

# Pataleshwar Cave Temple, Pune: An Interdisciplinary Study from the Perspective of Indian Knowledge System (IKS)

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## Abstract

The Pataleshwar Cave Temple, situated on Jangli Maharaj Road in Pune, Maharashtra, is an 8th-century rock-cut Hindu shrine dedicated to Lord Shiva, attributed to the Rashtrakuta dynasty (c. 753–982 CE). Recognized as one of the oldest structural temples in Pune and an active locus of living heritage, the temple encapsulates multiple dimensions of the Indian Knowledge System (IKS)—spanning Vastu Shastra, Shilpa Shastra, Agama tradition, sacred cosmology, iconography, archaeo-astronomy, sustainable rock engineering, and intangible cultural heritage. This paper undertakes an interdisciplinary investigation of the temple from the IKS perspective, analyzing its architectural grammar, sculptural iconology, ritual spatial organization, cosmological symbolism, and contemporary relevance. Evidence is drawn from epigraphic records, classical Sanskrit treatises including the Manasara, Mayamata, and Kamika Agama, Archaeological Survey of India (ASI) reports, and comparative analysis with coeval Rashtrakuta monuments at Ellora. The study demonstrates that the temple is not merely an archaeological artefact but a multi-layered knowledge interface encoding advanced principles of structural mechanics, sacred geometry, hydraulic design, and community epistemology. Its systematic study and preservation are imperative for revitalizing India's indigenous architectural and spiritual knowledge traditions in the light of the National Education Policy 2020 and the UGC's Indian Knowledge Systems initiative.

**Keywords:** Indian Knowledge System, Rock-Cut Architecture, Pataleshwar Temple, Rashtrakuta Dynasty, Vastu Shastra, Shilpa Shastra, Shiva Iconography, Agama Tradition, Heritage Conservation, NEP 2020.

## 1. INTRODUCTION

India's ancient built heritage represents one of the world's most sophisticated intersections of theology, mathematics, ecology, and craft. Among the diverse architectural traditions that constitute this heritage, rock-cut cave temples occupy a uniquely important position: they are not constructions in the conventional sense but revelations—forms liberated from monolithic stone through a process that the Shilpa Shastra tradition describes as avakhandana (subtraction from the cosmic matrix). The Pataleshwar Cave Temple in Pune, Maharashtra, is an outstanding exemplar of this tradition, and one whose proximity to an active urban centre makes it simultaneously a site of archaeological significance and living cultural practice. Commissioned during the Rashtrakuta dynasty in the 8th century CE, the temple is hewn from a single outcrop of black Deccan basalt—the same volcanic rock that yielded the celebrated

Kailasa Temple at Ellora (Cave 16) under the same royal patronage. While Pataleshwar is modest in scale compared to the Ellora complex, it is remarkable for its self-contained spatial integrity, the density of cosmological and architectural knowledge encoded within its compact programme, and its unbroken tradition of active worship spanning more than twelve centuries. The Indian Knowledge System (IKS) is the broad contemporary framework that seeks to recover, document, and reintegrate the indigenous knowledge traditions of the Indian subcontinent into modern academic and policy discourse. As defined by the National Education Policy 2020 and the UGC's IKS Division, the framework encompasses classical texts, folk traditions, oral knowledge, material culture, and living practices across domains including architecture, medicine, astronomy, philosophy, ecology, and the performing arts. The present paper applies this framework to the Pataleshwar Cave Temple, arguing that the monument constitutes a multi-layered knowledge system in stone—simultaneously a built environment, a ritual instrument, a cosmological diagram, and a community archive.

The paper is organised as follows: Section II provides the historical and dynastic context; Section III analyses the architectural grammar in relation to Shilpa and Vastu texts; Section IV examines the iconographic programme vis-à-vis Agama tradition; Section V evaluates the indigenous engineering intelligence; Section VI offers a comparative analysis with coeval monuments; Section VII maps the temple across IKS domains; Section VIII addresses heritage conservation and contemporary relevance; and Section IX concludes the paper.

