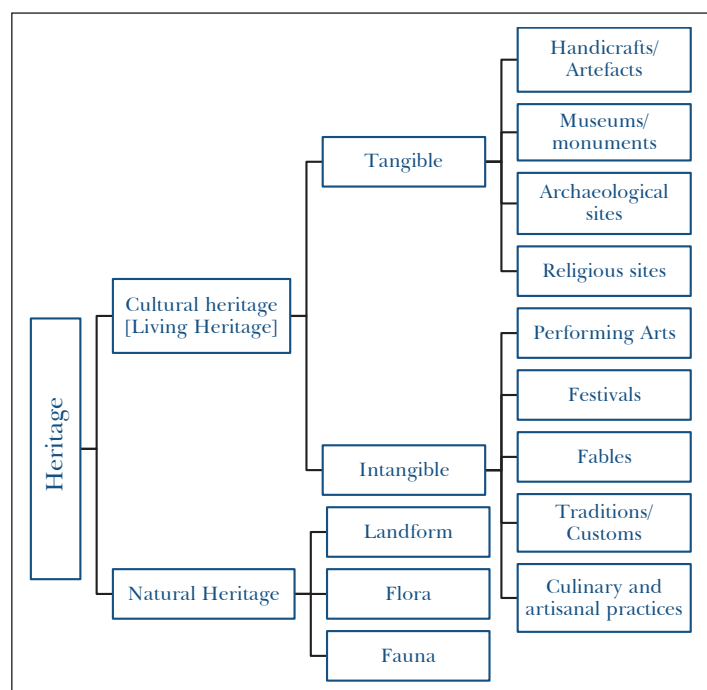
This paper discusses the transformation of heritage as a public good, expounds the concept of the “heritage-industrial complex”, and identifies the challenges to digital heritage preservation. Studying the experiences of certain other countries, it underscores the role of digital technologies in preserving and systematising India’s heritage conservation efforts. It argues that India must expand its focus from the mere economic exploitation of the country’s rich heritage to tourism-driven infrastructural fixes. Initiatives must address fundamental challenges such as poor documentation, financial constraints, database creation and management, and public participation, to preserve and promote the significant and intrinsic socio-economical, cultural, emotional, historical, and national characteristics of India’s heritage.

“Current heritage conservation schemes prioritise economic gain over preserving evolutionary markers of emotional, cultural, and national identity.”

Emergence of the ‘Heritage Boom’

The word ‘heritage’ is equivocal,^{10,a} complicated, and controversial. It is often used to describe both tangible and intangible pasts that evoke intergenerational memory. Following the French Revolution, heritage evolved from a monarchical property to a public good, and thus became integral to the nationalisation process.¹¹ While the Venice Charter of 1964^{12,b} initially limited heritage to monuments and archaeological sites, the scope broadened in the late 20th century through the Protection of World Cultural and Natural Heritage Convention (1972),¹³ the Declaration of Amsterdam (1975),¹⁴ and later the FARO Convention (2011).¹⁵ Today, over 40 such international and regional accords exist,¹⁶ and heritage now includes buildings, gardens, urban and rural precincts, natural sites (reefs, mountains, ecosystems), and intangible cultural practices.¹⁷

Figure 1
Types of Heritage



Source: KPMG Heritage Tourism Report, 2024.¹⁸

a The term comes from French ‘patrimoines’ when royal property was appropriated as “national heritage” in eighteenth-century France. See: Yujie Zhu and Christina Maags, *Heritage Politics in China: The Power of the Past* (Routledge: 2020), pp 1-23

b Pioneering International Charter for the Conservation and Preservation of Monuments and Sites.

