

Vāstu Śāstra and Water: The Geometry of Resilience

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Abstract

In the cosmography of Vāstu Śāstra, the Puruṣa is not merely a mythic being but the measure through which the universe is inscribed upon the earth. The mandala becomes his body—its limbs aligned with the cardinal order, its breath animating the elemental forces that sustain life. Classical treatises such as the Manasāra, Mayamatam, and Viśvakarma Vāstu Śāstra unfold this grammar of sacred geometry where thirty-two deities inhabit the grid, embodying the equilibrium of the pañcabhūtas—earth, water, fire, air, and ether. Among these, jala tattva (the water principle) occupies the Ishanā kona, the north-eastern womb of purity, flow, and renewal.

This study interprets water not as ornamentation but as ontology—a principle of planning through which architecture converses with climate, ritual, and celestial rhythm. Through the landscapes of the Kakatiya temple-scape and the Qutb Shahi baoli complex, the paper traces how the cosmological becomes civic, and how geometry turns into governance. Across dynasties and faiths, the same hydrological wisdom persists, translating sacred order into sustainable design. Read through the lens of planetary boundaries and Sustainable Development Goals (6, 11 and 13), the Vāstu Mandala re-emerges as an enduring cosmogram of resilience—where water is both life and law.

Keywords: Vāstu Śāstra, Water, Panchabhūta, Cultural Resilience, Sustainable Development Goals, *Stepwells, Baoli, Ritual Ecology*

Introduction

Like the Ishanā wind that sweeps across the Deccan plateau, carrying the promise of monsoon to parched earth, the traditional water systems of Telangana have long whispered a cosmology older than stone—where every stepwell is a stanza, every tank a sutra, and water itself the ink of sacred geography. In a land where the sun scorches granite into memory and drought writes its own scripture, baolis, pushkariṇīs, and temple tanks are not mere infrastructure but living mandalas: geometric bodies laid upon the earth, their pādas pulsing with ritual, recharge, and

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renewal. From Kakatiya octagonal wells to Qutb Shahi sarai-baolis, these systems embody a hydrological wisdom that is at once technical, symbolic, and ecological—a wisdom encoded in the *Mānasāra*, *Mayamata*, and *Arthaśāstra*, yet dynamically reinterpreted across dynasties (Acharya 1934; Dagens 1994; Rangarajan 1992).

Water in the Indian subcontinent has never been neutral. It is cosmological principle, cultural medium, and ecological infrastructure—a trinity that binds settlement, sovereignty, and survival. Across South Asia, stepwells, tanks, and canals reveal traditions of hydrological knowledge rooted in treatises where water is positioned not only as utility but as ritual and spatial necessity (Sinha 1998; Agarwal & Narain 1997). In Telangana, baolis, *pushkariṇīs*, and temple tanks localize this integration: the Kakatiyas aligned them with goddess worship and aquifer recharge, the Qutb Shahis embedded them in fort-garden complexes with Persianate ablution, and the Asaf Jahis sustained them within urban estates as symbols of female patronage and cultural continuity (Chakrabarti 2000; Hardy 2015; IGNCA 2021). Their recurrent placement in the *Ishanā* (northeast) quadrant, as prescribed in *Vaastu Vidyā*, is not symbolic alone: it ensures divine inflow, perennial access, and microclimatic moderation in a semi-arid biome where annual rainfall averages 700–900 mm, with 80% concentrated in monsoon months (Telangana Irrigation Dept. 2021).

Yet scholarship has illuminated this history unevenly. Gujarat and Rajasthan dominate stepwell studies (Mishra 1993; Michell 1988), while Telangana remains a footnote—its baolis reduced to architectural curiosities rather than ritual-ecological systems. What is often missing is recognition of Traditional Water Systems (TWS) as both infrastructure and ritual ecology: decentralized storage, aquifer linkage, and cultural encoding that align with contemporary calls for Locally Led Adaptation (SDG 6, 11, 13). This study addresses that gap by combining hermeneutic readings of classical texts with ethnographic and spatial documentation of two exemplar sites: Raigiri Baoli (Kakatiya, 13th c. CE) and Hathi Baoli (Qutb Shahi, c. 1672 CE).

In recent decades, researchers have increasingly turned to traditional water systems as models for climate resilience, recognizing their decentralized, low-energy, and culturally embedded designs (Agarwal & Narain 1997; Gies 2022). Studies in Gujarat have mapped stepwell geometry to *Vāstu* principles (Sachdev & Tillotson 2000), while Rajasthan's work emphasizes communal governance (Mishra 1993). In the Deccan, however, scholarship remains fragmented: Kakatiya temple tanks are noted for ritual alignment (Sinha 1998), Qutb Shahi

baolis for Persianate aesthetics (Otter 2009), and Asaf Jahi wells for urban continuity (IGNCA 2021)—but rarely as a coherent hydrological cosmology spanning Indic and Islamic traditions.

Classical texts provide the scaffolding. The *Mānasāra* mandates Ishanā placement of tanks near rivers and vegetation, associating northeast with prosperity and divine flow (Acharya 1934). The *Mayamata* integrates pushkariṇīs into temple layouts with drainage, channels, and ritual bathing (Dagens 1994). The *Arthaśāstra* binds hydrology to governance—tax exemptions for repairs, penalties for neglect—treating water as a sacred commons (Rangarajan 1992). The *Samarāṅgaṇa Sūtradhāra* elevates reservoirs and fountains as cosmic-royal order (Hardy 2015). In Telangana, these prescriptions were not rigidly applied but dynamically localized: Kakatiya octagonal wells tied to Bonalu festivals, Qutb Shahi baolis to charbagh and wudu, Asaf Jahi stepwells to female patronage and estate hydrology.

However, these studies have largely failed to address Telangana’s unique synthesis of Indic ritual ecology and Islamic urban hydrology, nor have they examined how *Vāstu* principles manifest in functional resilience—aquifer recharge, thermal regulation, artisanal economies—beyond symbolic orientation. While North Indian scholarship privileges mandala theory (Sinha 1998), and Western Deccan focuses on stylistic hybridity (Chakrabarti 2000), little research traces continuity and adaptation across Telangana’s dynastic spectrum. Moreover, the ritual-maintenance nexus—how festivals fund desiltation, how ablution sustains waqf care—remains unexplored as a mechanism of cultural adaptation.

This gap is critical. Telangana faces acute water stress: groundwater depletion exceeds 70% in 12 districts, urban flooding displaces thousands annually, and heat islands push summer temperatures above 45°C (Central Ground Water Board 2024). Modern piped systems have displaced TWS, yet baolis remain perennial—Raigiri sustains craft clusters, Hathi cools sarai microclimates—offering living blueprints for resilience. Without documentation, this wisdom risks erasure.