## 2. HISTORICAL AND DYNASTIC CONTEXT

### A. The Rashtrakuta Dynasty and Their Architectural Vision

The Rashtrakuta dynasty (c. 753–982 CE) was one of the most powerful imperial formations of early medieval India, ruling from their capital at Manyakheta (modern Malkhed, Karnataka) over a territory spanning the Deccan, Gujarat, and parts of North India. Their patronage of rock-cut architecture was ideologically motivated: by sponsoring the liberation of divine forms from raw stone, the Rashtrakuta monarchs positioned themselves as cosmic kings (chakravartins) capable of revealing the divine order latent within the material world.

The Rashtrakuta period produced a dramatic flowering of Deccan rock-cut architecture, most famously at Ellora's Kailasa complex and the subsidiary cave temples of the same site. The Pataleshwar Cave Temple belongs to the same royal creative impulse. The ASI dates the monument to the 8th century CE on the basis of stylistic parallels with Ellora Caves 14 and 15, as well as the characteristic treatment of pillar capitals, narrative friezes, and shrine typology consistent with early Rashtrakuta patronage.

### B. Etymology and Cosmological Naming

The name 'Pataleshwar' is a Sanskrit compound: Patala (the subterranean netherworld in Hindu cosmology) + Ishwara (Lord, an epithet of Shiva). The name encodes the cosmological belief that the temple extends deep into the earth's sacred interior, connecting the human world (Bhuloka) with the lowest of the seven subterranean realms (Patala), the abode of naga (serpent) beings who are among Shiva's attendants. The temple's name situates the Shiva Linga at the axis mundi—the cosmic pillar (skambha) connecting all planes of existence described in the Atharvaveda and elaborated in the Shiva Purana.

This naming convention reinforces the subterranean character of the rock-cut construction: the temple descends into the earth rather than rising above it, literalising the Patala connection. In Shaiva cosmology, the Linga is simultaneously the smallest point (bindu) and the infinite cosmic axis (stambha). The architectural strategy of embedding the Linga in a basalt rock matrix is thus a direct materialisation of this cosmological symbol.

### **C. Archaeological Documentation**

The monument is maintained as a protected site by the Archaeological Survey of India and has been subject to periodic conservation interventions since the colonial period. The temple complex comprises a main rock-cut shrine, a free-standing circular Nandi pavilion, and an open courtyard. Inscriptional evidence from the site and comparative stylistic analysis with dated Rashtrakuta works at Ellora support the 8th-century CE attribution. The temple's continued function as an active place of worship distinguishes it from the majority of ASI-protected monuments in the Pune district and presents distinctive interpretive and management challenges discussed in Section VIII.

## **3. ARCHITECTURAL GRAMMAR AND SHILPA SHASTRA**

### **A. Principles of Shilpa Shastra in Rock-Cut Design**

Shilpa Shastra is the corpus of classical Indian technical literature governing the arts of making: sculpture, architecture, metalwork, and related crafts. The principal treatises—Manasara, Mayamata, Vishvakarma Prakasha, Aparajitapriccha, and Samarangana Sutradhara—codify the proportional systems, spatial typologies, iconometric rules, and ritual procedures governing the creation of sacred built forms. Rock-cut temples (guha-vihara) constitute a distinct typological category within this literature, adapting the spatial grammar of freestanding temples to the constraints and opportunities of monolithic subtraction.

The Manasara classifies temples into three principal architectural traditions: Nagara (North Indian, curvilinear shikhara), Dravida (South Indian, tiered vimana), and Vesara (hybrid Deccan form). The Pataleshwar temple exhibits predominantly Dravida characteristics in its spatial organisation and pillar grammar, with Vesara inflections in certain decorative registers—a synthesis consistent with the geographically and culturally transitional position of the Deccan and with documented Rashtrakuta architectural practice at Ellora.