Emergence of the 'Heritage Boom'

The “heritage boom” that followed the Second World War was driven by increased middle-class insecurity, with nostalgia fuelling the development of mass tourism and the commercialisation of the past.¹⁹ Today, ‘heritage’ is defined as a negotiated narrative of the past, “tailored to present-day purposes,”²⁰ distinct from the study of history. National heritage is part of the social fabric²¹ and is essential in shaping any imagined community.²² Heritage conservation thus serves as a tool for power, nation-building, and the creation of a national narrative that supports contemporary political goals.^c For example, the former Shah of Iran celebrated Persepolis as the birthplace of the Iranian state, and Nazi Germany promoted cultural links to ancient India.^{23,d}

c This informs why governments use heritage to direct and control how the past is interpreted through the strategic site selection, practices, and events, creating a national heritage narrative that mirrors the historical significance of the nation. See: Yujie Zhu and Christina Maags, *Heritage Politics in China: The Power of the Past* (Routledge: 2020), pp 1-23

d Conversely, countries also highlight their past to contrast it with the present. For instance, between 1898 and 1901, colonial powers in Burma, Vietnam, Cambodia, and the East Indies set up local archaeological groups to document and restore sites like Angkor Wat, Borobudur, and Pagan. See: Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism*.

The Heritage-Industrial Complex and Digitalisation

The heritage-industrial complex is reimagined from the ‘iron triangle’ of the military-industrial complex, a concept popularised by former US President Dwight D. Eisenhower.^{24,25} In heritage, a similar “iron triangle” forms between government, legislators, and companies, each with different normative dynamics. While international insecurity drives the military-industrial complex, heritage selection and presentation are shaped by internal insecurities and national image concerns. The heritage-industrial complex thus represents a specialised interaction between tourism and culture. This specialised discourse on conservation and heritage often loses its original context, enabling public participation through consumption. The stakeholder matrix has expanded, with increased collaboration between tourism and culture.²⁶ Local communities play a key role in defining and facilitating this interaction, and tourists increasingly contribute to shaping heritage through their experiences.²⁷

The cyberspace dimension has expanded the public beyond geographical territory. The United Nations Educational, Scientific and Cultural Organization (UNESCO) considers world heritage as “an imagined community”.^{28,29} The global public often feels nostalgic for a past they may never have shared,³⁰ making these narratives more selective ideological claims³¹ than purely historical facts.^e While heritage conservation once focused on protecting tangible cultural elements from “the market,” it is now viewed, quite ironically, as a key driver of economic development.³²

The digitalisation of heritage can further globalise the creation and co-option of narratives, serving as soft power in two ways: a) by providing a shared historical context that is “positive”^f and b) by implying a similar value system that the heritage represents. In this regard, heritage has evolved from being a transformative public good to a signifier. Rather than reshaping identity, countries now use heritage as a tool for protection, preserving it to reinforce the credibility of national narratives both in physical and virtual spaces. Therefore, the increasing reliance on digital preservation must be considered within the discourse around heritage conservation.

e The United Nations World Tourism Organisation’s (UNWTO) 22nd General Assembly session defined cultural tourism as a type of tourist engagement in which the visitor’s core motive is to “learn, discover, experience, and consume” the tangible and intangible products and attractions at the destination. The attractions/products comprise spiritual and emotional features of a society expressed in “arts and architecture, historical and cultural heritage, culinary heritage, literature, music, creative industries and the living cultures with their lifestyles, value systems, beliefs and traditions. See: *UNWTO Report on Tourism and Culture Synergies*.

f Positive context represents heritage of a nation-state as a “good” entity. For example, the Memorial and Museum Auschwitz-Birkenau in Germany and the Jallianwala Bagh Memorial in Punjab, India, are reparative reminders of the Holocaust and the Jallianwala Bagh massacre, respectively.

The Heritage-Industrial Complex and Digitalisation

The World Intellectual Property Organization (WIPO) introduced the concept of digital preservation in 1996 as a set of tools and management activities to ensure continuous access to digital materials.³³ In 2003, UNESCO's Charter on the Preservation of Digital Heritage defined "digital preservation" as the use of digital technologies to record, preserve and access the cultural and historical values of monumental buildings and sites.³⁴

The digital cultural heritage procedures include three stages: internal storage, network sharing, and content interaction, further divided into digital documentation, research management, and presentation.³⁵ Advanced techniques such as morphological modelling, early warning systems, archiving with tools like Heritage Building Information Modelling (HBIM), Augmented Reality (AR), Virtual Reality (VR), Light Detection and Ranging (LiDAR) and digital twins are increasingly helping countries conserve urban built heritage with improved public participation.³⁶ Italy, China, and Spain are leaders in research on the digital preservation of built heritage.³⁷

The scope for digital intervention in the heritage heavily relies on the level of end-user engagement envisioned for the site.³⁸ Technology interventions in specialised areas, including the act and process of conservation planning, public engagement via tools like AR and VR, and end-to-end ticketing,³⁹ bring inclusivity and accessibility under the microscope, especially given the significant digital divide in India.⁴⁰ Whether digital tools enhance or hinder community engagement requires further research, as their effectiveness hinges on political will and bureaucratic clarity on conservation mandates, which, in the Indian context, remain limited and ambiguous.