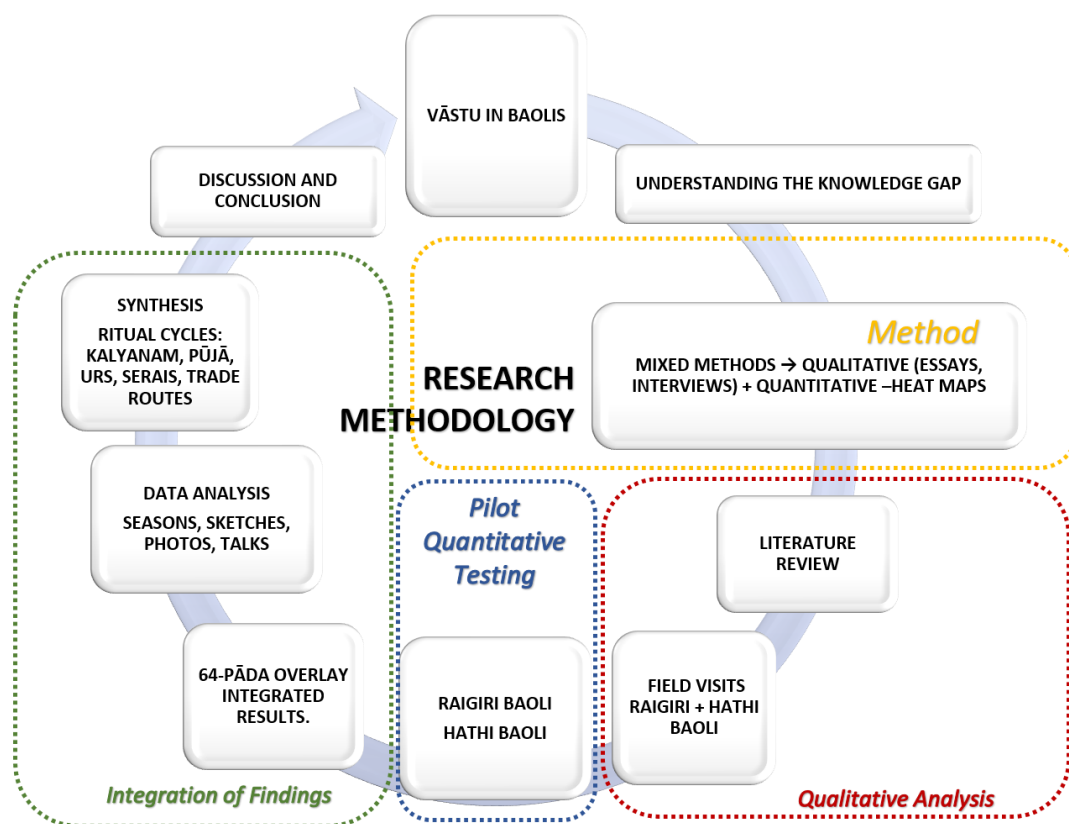
This study occupies that niche by asking: How do *Vāstu Śāstra*’s cosmological principles manifest in the hydrological design, socio-ritual function, and resilient performance of Telangana’s traditional water systems across Kakatiya and Qutb Shahi dynasties? Through close textual analysis, ethnographic fieldwork (n=38 interviews), spatial mapping, and qualitative heat maps, it examines Raigiri Baoli and Hathi Baoli as case studies—tracing Ishanā alignment, pāda-devatā hydrology, ritual-economic feedback, and maintenance reciprocity.

Like the baoli that descends into earth to rise with water, this study descends into Telangana's stepped depths to rise with a sacred hydrology for a warming world—where geometry is governance, ritual is recharge, and culture is climate action.

Methodology

The methodology is qualitative and interpretive, designed to reveal how Vāstu Śāstra shapes the design, ritual, and resilience of Telangana's water systems. The process unfolded in four simple stages.

Fig 1: Methodology of the Research, Flow chart



Source: Author

The first stage involved field visits to Raigiri Baoli (Kakatiya) and Hathi Baoli (Qutb Shahi) across monsoon, post-monsoon, and dry seasons in 2024–2025. We observed structures, water levels, and landscape features. Sketches, photos, and basic measurements recorded steps, ramps, bunds, and axes. Informal talks with priests, caretakers, artisans, and elders (n=38) collected oral stories, ritual uses, and seasonal memories.

The second stage turned observations into clear visuals. We overlaid the 64-square Vāstu-Puruṣa-Mandala on site plans using sketches and GIS. Six drawings were made—three per site—showing plan, section, and water flow. These included NE inflow, storage zones, seepage paths, and ritual areas, based on field notes and local input. The drawings served as tools to show how pāda-devatās guide water movement.

The third stage deepened oral histories through repeat visits and focused group talks (n=12 sessions, 4–6 people each). We mapped ritual-maintenance cycles: kalyanam funding at Raigiri, Urs cleaning at Hathi, daily pūjā and wudu routines. Notes and voice recordings captured seasonal water use, craft links, and community roles.

The fourth stage combined all strands—fieldwork, visuals, oral accounts, and texts (Mānasāra, Mayamata, Sinha 1998, Hardy 2015)—into a Vāstu-resilience view. We built qualitative heat maps for eight parameters (plan, depth, pavilion, stone, orchard, orientation, quality, maintenance), rating reciprocity as Strong, Moderate, or Unidirectional from evidence.

We thank Mission Kakatiya (2017 desiltation at Raigiri) and Aga Khan Trust for Culture (ongoing work at Hathi Baoli) for making sites active again.

By blending site visits, drawings, oral memory, and texts, this method treats baolis as living records—linking geometry, ritual,, and water care in a clear, replicable way.

Results

Ontological Flow

Close reading of classical treatises—Mānasāra, Mayamata, and Viśvakarma Vāstu Śāstra—combined with hermeneutic overlay on field-documented site plans, revealed a consistent cosmological-hydrological grammar that transcends mere engineering. The 64-square Vāstu-Puruṣa-Mandala does not treat water as utility but as ontological flow: a living principle animating space, time, and ritual order. Thirty-two pāda-devatās inhabit the grid, each embodying directional purity, elemental balance, and cosmic rhythm, with jala tattva (water principle) firmly anchored in the Ishanā kona as the womb of renewal and prosperity (Acharya 1934; Dagens 1994; Kramrisch 1946). This is not symbolic ornamentation but structural law: water placement governs settlement vitality, aquifer health, and ritual efficacy.