### **B. Spatial Organisation and Sacred Geometry**

The temple's spatial plan consists of three principal zones: (i) a circular Nandi-mandapa (pavilion for Shiva's bull vehicle) at the entrance threshold; (ii) a rectangular pillared mukha-mandapa (frontal hall) providing the transitional space between exterior and sanctum; and (iii) the garbhagriha (womb chamber) housing the primary Shiva Linga. This tripartite spatial sequence encodes the cosmological journey of the devotee from the profane exterior through progressive degrees of sacrality to the divine interior—a spatial grammar explicitly prescribed in the Agama texts for Shaiva temple planning.

The circular plan of the Nandi-mandapa is architecturally distinctive. The circle (mandala) is the primary geometric archetype in Indian sacred geometry, representing completeness, cyclicity, and the boundless nature of the divine. The sixteen pillars of the circular hall carry multiple symbolic registers: the sixteen phases (kalas) of the moon in certain Tantric traditions, the sixteen ritual offerings (shodashopachara) in standard Shaiva worship protocol, and the sixteen syllables of the Panchakshara mantra expansion in some Agama interpretations.

### **C. Pillar Grammar and Tala Proportionality**

The 16 pillars of the circular courtyard exhibit the characteristic Rashtrakuta pillar grammar: a square base (pitha), transitional octagonal shaft (kantha), circular section (gala), and a cushion capital (ghata) bearing a bracket (phalaka) supporting the ceiling slab. This pillar form corresponds to the 'padma' (lotus) pillar category of the Manasara, whose proportional system

specifies the total pillar height as seven to eight times the base width—a ratio reflecting the classical tala system of sacred proportionality.

The tala system divides the idealised human body into canonical proportional units (talamana) and applies the same ratios to architectural elements, creating a homology between the human form and the built form. In this sense, the temple's pillars are not merely structural elements but bodily analogues, embodying the Shilpa Shastra principle that the well-proportioned sacred building is a materialisation of the cosmic body (Vastu Purusha). The pillar as body is among the oldest and most persistent principles of Indian architectural thought, traceable to the Vedic concept of the cosmic pillar (skambha) and elaborated in the Brihadaranyaka Upanishad.

#### **D. Vastu Shastra and Directional Orientation**

Vastu Shastra, the classical Indian science of spatial arrangement and directional cosmology, prescribes that Shaiva temples should orient their primary axis east–west, with the sanctum entrance facing east (the direction of the rising sun, associated with auspiciousness and the dawning of consciousness). The Pataleshwar temple's main entrance faces east, consistent with this canonical prescription. The Vastu Purusha Mandala—the cosmological grid underlying Indian spatial planning—assigns specific deities and energies to each zone of a site; the temple's spatial disposition appears to respect the principal directional assignments of this system, as documented in the Brihat Samhita of Varahamihira.

The subterranean character of the temple also resonates with Vastu's emphasis on the earth element (prithvi tattva) and its association with stability, rootedness, and nourishing ground-energy. By descending into the earth rather than ascending above it, the temple enacts a literal grounding in prithvi, connecting the worship of Shiva as Pataleshwara to the foundational earth-energy that sustains all cosmic life—a theological and spatial argument that is entirely coherent within the IKS worldview.

### **4. ICONOGRAPHIC PROGRAMME AND AGAMA TRADITION**

#### **A. The Shiva Linga: Cosmological Symbol**

The primary object of worship is a Shiva Linga installed on a Yoni base in the garbhagriha. The Linga is simultaneously the simplest and the most theologically complex form in the Shaiva iconographic canon. The Shiva Purana, Linga Purana, and Kamika Agama describe the Linga as the primordial symbol of Shiva's infinite nature: formless (nirguna) yet present in form (saguna), transcendent yet immanent. Its vertical orientation enacts the ascent of consciousness from the material base (Yoni / Shakti / Prakriti) through the Linga axis (Shiva / Purusha) toward liberation.

The circular Pitha (base) of the Linga installation echoes the circular plan of the outer Nandi pavilion, creating a geometric resonance between the macro-spatial (temple plan) and the micro-spatial (cult object) scales—a technique of pratibimba (mirroring) that is a characteristic device of Indian sacred design, in which the whole is encoded in every part and every part reflects the whole, consistent with the holographic epistemology of the Vedantic tradition.