India's Heritage Conservation Landscape

India's built heritage is managed by multiple agencies, each with specific mandates and jurisdictions. The ASI oversees 3,691 monuments, sites, and historical and archaeological relics across the country, including the 22 UNESCO World Heritage sites.⁴¹ India's states have archaeological departments and museums governing approximately 5,000 sites.⁴² However, conservation initiatives by state agencies have been sporadic and often remain uncaptured in the central databases.⁴³ Some metropolitan cities, such as New Delhi and Mumbai, have their own conservation committees due to the density of sites under municipal jurisdictions. Approximately 450,000 heritage temples fall under the ambit of Temple Trusts and Committees.⁴⁴ The Central Public Works Department (CPWD) of the Ministry of Housing and Urban Affairs (MoHUA), the Indian National Trust for Art and Cultural Heritage's (INTACH) Charter of Unprotected Heritage in India, state Public Works Departments (PWDs), Urban Local Bodies (ULBs), and Indian Railways, also manage several heritage buildings, many of which remain unprotected and unlisted.⁴⁵

Due to inadequate infrastructure and funding, many heritage structures lack formal protection systems. Efforts by NGOs like INTACH, the Aga Khan Trust for Culture (AKTC), the International Council on Monuments and Sites (ICOMOS) and government organisations like the Indira Gandhi National Centre for the Arts (IGNCA) and the National Mission on Monuments and Antiquities (NMMA), have worked to compile listings that provide approximations of these sites. The ASI and the Indian Space Research Organisation (ISRO) work on a National GIS Database for monuments and sites.⁴⁶ Bhuvan, an ISRO web-based utility that compiles geospatial data, offers detailed satellite imagery but remains unvalidated and unreliable.⁴⁷

Cities like Mumbai have had Heritage Conservation Committees for decades, with most urban heritage sites listed and protected from redevelopment.⁴⁸ However, these committees often fail to engage with these structures after creating such lists. The Mumbai Heritage Conservation Committee (MHCC), comprising experts across all relevant domains, including conservation architects, academics, and municipal officers,⁴⁹ is primarily responsible for approving individual renovation or conservation applications, focusing primarily on preserving the facades of buildings. While the committee often rejects applications that do not meet its specifications, private sector participation lacks incentive due to the competitive real estate market and the absence of compensation for conservation efforts. As a result, the committee is often

India's Heritage Conservation Landscape

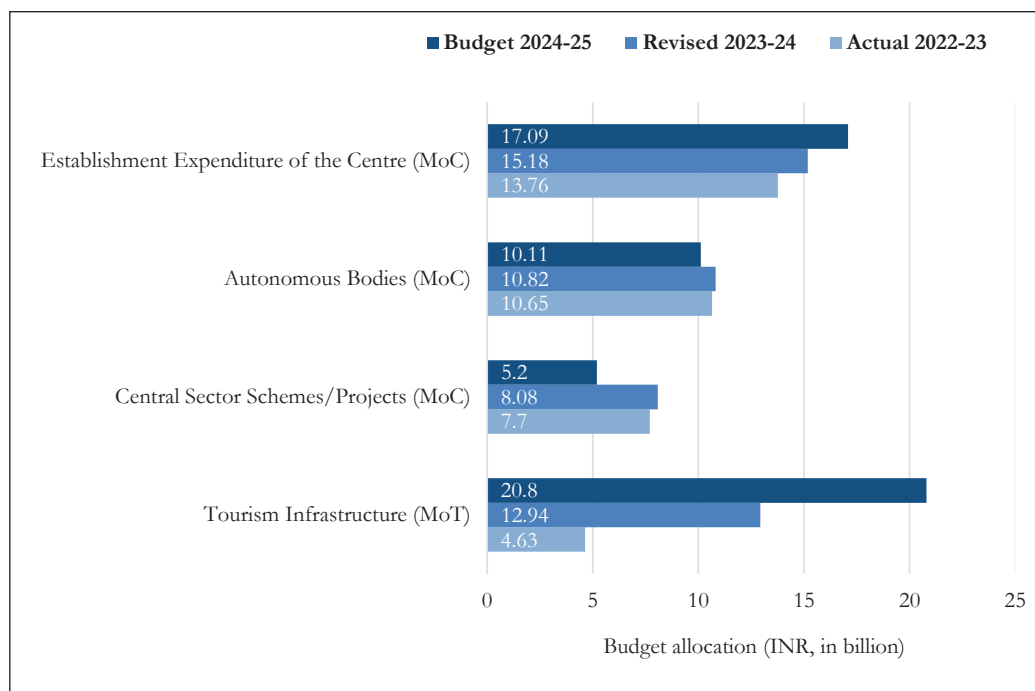
perceived as a hurdle rather than an opportunity. India's heritage conservation system treats the public as passive, with little proactive engagement, hindering innovation and dialogue with the communities. Additionally, heritage sites are governed by different departments; for instance, eight properties in Mumbai are under the CPWD's jurisdiction.⁵⁰