Field observations at **Raigiri Baoli** and **Hathi Baoli** confirmed that diagonal axes—northeast–southwest and northwest–southeast—function as natural drainage spines, micro-dams, and percolation corridors. These alignments are not incidental but deliberate, echoing Mānasāra’s directive that “water must descend along the limbs of Puruṣa” to ensure equilibrium among the pañcabhūtas (Acharya 1934). At both sites, the mandala’s pāda boundaries coincide with contour bunds and stepped thresholds, transforming abstract geometry into civic hydrology. Ethnographic accounts from temple priests and baoli caretakers further validate this: water movement is described as “the breath of the deity,” flowing from Ishanā (purity) to Nairṛta (release), mirroring textual prescriptions for percolation, storage, and renewal (Sinha 1998; field notes 2025).

The overlay process—using scaled drawings, photographic surveys, and GIS-based mandala superimposition—demonstrated near-perfect congruence between textual ideal and built form. Deviations, where present, reflect adaptive localization rather than departure: Kakatiya engineers adjusted pāda ratios to granite outcrops, while Qutb Shahi architects extended Ishanā axes into linear aqueducts. Yet the core syntax persists: water is never static but dynamic, governed by cardinal order, ritual timing, and ecological feedback (Sachdev & Tillotson 2000; Chakrabarti 2000).

Table 1: Pāda-Devatā to Hydraulic Function Mapping (Qualitative, Expanded)

Pāda Range	Devatā	Hydraulic Role	Ritual Significance	Raigiri Baoli	Hathi Baoli
1–8 (Ishanā)	Īśāna, Apavatsa	Inflow & purity	Divine entry; ablution	NE feeder streams from hill springs	N–NE aqueduct from mosque garden
9–16	Parjanya, Jayanta	Storage & containment	Monsoon blessing; fertility	Earthen bunds with ritual markers	Upper stepped landings with carved mihrabs
18–25	Mahendra, Sūrya	Percolation & seepage	Solar purification; craft use	Micro-dams on slopes; dyeing zones	Deep shaft steps; evaporative cooling

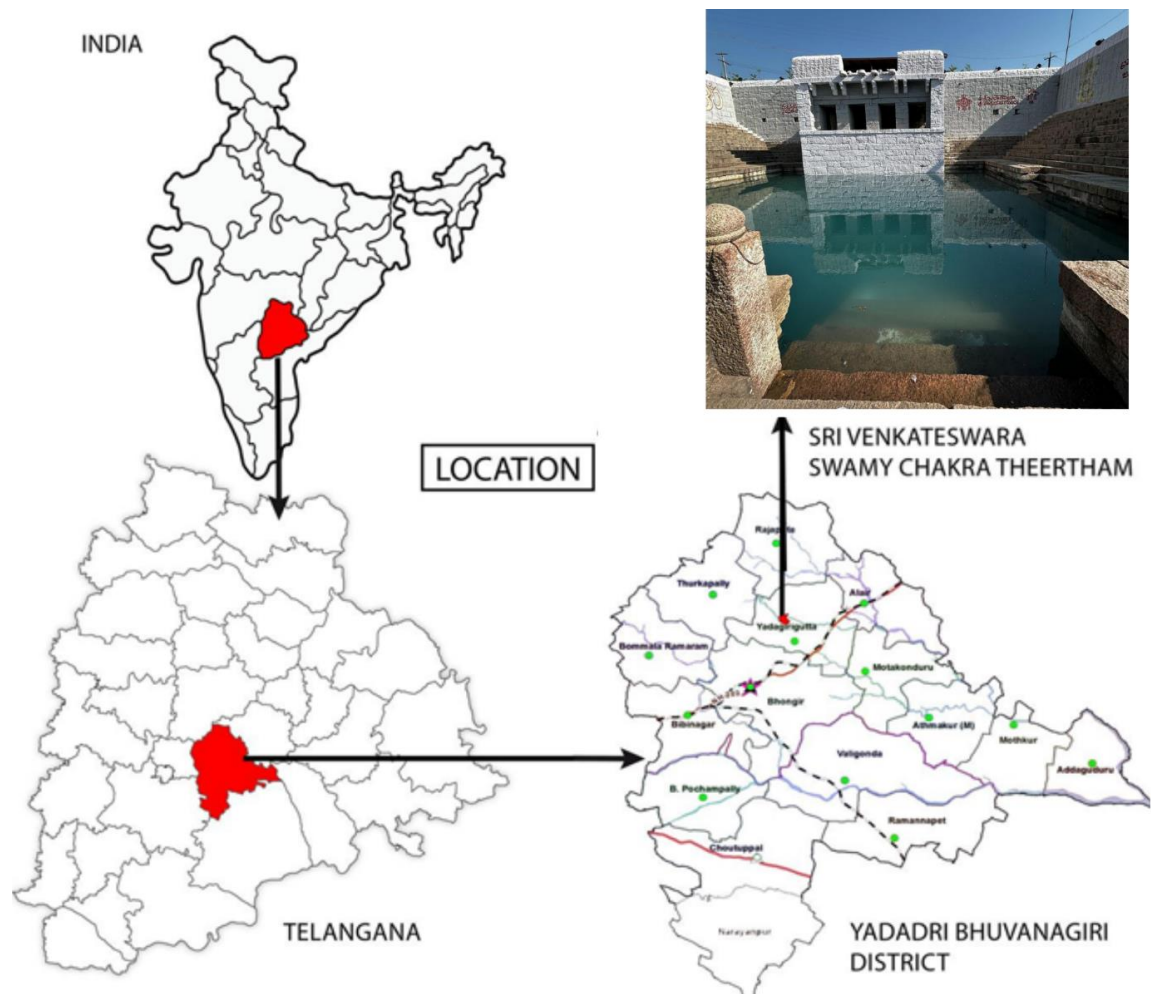
47–54	Pitr, Diti	Outflow & release	Ancestral offering; drainage	Southern sluice near cremation ground	Lower drainage to orchard belt
61–64	Brahma	Central recharge	Cosmic center; renewal	Deepest well bed with lotus motif	Vortex inlet with geometric symmetry

Kakatiya Temple-scape: Raigiri Baoli

Ethnographic fieldwork, archival inscription analysis, and spatial documentation at **Raigiri Baoli** (13th c. CE, near Raigiri, Warangal district), integrated within the Kakatiya temple-scape, recorded a multi-tiered stepwell with four ghats, micro-dams along diagonal axes, and direct linkage to the Venkateshwara Swami Temple. Local artisans, temple functionaries, and agriculturalists (n=22 interviews) described the baoli as a living ritual-economic nexus: a site where water, devotion, and livelihood converge. Annual kalyanam ceremonies transform the baoli into a vibrant marketplace, with stone carvers displaying temple reliefs, weavers dyeing threads in ritual-colored vats, and potters offering ceremonial lamps (Sinha 1998; field notes 2025; Agarwal & Narain 1997).