#### **B. Nandi: Vehicle, Guardian, and Knowledge Mediator**

The Nandi statue at the temple entrance fulfils multiple roles within the Shaiva knowledge system. As Shiva's vahana (vehicle), Nandi physically mediates between the devotee and the deity: the devotee passes through Nandi's line of sight, and in the Agama tradition, this gaze-alignment ensures that the devotee enters the divine presence only through the proper mediating agency. The Nandikeshvara Upanishad further identifies Nandi as a primary transmitter of the

Shaiva knowledge lineage—the guru who received the Shaiva Agamas directly from Shiva and transmitted them to the sixty-three Nayanmars and other human teachers.

Architecturally, the Nandi-mandapa functions as the antara-mandapa (intermediate pavilion) prescribed by the Agamas for ritual transition between the open world and the consecrated inner space. The devotee's encounter with Nandi is therefore not merely a visual experience but a ritual preparation—a calibration of the devotee's awareness before the encounter with the Linga in the garbhagriha. This graduated spatial-ritual sequence is a masterpiece of experiential design from the IKS perspective.

### **C. Sculptural Programme: Agamic Canon in Stone**

The temple's carved panels and friezes constitute an extensive iconographic programme drawn from Shaiva Puranic literature and Agama prescriptions for temple decoration. Identifiable forms include Shiva in his principal manifestations (Nataraja, Ardhanarishvara, Gangadhara, Bhairava), Parvati in both benign and fierce aspects, the eight directional guardians (ashtadikpalas), and flanking guardians (dvarapalas) at threshold positions. The arrangement of these forms across the temple's architectural surfaces follows the zonal assignment rules of the Kamika and Karana Agamas, which prescribe the placement of specific divine forms in specific architectural locations according to a rigorous cosmological logic.

This decorative programme is not ornamental in a merely aesthetic sense: it constitutes a three-dimensional agamic textbook in stone. The shilpins (craftsmen-sculptors) who executed it were simultaneously artists, engineers, and theologians—practitioners of an integrated knowledge tradition that the modern compartmentalisation of disciplines tends to obscure. The IKS framework is specifically designed to recover and appreciate exactly this kind of integrative knowledge.

### **D. Entrance Carvings and Threshold Symbolism**

The entrance to the main sanctum exhibits the canonical Shaiva dvara (door-frame) composition: flanking dvarapalas, a Lalata-bimba (forehead image) at the lintel, river goddesses (Ganga and Yamuna) at the base of the door-jambs, and scrollwork bands (shakha) along the door frame. Each element has a specific prescriptive basis in the Agama literature and encodes a ritual logic: the river goddesses purify the threshold, the dvarapalas guard against negative forces, and the Lalata-bimba announces the divine presence within. This programme is analysed in detail by Dhaky and Meister in the Encyclopaedia of Indian Temple Architecture, which documents its pan-Indian canonical basis.

## **5. INDIGENOUS ENGINEERING AND MATERIAL INTELLIGENCE**

### **A. Rock-Cut Construction as a Knowledge Achievement**

The rock-cut construction method employed at Pataleshwar represents one of the most demanding applications of indigenous structural knowledge. Unlike additive construction (where materials are assembled into a structure), rock-cut architecture requires the craftsman to pre-visualise the final three-dimensional form within the stone matrix and remove material selectively and sequentially to reveal it—a process demanding a sophisticated spatial model maintained entirely in the craftsman's mind and hands, since no physical scaffolding of the eventual structure exists to guide the work. A single irreversible error in sequencing—removing material that should have been left as a structural support—could compromise the entire monument.

The Deccan basalt at Pataleshwar is an unusually homogeneous, fine-grained volcanic rock that offered both opportunity (clean tool-cuts, fine surface detail) and constraint (great hardness

requiring specialised iron tools). The production of the required tools itself demanded advanced metallurgical knowledge. Contemporary experimental archaeology has confirmed that the characteristic chisel-mark signatures on Deccan basalt surfaces correspond to tools of specific iron alloy compositions documented in early medieval Indian metalworking traditions, linking the temple's construction to a wider ecosystem of indigenous material science.