Implemented from 2015 to 2019, the Heritage City Development and Augmentation Yojana (HRIDAY) focused on 12 cities: Ajmer, Amravati, Amritsar, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi, Velankanni, and Warangal. Funds under HRIDAY were disbursed to cities in lump sums rather than gradually.⁵¹ The scheme aimed to achieve the "development of core heritage-linked civic infrastructure projects which include revitalisation of urban infrastructure for areas around heritage, religious, cultural and tourism assets of the cities,"⁵² dissonance between central and local government prerogatives and approvals caused significant delays. However, its effectiveness was hindered by challenges, including poor interdepartmental collaboration, conflicting central and local government priorities, lack of institutional arrangement and due diligence, irrational timelines, and high cost and time overruns.

In Dwarka and Mathura, these constraints led to quick fixes without considering the crucial local and traditional crafts for restoration works, giving "incidental and largely unplanned" benefits. Frequent conflicts between the CPWD and state departments over budget allocations, coupled with tight timelines, restricted the employment of local or technical expertise.^{53,54}

HRIDAY has been subsumed⁵⁵ under the Pilgrimage Rejuvenation and Spiritual Heritage Augmentation Drive (PRASHAD) and Swadesh Bharat schemes, which focus on religious tourist hotspots.^{56,57} HRIDAY and PRASHAD fall under the Adarsh Smarak⁵⁸ scheme, launched by the Ministry of Culture in 2014, which chose 153 sites from ASI's portfolio for the provision of tourist facilities like Wi-Fi, security, interpretation centres, and signage.⁵⁹ However, this tourism-centric approach has ignored the fundamental challenges in conservation, including documentation, verification, workforce improvement and site management.⁶⁰ Rather than holistic cultural preservation and promotion as the ultimate goal, heritage conservation has become a subset of the tourism industry.

Figure 2 Budget Allocations for Ministries of Tourism and Culture, India



Source: *Open Budgets India*.^{61,62}

Figure 2 highlights a marked rise in budget allocations for tourism infrastructure, while funding for central schemes supporting libraries, museums, archives, and performing arts Akademis⁶³ has stagnated or declined over the past three years. This decline affects allocations for Central Sector Schemes and autonomous bodies. Persistent challenges, including poor documentation, overlapping jurisdictions, ambiguous mandates, and the lack of community involvement, remain unmitigated. Thus, the survival of India's heritage runs the risk of being entirely reliant on its commercial potential.

Successful large-scale conservation efforts globally are characterised by two key features. The first is community involvement in project planning, which addresses practical concerns such as transport bottlenecks and access to amenities like potable water and toilets. Engaging community networks also facilitates access to local resources, preserves surrounding intangible aspects, and ensures greater socio-economic benefits to the local communities.^{64,65} The second feature includes mapping and archiving existing structures for digital preservation as well as integrity assessment contributing to easier documentation and a larger digital footprint of public histories. Both features directly impact the long-term sustainability of the development plans. Table 2 lists the digital tools most commonly used in built heritage conservation.