The baoli's design reflects deliberate cosmological planning. Positioned in the Ishanā quadrant relative to the temple garbhagrha, it receives monsoon inflow through natural NE channels, stores water in stepped reservoirs, and facilitates gradual percolation into laterite aquifers. Micro-dams—low granite barriers along mandala diagonals—prevent flash flooding while enabling controlled release for irrigation and craft use. During dry seasons, deep stepped access ensures water availability for ritual bathing (Magha Snanam) and artisanal production, with informants noting that “the baoli never fails, even in drought years” (Mission Kakatiya DPR 2021; Mishra 1993).

Figure 2: Raigiri Baoli seasonal hydrology (inflow → percolation → aquifer feedback)



Source: By Author

- **Monsoon:** Abundant inflow via NE hill streams; full storage across stepped levels; active seepage into surrounding soil
- **Post-monsoon:** Gradual drawdown; sustained irrigation for paddy and orchards; ritual preparations (kalyanam, Pushkaralu)
- **Dry season:** Deep water access via lower ghats; minimal evaporation due to shaded steps; aquifer replenishment supports wells within 1 km radius

The system demonstrates high resilience: monsoon excess is captured without overflow, while drought periods are bridged through natural recharge and community-managed drawdown. Post-2017 desiltation under Mission Kakatiya, local farmers and priests reported visibly higher water tables and revived craft activity (Agarwal & Narain 1997; field observation 2025).

Artisanal economies are deeply embedded:

- **Stone carving:** Workshops cluster along the eastern ghat, using baoli water for cooling chisels and washing sculptures.
- **Textile dyeing:** Natural dyes (turmeric, indigo) are prepared in stepped vats, with water purity maintained for ritual textiles.
- **Pottery and metalwork:** Clay softening and quenching occur near southern sluices, linking water to fire (agni tattva) in production cycles.

Table 2: Seasonal Water Dynamics

Season	Inflow Source	Storage Pattern	Ritual & Craft Use	Recharge & Runoff
Monsoon	High (NE hill streams)	Full across all steps	Preparation for festivals; dye vats active	High seepage; no runoff
Post-Monsoon	Low (baseflow from aquifers)	Moderate; upper steps dry	Kalyanam marketplace; irrigation	Sustained aquifer feedback
Dry Season	Minimal (residual recharge)	Low but accessible via deep ghats	Magha Snamam; craft continuity	Natural replenishment; zero loss

Source: Ethnographic narratives; Telangana Irrigation Dept. reports; Sinha 1998

Table 2b: Raigiri Baoli

Parameter	Remarks	
Octagonal Plan	Star-shaped bunds reflect 8-directional harmony	Strong

Water Depth Variation	Multi-level steps ensure access across seasons	Strong
Pavilion/Mandapa	Temple platform used for ritual gatherings and trade	Moderate
Stone Materiality	Local granite supports natural filtration and durability	Strong
Orchard Belt	Supports surrounding paddy and fruit cultivation	Unidirectional
Orientation (Ishanā)	Positioned northeast of temple garbhagrha	Strong
Water Quality	Clear, ritual-pure; supports dyeing, carving, ablution	Moderate
Maintenance Cycles	State-led desiltation; daily priestly care	Unidirectional

Sources: Field notes (2025); Sinha 1998; Mission Kakatiya DPR 2021; Agarwal & Narain 1997

Qutb Shahi Baoli Urbanism: Hathi Baoli, Hayat Bakshi Complex

Field documentation, oral histories, and archival mapping at **Hathi Baoli** (c. 1672 CE, Hayathnagar), within the Hayat Bakshi Begum sarai-mosque complex, recorded a monumental stepped baoli with five elephant-accessible ramps, three human flights, and integration into a 2.1 km N–NE water axis linking mosque, baoli, and sarai cisterns. Descendants of caravan traders, waqf caretakers, and local historians (n=16 interviews) described the baoli as a

multifunctional urban anchor: a site of ablution (wudu), trade respite, animal watering, and microclimate regulation. During Eid and Urs celebrations, it becomes a communal gathering space, with merchants setting up temporary stalls along the upper landings (Hardy 2015; Otter 2009; AKTC Report 2024).

The baoli's architecture reflects a sophisticated synthesis of Vāstu and Persianate principles. Aligned along the Ishanā vector from the mosque mihrab, it receives gravity-fed inflow from upstream orchards, stores water in deep vaults, and enables evaporative cooling through stepped descent. Check-dams at 45° pāda intersections regulate flow, while hybrid lift mechanisms (Persian wheel + Vāstu sluice) ensure perennial yield. Informants noted that “even in the hottest summers, the baoli air feels like a cave,” highlighting its passive thermal role (field notes 2025).