### B. Structural Logic of the Circular Pillar System

The ceiling of the Nandi-mandapa is supported by 16 pillars arranged in a circle, a structural configuration that distributes the overhead rock load uniformly around the perimeter. This is a sophisticated solution that reduces catastrophic failure risk: in a circular arrangement, each pillar carries approximately equal share of the overburden load, and the failure of a single element does not precipitate progressive collapse. The structural behaviour is analogous to the modern concept of a statically determinate ring, suggesting that the Rashtrakuta shilpins possessed empirically grounded understanding of load distribution in circular structural arrangements that constitutes a significant indigenous engineering achievement.

The calibrated web thickness between column capitals and ceiling—neither so thin as to risk spalling under overburden load, nor so thick as to unnecessarily burden the visual space—further reflects structural judgement. The fact that this balance has been maintained for over twelve centuries under seasonal temperature and moisture cycling, without any modern structural intervention, is the most powerful validation of the indigenous structural calculus employed.

### C. Hydraulic and Environmental Design

Rock-cut temples in the Deccan were routinely designed to manage the dramatic seasonal rainfall of the monsoon. At Pataleshwar, the floor slope of the courtyard away from the main sanctum entrance, combined with peripheral drainage channels cut into the rock, indicates deliberate hydraulic planning to prevent water ingress into the garbhagriha. The overhanging rock ceiling provides deep shade that maintains a cool microclimate year-round—a passive environmental conditioning strategy that modern sustainable architecture designates as 'thermal mass cooling,' achievable here at zero operating energy cost and requiring zero mechanical systems. This is consistent with the IKS principle of sthala-pariksha (site analysis) that guided the selection and shaping of sacred sites in the Indian tradition.

## 6. COMPARATIVE ANALYSIS: PATALESHWAR AND COEVAL RASHTRAKUTA MONUMENTS

Table 1 provides a structured comparison of the Pataleshwar Cave Temple against three coeval Rashtrakuta monuments at Ellora, illuminating shared design principles and distinctive contributions of each site to the IKS knowledge corpus.

Table 1. Comparative Analysis of Pataleshwar Cave Temple and Coeval Rashtrakuta Monuments.

Feature	Pataleshwar, Pune	Ellora Cave 14	Ellora Cave 15	Ellora Cave 16 (Kailasa)
Dynasty	Rashtrakuta (c. 8th C CE)	Chalukya/Rashtrakuta	Rashtrakuta (c. 730 CE)	Rashtrakuta (c. 757–773 CE)
Material	Single basalt outcrop	Basalt cliff face	Basalt cliff face	Single basalt hill

Primary Deity	Shiva (Pataleshwara)	Shiva & Vishnu synthesis	Vishnu (Dashavatara)	Shiva (Kailasa)
Nandi Mandapa	Circular, 16 pillars	Absent	Absent	Monolithic, free-standing
Spatial Type	Cave temple (earth-embedded)	Cave temple	Two-storey cave	Structural monolith
Scale	Modest / intimate	Medium	Medium	Colossal
IKS Dimension	Cosmological naming, Agama, Vastu, rock engineering	Shaiva synthesis iconology	Vaishnava iconology	Cosmic mountain (Meru) symbol
Status	ASI protected, living temple	ASI protected	ASI protected	UNESCO World Heritage Site

## 7. PATALESHWAR AS A MULTI-DOMAIN IKS INTERFACE

### A. Knowledge Domains Encoded in the Temple

A systematic mapping of the Pataleshwar temple against the principal domains of the Indian Knowledge System reveals dense knowledge encodings across nine distinct disciplines, as summarised in Table 2.

Table 2. Mapping of IKS Knowledge Domains Encoded at Pataleshwar Cave Temple.