Table 2
Commonly Used Digital Tools in Heritage Conservation

Digital technology	Definition
Satellite and aerial imagery and photography	Accurate land mapping and making landscape features understandable on regional, continental, and global scales.
Geographic Information System (GIS) mapping	GIS relies on computer-based technology to produce, organise and analyse spatial information in map form. It encompasses database management, mapping, image processing, and statistical analysis tools, enabling users to analyse statistical data in relation to topographic and geographic features and administrative boundaries.
Photogrammetry	It includes techniques for interpreting, measuring, and modelling objects from acquired images, providing geometric details, surface texture of the recorded objects and giving dense and textured 3D-coloured point clouds.
Laser scanning	Laser scanning rapidly acquires data from targets measuring distance in regular networks without requiring a reflector. A laser scanner has a field of view similar to that of human eyes, operating on two elements: distance and angle. Controlled by computers and integrated with a Global Positioning System, it has various applications in cultural heritage documentation, from small objects to large complex buildings.

Digitised Heritage Conservation and Inventory Management: Global and Indian Examples

Digital technology	Definition
Building information modelling (BIM)	A 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insights and tools to efficiently plan, design, construct, and manage buildings and infrastructure.
3D modelling, Augmented Reality (AR) and Virtual Reality (VR)	3D modelling produces a digital representation of any object or surface using a particular software. AR and VR can reconstruct historical buildings and monuments in the previous era, giving users a “real environment” experience.

Source: *Towards a Systematic Approach to Digital Technologies for Heritage Conservation*.⁶⁶

Following specific norms and practices, adapted technologies ensure unique and context-dependent treatment of cultural and built heritage. Conservation and reconstruction require interdisciplinary expertise from architecture, technology, chemistry, biology, history, and archaeology, among many other disciplines. Thus, digitisation is an active resource only with meticulous instruction and database planning, not retrofitted as a tokenistic measure.

Disaster Prevention and Conservation Planning

BIM, HBIM,⁶⁷ 3-D modelling, GIS, and photogrammetry are standard digital tools for conservation, providing planners with detailed analysis and field studies while facilitating essential audits for preservation efforts. By looking at erosion, ruin patterns, and surrounding occupation, these tools help develop effective strategies for future management, tourist engagement, restoration, transit-oriented development, and a historic urban landscape (HUL).

In India, Aga Khan Trust for Culture (AKTC), Tata Trusts, and ASI partnered to restore Delhi's Humayun's Tomb and Nizamuddin Basti, with public participation at the core of the conservation activity.⁶⁸ This large-scale project meticulously mapped and uploaded every house and stone to a GIS database. These interventions led to a 1,000-percent increase in footfall, the engagement of local artisans, the restoration of over 45 monuments, the creation of 150 acres of green space, and direct socio-economic benefits for 15,000 people.⁶⁹

AKTC was also commissioned by the government of Pakistan's Punjab to aid the conservation efforts for the Walled City of Lahore (WCLA) under the World Bank-funded Punjab Municipal Services Improvement Project (PMSIP).⁷⁰ The project trained young unemployed residents to use computers and transcribe hand measurements into CAD for documenting and archiving the area, achieving two key purposes. First, it mapped the existing conditions of buildings and bazaars, forming the basis for streetscape design proposals developed collaboratively with commercial property owners, residents, and other stakeholders. Second, it created opportunities for interacting with local communities, cultivating trust and confidence among citizens and merchants before conducting a more extensive pilot survey. Some of the interns who volunteered for the project were later employed by WCLA and AKTC.