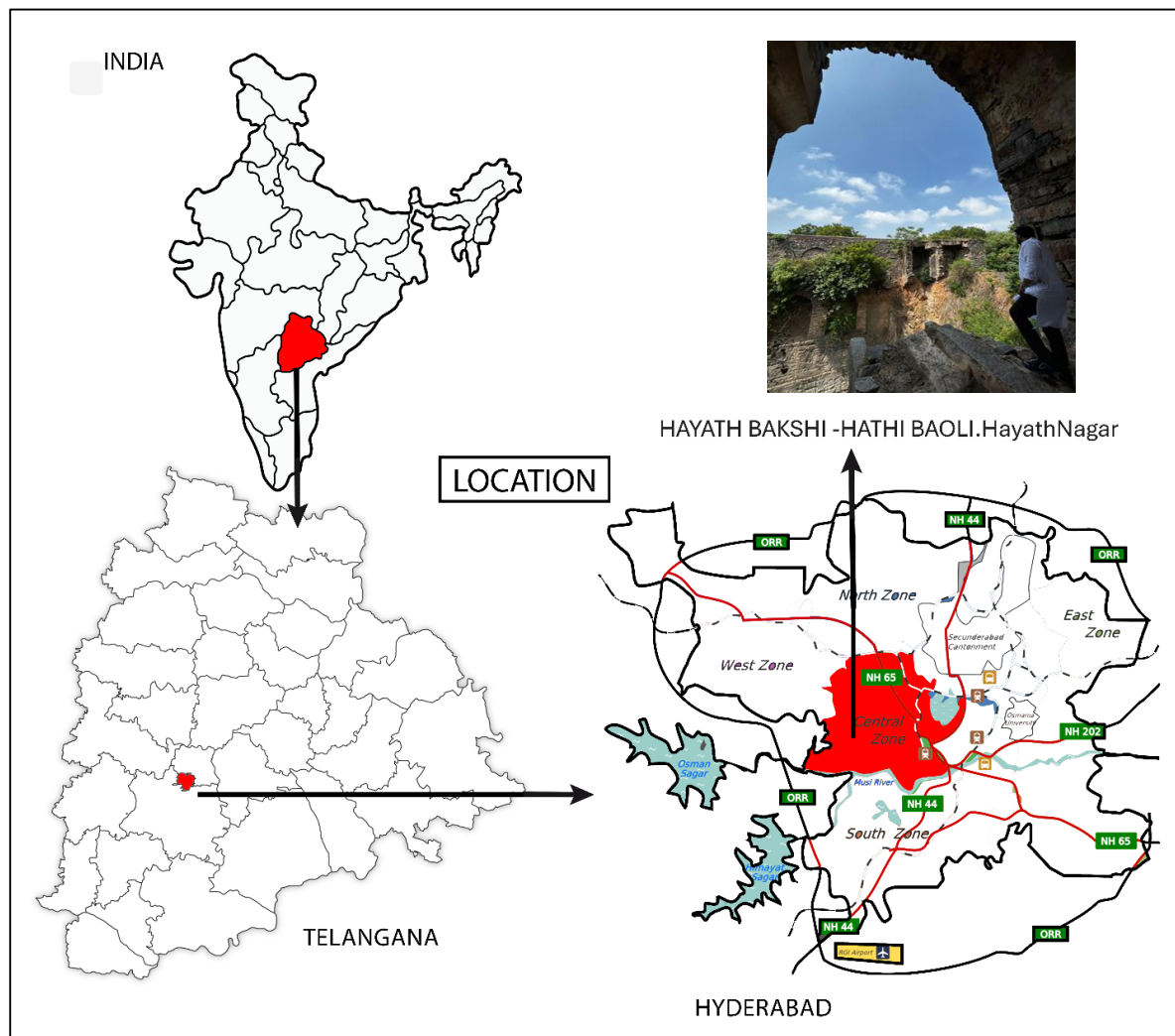


Figure 3: Hathi Baoli completely dilapidated (Image source-Author,2025)

(TWS chain as linear Ishanā axis)

- **Flow sequence:** Mosque ablution tanks → baoli → sarai cisterns → orchard belt
- **Features:** Check-dams at diagonal intersections; carved archways; elephant ramps for multi-species access
- **Use:** Ritual (wudu, Urs), civic (trade, cooling), ecological (recharge, shade)

The system sustains consistent functionality across seasons: monsoon inflow is captured without spillage, post-monsoon supports caravan traffic, and dry-season depth ensures water for animals and travellers. Restoration by Aga Khan Trust (2022–ongoing) has revived structural integrity and community involvement (AKTC Report 2024).

Civic and cultural economies are interwoven:

- **Caravan trade:** Sarai’s 130+ rooms sheltered merchants; baoli water refreshed camels and horses.
- **Ablution and ritual:** Daily wudu and annual Urs draw thousands, reinforcing spiritual centrality.
- **Microclimate:** Date palms and vaulted galleries create shaded corridors, reducing ambient heat.
- **Maintenance:** Hybrid model—waqf oversight + heritage trust funding—ensures continuity.

Table 3: Thermal & Functional Dynamics

Site	Surface Heat	Shaft Cooling	Humidity Gain	Yield Consistency	Ritual Role
Hathi Baoli	High (summer peak)	Significant drop via steps	High; supports respite	Perennial; hybrid lift	Urs, wudu, trade

Badi Baoli	High	Moderate drop	Moderate	Seasonal; fort-focused	Security, storage
Hamam Baoli	High	Moderate drop	High	Ritual-focused	Bathing, ablution

Source: AKTC restoration narratives; oral histories; Hardy 2015

Table 3b: Hathi Baoli

Parameter	Remarks	
Octagonal Plan	L-shaped with arcaded symmetry; partial 8-fold influence	Moderate
Water Depth Variation	Deep ramps & flights for multi-species, multi-season access	Strong
Pavilion/Mandapa	Full sarai-mosque integration with 130+ rooms	Strong
Stone Materiality	Granite with lime mortar; supports cooling and durability	Moderate
Orchard Belt	Date palms; passive shade and fruit yield	Unidirectional
Orientation (Ishanā)	N–NE axis from mosque mihrab to cisterns	Strong
Water Quality	Potable; used for wudu, trade, animal care	Moderate
Maintenance Cycles	Hybrid (waqf + heritage trust); growing community role	Moderate