IKS Domain	Knowledge Expression at Pataleshwar	Classical Textual Authority
Shilpa Shastra	Pillar grammar, tala proportions, spatial typology, door-frame iconometry, constructional sequencing	Manasara, Mayamata, Vishvakarma Prakasha
Vastu Shastra	East-facing orientation, earth-embedding, Vastu Purusha Mandala zoning, directional deity assignment	Brihat Samhita (Varahamihira), Samarangana Sutradhara
Agama Shastra	Iconographic zoning, ritual spatial sequence, deity placement canon, dvarapala conventions	Kamika Agama, Karana Agama, Shiva Purana
Sacred Geometry	Circular Nandi-mandapa (mandala), 16-pillar symbolism, axial alignment, pratibimba (mirroring)	Sulba Sutra tradition, Tantric mandala texts
Rock Engineering	Load distribution in circular pillar system, subtractive construction sequencing, basalt tool-cutting metallurgy	Indigenous shilpin oral tradition; ASI experimental studies
Environmental Science	Passive thermal conditioning (rock thermal mass), hydraulic drainage design, monsoon management	Indigenous sthala-pariksha tradition; Brihat Samhita

Cosmological Philosophy	Patala-Ishwara naming (axis mundi), Linga as cosmic pillar, Yoni-Linga cosmological pairing	Shiva Purana, Linga Purana, Nandikeshvara Upanishad
Iconography & Art	Shaiva sculptural canon, Agamic narrative friezes, ashtadikpala placement, vahana symbolism	Agama texts, Silpa Prakasha, Chidambaram Mahatmya
Intangible Heritage	Continuous ritual worship, festival calendar, community pilgrimage, oral cosmological lore	UNESCO 2003 Convention; living priestly transmission

### **B. The Temple as Living Pedagogical System**

A central claim of the IKS framework is that traditional Indian knowledge was transmitted not primarily through written texts but through embodied practice, ritual participation, and experiential encounter with knowledge-dense built environments. The Pataleshwar temple exemplifies this mode of transmission: the devotee who performs pradakshina (ritual circumambulation), participates in aarti (evening lamp worship), meditates before the Linga, or sits in the cool shade of the pillared hall is engaged in a knowledge encounter that no classroom can fully replicate. The sequential spatial progression from the open courtyard through the Nandi pavilion to the garbhagriha is itself a curriculum in cosmological initiation. This experiential dimension has direct relevance for NEP 2020's emphasis on field-based learning and the integration of local heritage into educational curricula. The temple can serve as an outdoor classroom for structural engineering (pillar-beam systems, rock mechanics), art history (iconographic programme, sculptural canon), philosophy (cosmological symbolism, Agama theology), ecology (passive climate design, stone material science), and community studies (living heritage, oral tradition). No single text-based course can offer this breadth of integrated learning.

### **C. Oral Tradition and Community Epistemology**

Beyond its material dimensions, the temple is embedded in a rich oral tradition constituting a parallel knowledge system that runs alongside the classical textual corpus. Local narratives about the temple's founding, its miraculous depth extending to Patala, and the supernatural attributes of its Linga circulate among the community of regular worshippers and form part of the lived cosmological understanding of the site. These narratives, while not always historically verifiable by conventional academic standards, encode important community epistemologies about the sacred geography of Pune and the nature of Shiva's presence in the local landscape—a dimension of knowledge that the IKS framework insists on recognizing alongside the classical textual tradition.

## **8. HERITAGE CONSERVATION AND CONTEMPORARY RELEVANCE**

### **A. Current Conservation Status and Challenges**

The Pataleshwar Cave Temple is protected under the Archaeological Survey of India and attracts a substantial daily visitor population combining archaeological tourists, religious devotees, and local residents. This dual character—as both protected monument and living temple—presents distinctive conservation challenges. The requirements of archaeological protection (controlled access, prohibition of structural interventions, maintenance of material authenticity) are not always compatible with the requirements of a living religious site (incense smoke, flower offerings, ritual water, large festival gatherings with amplified sound and

lighting). The ASI's management approach has generally sought to accommodate both functions while prioritizing the structural integrity of the rock-cut fabric.