GIS played a crucial role in identifying Special Value Zones in the project's 20-year Master Conservation and Redevelopment Plan (MCRP), allowing the planners to better understand the mobility patterns and link current circumstances to opportunities, occupations, and access to facilities.⁷¹ The MCRP made a spatially integrated development plan of water supply, wastewater disposal, storm-water drainage, electricity, telecommunication and natural gas infrastructures, aligned with the topographic and historic

Disaster Prevention and Conservation Planning

characteristics of Lahore. These interventions led to a 12-percent increase in visitors in 2018 (29,744) compared to 2017 (26,468), including a 17-percent rise in foreign visitors.⁷² A World Bank evaluation report cited high cost-efficiency and improved business opportunities for 75 percent of survey respondents.⁷³

Heritage sites in disaster-prone zones are increasingly documented for archival purposes and resilience building.^{74,75} In Spain, unmanned aerial vehicle (UAV) photogrammetry and terrestrial laser scanners (TLS) were used for data collection, while HBIM facilitated structural analysis, visualisation, and documentation of the ancient structures at Cortijo del Fraile in Njar, Almera. Italy's Masonry Towers and Sassi landscape rely on a wireless sensor network (WSN) to monitor their structural health,⁷⁶ generating simulations and predictive models to mitigate threats and build capacity for prioritised restoration.⁷⁷

In Syria, Project Anqa uses a mountable 3D panoramic camera to document the damage and destruction of heritage sites, while also offering immersive experiences to visitors through CyArk.^{78,79} Japan, prone to natural calamities, has created extensive digital archives of its cultural heritage. After the 2011 Great East Japan Earthquake and tsunami destroyed about 30,000 historical documents in Miyagi Prefecture, the documents had already been digitalised, with over 70,000 electronic files saved.⁸⁰ Japan's Society 5.0 initiative aims to create digital twins of each heritage element, integrating cyberspace and physical space for reimagined structural business design and development.^{81,82}

Engagement with cultural heritage goes beyond aesthetic admiration; it involves creating knowledge, memories, and experiences. Public participation via co-creation and edutainment, driven by digital technology, sparks interest and creates a common ground for engagement with all age groups.^{83,84} Virtual tours of museums and heritage sites are becoming a norm, with many examples in India. For example, the Ministry of Culture's JATAN is a virtual museum builder with a GIS data collator and AI language translator for 10 museums across the country. The ASI has collaborated with CyARK to preserve the Gateway of India in Mumbai, while Rajasthan and Gujarat are developing virtual tours under Rajdharaa, a three-phase 3D-GIS documentation project of heritage sites and museums. The Ministry of Tourism also partnered with Google for Incredible India to create virtual walk-throughs of famous historical places.⁸⁵ While these initiatives are promising, community dialogue and gamification technologies as an extension to conservation are still novel concepts in India's heritage conservation space.

The Getty Conservation Institute and Dunhuang Academy have conserved the Mogao caves, a UNESCO World Heritage site⁸⁶ on the ancient Silk Road route in Dunhuang, China.⁸⁷ The caves' 25,000 square meters of mural art and over 2,000 painted sculptures have been digitally indexed to track new excavations, renovations, and motifs through the years, with accessibility in multiple languages.⁸⁸ The caves have been virtually reconstructed⁸⁹ in exceptional detail, allowing public access to these relics without exposing them to light, which would cause damage.^{90,91,92} Recently, Tencent Games has gamified two grottoes, offering a virtual yet real-life user experience.⁹³

The Netherlands is another pioneer in storytelling and co-creating heritage via public participation. The Rijksmuseum's Rijksstudio⁹⁴ makes high-quality images of its collections for free. Since its launch in 2012, it has attracted over 360,000 registered users, who have created 200,000 personal collections and downloaded over two million artworks.⁹⁵ The Ministry of Education, Culture and Science commissioned the Dutch Digital Heritage Network and International Heritage Cooperation Programme (IHCP) to digitise the Dutch National Archives and expand engagement with digital heritage through simplified, user-friendly offerings.⁹⁶ This strategy allows global and local audiences to access heritage materials that might otherwise be limited to physical archives. Furthermore, projects, such as Sharing Stories on Contested Histories,⁹⁷ allow the public to contribute historical data, photographs, and personal stories, which enriching archival content with lived experiences and adding new dimensions through diverse perspectives.⁹⁸

Data Management and Collection Systems

Accurate documentation and database management are critical for land-use planning, systemised ticketing, and site and project management. European countries use some of the most sophisticated data management systems for heritage and archival materials. Advanced geodatabases for their cultural heritage have mainly been structured around the INSPIRE Directive 2007,⁹⁹ which enhanced interoperability among member states and beyond European Union borders, creating unified access to and management of heritage data. A pioneering example of such expansion is Italy's SIGECweb,¹⁰⁰ which catalogues over 2.7 million records that comprise archaeological, architectural, historical, and intangible heritage assets.¹⁰¹