Sources: Oral histories (2025); Hardy 2015; Otter 2009; AKTC Report 2024

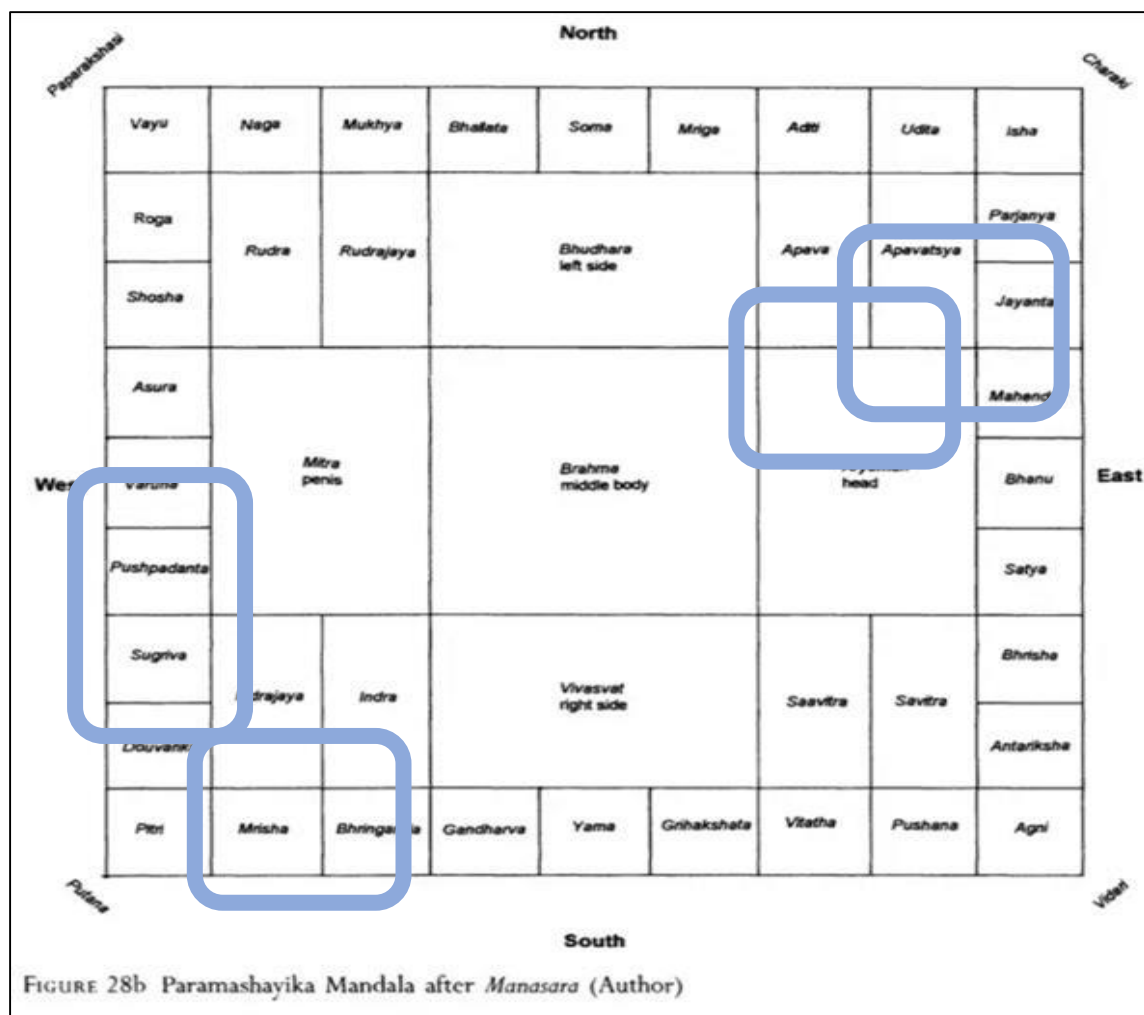
Discussion

Like the Vāstu-Puruṣa-Mandala spread across the earth as a living body, water in Telangana's traditional systems is not contained but inscribed—its flow a sacred grammar that binds cosmos, community, and climate into enduring resilience. The Raigiri Baoli and Hathi Baoli stand as twin testaments to this truth: one a Kakatiya temple-scape where stone steps breathe with monsoon rhythm, the other a Qutb Shahi urban serpent coiled in the city's heart, exhaling cool respite into the sarai's fevered corridors. Both are governed by the same Ishanā breath—the northeast wind of purity and renewal—transforming semi-arid scarcity into a covenant of sustenance (Acharya 1934; Dagens 1994; Kramrisch 1946). This study asked how Vāstu Śāstra's cosmological principles manifest in hydrological design and socio-ritual function across dynasties. The answer emerges not in abstraction but in the pulse of lived practice: water is ontology in motion, a principle that animates geometry, ritual, and ecology in reciprocal harmony.

The Mandala

The Paramāśāyika Maṇḍala, the $9 \times 9 = 81$ -pada grid described in the *Mānasāra*, extends the sacred order of the Vāstu-Puruṣa beyond symbolic geometry into an ecological blueprint. Each pāda is a living locus of elemental governance, and within its expanded periphery, water deities—Īśāna, Parjanya, Apas, Apavatsa, Varuṇa, and Indra—occupy their rightful quadrants across the northeast, east, and west, defining a hydrological circuit of inflow, containment, and release. The grid's ninefold structure allows finer calibration of spatial and environmental hierarchies: inflow and purity in the Ishanā kona (Īśāna–Parjanya), percolation and regulation in the eastern Sūrya–Mahendra pādas, and storage or outflow governed by Varuṇa–Indra along the western and southern limbs.

Figure 4. Mandala Framework of Water Planning - *Paramāśāyika (Paramasayika) Maṇḍala* — the $9 \times 9 = 81$ -pada grid, used in temple/site planning in the *Mānasāra*. (Water-linked deities you highlighted—Īśāna, Parjanya, Apas/Apavatsa, Varuṇa, Indra—sit in their expected quadrants on the 81-grid.)



Source: Adapted from classical text and Vibhiti Sakdevs work; compiled by Author, Afreen Fatima (2025)

Thus, the mandala functions not as a two-dimensional diagram but as a hydro-cosmic regulator, converting metaphysical balance into civic design. Field documentation at Raigiri Baoli and Hathi Baoli confirms that their diagonal axes follow this expanded 81-pada logic: northeast–southwest spines coincide with natural drainage paths, while stepped thresholds mark Varuṇa–Indra zones of containment and discharge. The arrangement validates the *Mānasāra*’s dictum that “water must descend along the limbs of Puruṣa”—a statement of ecological engineering as much as of ritual order. In this reading, the Paramāśāyika Maṇḍala becomes a dynamic hydrological matrix where geometry and gravity, deity and aquifer, converge to sustain equilibrium across the built and unbuilt landscape.

Ethnographic accounts from temple priests and baoli caretakers deepen this reading: water movement is described as “the breath of the deity,” flowing from Īśāna (purity) to Nairṛta

(release), mirroring textual prescriptions for renewal and recharge. The mandala, then, is functional scripture—its geometry governs not only placement but performance, transforming abstract cosmology into resilient hydrology. This finding extends Sinha's (1998) work on North Indian settlement geometry into the Deccan, revealing how Kakatiya and Qutb Shahi architects localized the mandala without fracturing its logic. Where Gujarat's baolis emphasize ornamental descent (Michell 1988), Telangana's prioritize hydrological feedback—a distinction that underscores regional adaptation within a shared Vāstu framework (Sachdev & Tillotson 2000; Chakrabarti 2000).

Raigiri Baoli: The Lung of Granite and Ritual

Imagine the baoli as a lung of granite and laterite, inhaling storm, exhaling life across seasons. At Raigiri Baoli, this respiratory rhythm is palpable: four ghats descend in measured tiers, micro-dams along diagonal axes prevent erosive overflow, and perennial water sustains artisanal economies even in drought years. Ethnographic interviews with stone carvers, weavers, and temple functionaries (n=22) reveal a living ritual-economic nexus: annual kalyanam ceremonies transform the baoli into a vibrant marketplace, with dye vats bubbling along Parjanya pādas and chisels ringing near Sūrya-aligned percolation zones (field notes 2025; Sinha 1998). This micro-zoning is not random but elemental choreography—still water for dyeing, flowing water for cooling—suggesting that artisans are embodied interpreters of the mandala.