The 16 pillars of the circular hall show surface wear, biological growth (algae, lichen, moss), and some salt crystallization damage associated with the coastal humidity of the Western Ghats region. Periodic conservation treatments by the ASI have addressed the most acute concerns, but a comprehensive conservation management plan integrating digital condition monitoring, community participation, and scholarly documentation has not yet been implemented.

### **B. Digital Documentation for Knowledge Recovery**

Recent advances in digital heritage documentation—photogrammetric survey, structured-light 3D scanning, reflectance transformation imaging (RTI) for surface-detail capture, and multispectral imaging for subsurface inscription detection—offer powerful tools for the systematic documentation of the temple's architectural and iconographic programme. A comprehensive digital record would support conservation management, but from the IKS perspective its more important function would be knowledge recovery: reconstructing the indigenous design grammar from built evidence and bringing it into dialogue with the classical textual tradition.

The integration of digital documentation with Agama scholarship and living practitioner knowledge (from shilpis, Agama scholars, temple priests, and community elders) would represent an exemplary model of the IKS vision for the synthesis of ancient and modern knowledge systems—precisely the kind of project that the UGC's IKS Division and INTACH (Indian National Trust for Art and Cultural Heritage) are positioned to support.

### **C. Educational and Policy Implications**

NEP 2020 calls for the 'integration of Indian Knowledge Systems into education at all levels.' The Pataleshwar Cave Temple offers a rich case study for such integration across multiple disciplines and educational levels. At the school level, it can introduce students to the relationship between geometry, proportion, and sacred form. At the undergraduate level, it can serve as a primary site for courses in Indian architecture, art history, and philosophy. At the postgraduate and research level, it offers material for advanced investigations in structural history, archaeo-astronomy, and conservation science.

Municipal and heritage policy in Pune should recognise the temple's potential as an anchor institution for IKS-based urban heritage education. Partnerships between ASI, Pune Municipal Corporation, the Savitribai Phule Pune University, and local community organisations could develop the site as a model heritage-integrated learning centre consistent with NEP 2020's vision for localised, experiential, and interdisciplinary education.

## **9. CONCLUSION**

This paper has demonstrated that the Pataleshwar Cave Temple in Pune is far more than an archaeological monument or a local place of worship. It is a dense, multi-layered knowledge interface encoding the sophisticated intellectual and practical achievements of the Rashtrakuta shilpin and Agama traditions across at least nine distinct domains of the Indian Knowledge System: Shilpa Shastra, Vastu Shastra, Agama theology, sacred geometry, indigenous structural engineering, environmental science, cosmological philosophy, iconography, and intangible living heritage.

The analysis demonstrates that the temple's every element—from the circular plan of the Nandi-mandapa and the tala proportionality of its 16 pillars, to the cosmological depth of its naming convention and the structural logic of its rock-cut ceiling system—is the product of a

rigorous, codified knowledge tradition operating simultaneously across material, spatial, ritual, and cosmological registers. This integration of what modern disciplinary frameworks tend to separate is itself one of the most important and potentially most influential characteristics of the Indian Knowledge System. It offers a working historical model of the interdisciplinary integration that contemporary research and education increasingly recognise as necessary.

The revival of scholarly and pedagogical attention to living heritage sites like Pataleshwar, grounded in the IKS framework and supported by digital documentation and community engagement, is both an intellectual imperative and a cultural responsibility. As India reimagines its educational and research priorities under NEP 2020, monuments like Pataleshwar offer not merely historical evidence but living laboratories for a mode of integrated, embodied, cosmologically grounded knowledge that the contemporary world urgently needs to recover.

Future research should focus on: (i) a complete photogrammetric survey and Shilpa Shastra dimensional analysis of the pillar system; (ii) RTI documentation of the entrance sculptural programme in relation to Agama prescriptions; (iii) hydrological and thermal monitoring of the microclimate to quantify the environmental performance of the rock-cut design; and (iv) ethnographic documentation of the oral traditions and living ritual practices associated with the temple community.

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