England's National Heritage List for England (NHLE)¹⁰² hosts a statutory list on a modern public platform with over 400,000 entries, supporting both text-based and map-based searches. It provides an open data hub with free downloadable GIS packages.¹⁰³ Portugal's ATLAS database integrates the country's immovable, movable, and intangible heritage, offering spatial data for geo-referenced searches of specific heritage sites and areas.¹⁰⁴ In 2015, the Czech Republic's National Heritage Institute (NHI) developed a geoportal with several map applications, a monument catalogue, legal protection statuses, and risk management information for sites endangered by natural or anthropogenic stimuli.¹⁰⁵ Meanwhile, the Aerial Photographic Archive for Archaeology in the Middle East (APAAME)¹⁰⁶ and Endangered Archaeology in the Middle East and North Africa (EAMENA)¹⁰⁷ use remote sensing to archive geodatabase of physically inaccessible areas.¹⁰⁸

There is immense scope for cross-border and public-private partnerships in heritage conservation, especially to enhance tourism opportunities. However, an overly tourism-centric approach risks reducing heritage to a mere commodity, neglecting its historical, cultural, emotional and national values. Transforming the heritage-industrial complex into a sustainable industry requires community interaction, through surveys and prioritising the socio-economic welfare of residents. Training programmes and localised capacity-building initiatives can generate employability as well as interest in the field of heritage conservation.

A 2023 report from NITI Aayog highlights the chronic underfunding of India's heritage, emphasising the need for comprehensive planning and innovative financing solutions.¹⁰⁹ Government schemes like the National Culture Fund¹¹⁰ and Adopt a Heritage¹¹¹ enable private sector participation through Corporate Social Responsibility (CSR) funding. Similarly, the PRASHAD scheme leverages CSR funding and public-private partnerships, with central financial assistance covering most costs and some budget allocation for heritage sites.¹¹² The Swadesh Bharat Scheme, which includes the twelve-route Heritage Circuit, is funded entirely by the Ministry of Tourism.¹¹³ However, these initiatives are limited to centrally protected sites, overlooking the enormous and untapped potential of unprotected heritage assets outside ASI jurisdiction, particularly in urban India. State agencies often lack even the necessary research and development capacity to integrate them into preservation frameworks and curate comprehensive site databases. Thus, current financing models barely address India's extensive heritage landscape, focusing narrowly on tourism-driven development.

Given this scenario, creating a central archaeological database and incorporating digital archiving of India's priceless heritage is crucial to achieving its tourism targets by 2047. Both central and state agencies need support via capacity-building initiatives, increased funding and consultancy access for conservation plans, work audits, and digital infrastructure development to systematise resources and sites.

India must learn from past mistakes by addressing overlapping and ambiguous mandates that lead to bureaucratic inefficiencies and resource wastage. Collaborative initiatives should be streamlined and accountable to a central nodal agency. Large-scale digital public infrastructure can benefit the heritage conservation ecosystem only if conflicting mandates are resolved through a central database and agency. Prioritising documentation and

Conclusion

digitisation of archives is crucial to avoid roadblocks—existing databases, like those developed by ISRO, must be urgently authenticated and validated. Budget allocations should align with project completion rather than being provided as lump sums to maintain accountability. All projects should undergo compulsory financial and work audits.

Digitisation is intertwined with our experience of reality, and this symbiotic relationship must be leveraged for the conscious preservation and systematisation of India's abundant heritage. Using AR and VR can enhance space reuse and offer cost-effective, innovative access to heritage, while promoting tourism. Creating a comprehensive digital public infrastructure to systematise heritage management and data collection is needed to understand the scope of work and identify the economic opportunities in conservation planning.

A policy push could revitalise India's heritage and foster a sense of belonging through shared histories. Successful local projects, including those of the Humayun's Tomb and Nizamuddin Basti in Delhi, demonstrate the potential of collaborative and participatory initiatives. These efforts must be expanded to cover the numerous other heritage sites across the country, drawing inspiration from global best practices. 

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