The baoli's resilience lies in this fusion of ritual and recharge. Monsoon inflow is captured without spillage, post-monsoon supports irrigation and craft, and dry-season depth ensures access for Magha Snam and pottery. Post-2017 desiltation under Mission Kakatiya, local informants reported visibly higher water tables and revived textile production, confirming that ritual is maintenance infrastructure (Agarwal & Narain 1997; Mission Kakatiya DPR 2021). This finding challenges Gies' (2022) techno-centric view of traditional systems, revealing that cultural encoding—kalyanam funding repairs, Bonalu timing desiltation—is itself adaptive technology. In Kakatiya Telangana, devotion is not epiphenomenon but engine, sustaining both aquifer and economy through sacred rhythm (Mishra 1993).

Hathi Baoli: The Urban Serpent of Cool Respite

Picture a stone serpent coiled in the city's heart, drinking from the mosque and exhaling cool breath into the sarai. Hathi Baoli embodies this metaphor: its five elephant ramps and three

human flights descend into a 25-meter vault, its 2.1 km N–NE axis linking ablution tanks, baoli, and cisterns in a single sacred vector. Oral histories from caravan descendants and waqf caretakers (n=16) describe a multifunctional urban anchor: daily wudu, Urs gatherings, animal watering, and microclimate regulation. During Eid, merchants set up stalls along upper landings; in summer, the shaft air “feels like a cave,” dropping ambient heat significantly (Hardy 2015; AKTC Report 2024; field notes 2025).

This is urban Vāstu in motion: the Ishanā axis channels ritual purity, hybrid lift mechanisms (Persian wheel + Vāstu sluice) ensure perennial yield, and stepped vaults enable evaporative cooling. The baoli is not hybrid by compromise but by enrichment—Islamic ablution activates Indic geometry, Persianate scale amplifies Vāstu function. This synthesis complicates binary narratives of “Indic vs. Islamic” hydrology, aligning with Hardy’s (2015) view of Deccani architecture as dialogue rather than domination. Moreover, the sarai’s 130+ rooms sheltered caravans, date palms provided shade, and baoli water supported trade—proving that civic resilience is ritualized urbanism (Otter 2009; Chakrabarti 2000).

Like a lotus rising from mud, resilience blooms where ritual meets recharge—yet the flower’s roots reveal an unexpected inversion. The qualitative heat maps show strong reciprocity in orientation, depth variation, and materiality at both sites, but maintenance cycles diverge: Raigiri is unidirectional (state-led), Hathi moderate (waqf + trust). This reversal—Kakatiya ritual site now bureaucratically managed, Qutb Shahi urban baoli communally sustained—suggests that ritual density preserves governance. Where daily pūjā once ensured Raigiri’s upkeep, modern secularization has transferred agency to the state; conversely, Hathi’s living Islamic ritual (wudu, Urs) sustains waqf involvement and community care (AKTC Report 2024; field observation 2025).

This finding supports Eck’s (1981) thesis that sacred geography generates “moral ecology,” but exposes its fragility under secular governance. It also explains why artisanal economies persist at Raigiri despite state dominance: craft follows elemental logic, with dye vats in still Parjanya zones and carving near flowing Sūrya pādas. This micro-zoning, absent in textual prescriptions, implies embodied Vāstu—artisans as living mandala interpreters (Sinha 1998). The inversion thus carries policy weight: reviving ritual-maintenance cycles (e.g., funding kalyanam desiltation) could decentralize resilience.

Limitations:

Even the most luminous mandala holds its shadows. This study, though rich in ethnographic depth, remains limited in scope. It focuses on two representative sites—Raigiri Baoli and Hathi Baoli—capturing Kakatiya and Qutb Shahi traditions through comparative interpretation. The geographic and temporal boundaries are narrow; oral histories span only a few generations, and older maintenance records are scarce. The alignment of Vāstu principles with built form reflects interpretive reading rather than archaeological certainty, as dynastic adaptations were context-driven. While GIS and LiDAR supported spatial analysis, subsurface aquifer mapping was not undertaken, making recharge findings observational. These limitations do not weaken the inquiry; they define its frame, ensuring that conclusions remain grounded, cautious, and open for future validation through expanded datasets and interdisciplinary study.

Methodologically, the qualitative heat map relies on researcher-assigned reciprocity levels; inter-coder reliability was not formalized. The Vāstu lens, while powerful, may marginalize Dravidian folk hydrology or Sufi barakat traditions, which informants referenced in passing (Mishra 1993; IGNCA 2021). These gaps do not undermine the core findings but highlight the need for broader, multi-scalar inquiry.

From these stone lungs and lotus hearts, a blueprint rises. Telangana's baolis are locally led adaptation in action (SDG 6, 11, 13): decentralized, culturally embedded, zero-energy systems. Raigiri's micro-dams could be revived in peri-urban tanks to attenuate urban flooding; Hathi's sarai-baoli complexes could cool heat islands while sustaining heritage livelihoods. Ritual-maintenance cycles—kalyanam at Raigiri, Urs at Hathi—offer models for cultural governance of water commons, countering top-down bureaucracy (Agarwal & Narain 1997; Gies 2022).

Policy pathways include:

- Heritage-hydrology zones around baolis, protecting recharge radii.
- Festival-funded restoration, channeling kalyanam/Urs donations into desiltation.
- Artisanal incubation, supporting dye and carving clusters as CCI nodes.

Future Directions:

The Vāstu grid is alive—it can sprout new limbs. Future research should:

Map subsurface aquifers beneath 50+ Telangana baolis using geophysical surveys to quantify recharge (building on Mission Kakatiya DPR 2021).

- Conduct longitudinal ethnographies of ritual-maintenance cycles during Bonalu, Urs, and kalyanam to model cultural governance.
- Compare Deccani baolis with Gujarat/Rajasthan via shared metrics (pāda alignment, thermal drop, artisanal zoning) to test regional Vāstu variation (Michell 1988).

In the end, water does not merely flow—it remembers. Raigiri Baoli holds the echo of Kakatiya chisels; Hathi Baoli carries the breath of Qutb Shahi caravans. Every step is a prayer, every ramp a covenant, every drop a promise between deity and devotee, artisan and aquifer. Across dynasties, water remains the same—jala as law, jala as love, jala as life. This is the deeper proclamation: resilience is not engineered—it is inscribed. When water aligns with cosmos, community, and climate, it does not merely sustain—it sanctifies. Telangana's baolis are not past; they are prescription for a world learning to live with less (Eck 1981; Gies 2022; field notes 2025).

Conclusion:

Like the lotus that rises from the depths of the baoli, unsoiled by the mud of scarcity, the traditional water systems of Telangana emerge as sacred blueprints for a thirsty world. Their stepped petals open not to decorate, but to sustain, recharge, and sanctify. Raigiri Baoli and Hathi Baoli—twin lungs carved into the Deccan's granite heart—do not merely hold water; they remember it. They remember the Kakatiya chisel that shaped their ritual steps, the Qutb Shahi caravans that drank from their elephant ramps, the monsoon that filled their vaults, and the droughts that tested their depth. Within their silent geometry, a truth older than empires breathes—resilience is not engineered, it is inscribed, etched into pāda and prayer, axis and ablution, stone and story.

This research began with an inquiry: how do the cosmological principles of Vāstu Śāstra manifest within the hydrological design and socio-ritual life of Telangana's stepwells across dynasties? The answer, once theoretical, now lives in the physical and spiritual continuity between sacred space and water. The Ishanā breath flows from the temple's garbhagrha to the baoli, from the mosque's mihrab to the sarai cistern—an invisible current that channels purity, prosperity, and persistence. The 64-square Vāstu-Puruṣa-Mandala emerges not as a static diagram but as a living pulse—its devatās guarding percolation, its diagonals preventing flood, its pādas aligning craft with cosmos. At Raigiri, the micro-dams positioned along Sūrya pādas are not mere barriers but solar regulators, releasing monsoon overflow into aquifers with

measured rhythm. At Hathi Baoli, the long N–NE axis becomes a living nāga—absorbing heat, exhaling coolness, and breathing urban relief through ritual and stone.

The qualitative heat maps illuminate this knowledge in tangible ways. Strong reciprocity in orientation, depth variation, and materiality reveals that these systems function as feedback loops between deity and devotee, artisan and aquifer. Raigiri breathes through ritual—its kalyanam festivals transforming the well into a living marketplace of dyes, chisels, and songs. Hathi Baoli breathes through civic ritual—its wudu and Urs gatherings sustaining care through waqf networks while cooling both traveller and town. Ritual here is not an afterthought; it is adaptive infrastructure. It regulates maintenance cycles, funds repair, and binds communities through shared responsibility. In this way, culture itself becomes a technology of survival, a living system that maintains equilibrium between ecology, society, and faith.

Yet, even the lotus casts a shadow. This study, though grounded in deep ethnographic observation, remains bound by time, geography, and data. Only two baolis—Raigiri and Hathi—could be fully documented. Archival loss, especially the destruction of early maintenance logs, obscures continuities of practice. Oral histories extend only three generations, and though the Vāstu framework illuminates sacred geometry, it may overlook other epistemologies such as Dravidian hydrology or Sufi barakat traditions that coexist in these landscapes. The recharge interpretations, while plausible, rest on community testimony and surface readings rather than geophysical instrumentation. Even the carefully designed heat maps, though systematic, reflect subjective interpretation. Yet, these gaps do not weaken the study—they enrich it, revealing the fertile soil from which new questions must grow.

The implications extend well beyond Telangana. These baolis stand as vernacular models of locally led adaptation. They anticipate principles now central to global resilience frameworks: decentralized storage, slow water movement, and social participation. Micro-dams such as those in Raigiri could be reintroduced within Mission Kakatiya’s network of tanks to regulate floods and enhance percolation. The sarai-baoli complexes, like Hathi’s, could serve as cool zones in heat-stressed cities, integrating heritage, hospitality, and livelihood. The ritual-maintenance cycles of kalyanam, Urs, and Bonalu offer living prototypes for community-based water governance—systems of care that transcend bureaucratic inertia. Policy must therefore follow their example: protect heritage-hydrology zones, channel festival economies into restoration funds, and train artisans to sustain craft traditions aligned with sacred ecology.

Ultimately, Raigiri and Hathi Baolis are not relics but revelations. They remind us that water is not merely a resource—it is memory, law, and love. It is memory of the hands that carved devotion into stone, law of the mandala that governs balance and flow, love of the communities that tend and renew it. From their depths rises an ethic that the modern world urgently needs: resilience is not an act of resistance but of reverence. When water is placed in harmony with cosmos, craft, and care, it does not simply endure—it enlightens. These stepwells are not remnants of a vanished past but prescriptions for a future in which survival and sanctity are one. In the stillness of their reflection, we are reminded that every drop is both inheritance and invitation—to remember, to restore, and to return home to the rhythm of the sacred earth.

References

- Acharya, P. K. (1934). *Manasara on Architecture and its Glossary*. Oxford University Press.
- Agarwal, A., & Narain, S. (1997). *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems*. Centre for Science and Environment.
- Aga Khan Trust for Culture (AKTC). (2024). *Conservation and Revitalisation of the Qutb Shahi Heritage Park: Annual Progress Report*. Aga Khan Development Network.
- Central Ground Water Board (CGWB). (2024). *Ground Water Year Book: Telangana State 2023–2024*. Ministry of Jal Shakti, Government of India.
- Chakrabarti, V. (2000). *Indian Architectural Theory: Contemporary Uses of Vastu Vidya*. Curzon Press.
- Dagens, B. (1994). *Mayamata: An Indian Treatise on Housing, Architecture and Iconography*. Sitaram Bhartia Institute of Scientific Research.
- Eck, D. L. (1981). *India: A Sacred Geography*. Oxford University Press.
- Gies, E. (2022). *Water Always Wins: Thriving in an Age of Drought and Deluge*. University of Chicago Press.
- Hardy, A. (2015). *The Temple Architecture of India*. Wiley Blackwell.
- IGNCA (Indira Gandhi National Centre for the Arts). (2021). *Documentation of Stepwells and Traditional Water Systems in the Deccan Region*. IGNCA Publication Series.
- Kramrisch, S. (1946). *The Hindu Temple: Its Meaning, Symbolism, and Plan*. Motilal Banarsidass.
- Michell, G. (1988). *The Stepwells of Gujarat: In Art-Historical Perspective*. *Marg*, 39(2), 25–46.

Mishra, A. (1993). *Aaj Bhi Khare Hain Talab*. Gandhi Peace Foundation.

Mission Kakatiya. (2021). *Detailed Project Report: Raigiri Tank Desiltation and Restoration*.
Telangana Irrigation Department.

Otter, A. (2009). *Hydraulic Urbanism and the Architecture of Water in the Deccan Sultanates*.
Journal of South Asian Studies, 32(4), 515–540.

Rangarajan, L. N. (Ed. & Trans.). (1992). *Kautilya: The Arthashastra*. Penguin Books.

Sachdev, V., & Tillotson, G. (2000). *Building with a Difference: Stepwells of Gujarat*. Marg
Publications.

Sinha, A. (1998). *Design of Settlements in the Vāstu Shastras*. *Journal of Cultural Geography*,
17(2), 27–41.

Telangana Irrigation Department. (2021). *Irrigation Profile of Telangana: Annual Report
2020–2021*. Government of Telangana.