

Biophilic Design as a Bridge Between Applied Vastu and Contemporary Interior Design Practice in Urban Indian Residences

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Abstract

The growing disconnect between urban Indian residents and the natural environment has prompted renewed interest in design strategies that restore human–nature connections within indoor spaces. This paper investigates the conceptual and practical convergence between biophilic design—a framework grounded in the innate human affinity for nature—and Vastu, the ancient Indian architectural science that prescribes spatial harmony through alignment with natural forces. Drawing on a qualitative review of existing literature, established biophilic design frameworks, and core Vastu treatises, the study maps specific correspondences between the two systems across six thematic dimensions: orientation and light, natural materials, spatial organization, water integration, ventilation, and green elements. The analysis reveals that numerous principles advocated by contemporary biophilic design—such as daylighting optimization, the use of organic materials, courtyard-based spatial planning, and sensory engagement with natural elements—were already codified within Vastu Shastra centuries ago, albeit in a cosmological rather than empirical register. The paper argues that recognizing these parallels offers Indian interior designers a culturally grounded rationale for implementing biophilic strategies in urban residential projects, particularly in compact apartments where space constraints demand thoughtful adaptation. A conceptual framework is proposed for integrating biophilic and Vastu-informed design strategies in the context of contemporary Indian housing. The findings contribute to the growing body of cross-disciplinary scholarship at the intersection of interior design, architecture, and design pedagogy, and hold implications for curriculum development in Indian design education.

Keywords: Biophilic Design, design pedagogy, human–nature connection, interior design, urban Indian residences, Vastu Shastra

INTRODUCTION

India's urban population has grown at an unprecedented pace over the past two decades, with projections indicating that nearly 600 million Indians will reside in cities by 2030 (United Nations, 2018) [20]. This rapid urbanization has profoundly altered the residential landscape: high-density apartment complexes have replaced traditional courtyard houses, floor-area ratios have intensified, and the average urban dwelling has become progressively detached from its natural surroundings. The consequences of this detachment are increasingly well-documented. Studies in environmental psychology have demonstrated that prolonged isolation from natural elements correlates with elevated stress, diminished cognitive function, and reduced overall well-being (Kaplan, 1995 [9]; Ulrich et al., 1991 [19]).

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In response, biophilic design has emerged as a significant paradigm within contemporary architecture and interior design. Rooted in Edward O. Wilson's (2017) [21] biophilia hypothesis—the proposition that human beings possess an innate tendency to seek connections with nature and other living systems—biophilic design translates this evolutionary insight into actionable strategies for the built environment. Kellert et al. (2008) [12] formalized these strategies into a comprehensive framework, later refined by Kellert and Calabrese (2015) [11] into three experiential categories: direct experience of nature, indirect experience of nature, and experience of space and place. Concurrently, Browning et al. (2014) [4] developed the widely adopted 14 Patterns of Biophilic Design, which provides measurable criteria for implementation.

While biophilic design has gained considerable traction globally, its adoption in Indian residential interiors actually remains largely intuitive and commercially driven rather than theoretically informed. Simultaneously, Vastu Shastra—the ancient Indian science of spatial design rooted in Vedic texts, such as the Manasara, Mayamatam, and Brihat Samhita—continues to influence residential design decisions across India, though often in a prescriptive rather than analytical manner (Chakrabarti, 1998 [6]; Acharya, 1933 [1]). Vastu Shastra prescribes spatial organization based on the five elements (Panchamahabhutas: earth, water, fire, air, and space), cardinal orientation, solar geometry, and natural material use—principles that bear notable resemblance to the core tenets of biophilic design.

Despite these apparent parallels, there is a conspicuous gap in academic literature that systematically examines the correspondence between Vastu Shastra and biophilic design, particularly within the context of interior design for urban Indian residences. The present paper seeks to address this gap by undertaking a comparative, thematic analysis of the two systems, proposing a conceptual framework that enables Indian interior designers and educators to draw upon culturally embedded knowledge while meeting evidence-based wellness standards.

The objectives of this study are threefold: first, to identify and map the specific principles of Vastu Shastra that correspond with established biophilic design patterns; second, to examine how these convergences can be operationalized in contemporary urban Indian residential interiors; and third, to propose implications for interior design pedagogy in India.

LITERATURE REVIEW

Biophilic Design: Theoretical Foundations

The theoretical underpinning of biophilic design lies in Wilson's (2017) [21] biophilia hypothesis, which posits that *Homo sapiens* evolved in adaptive response to natural, not artificial, forces over more than 99 percent of our species' history (Kellert & Calabrese, 2015) [11]. This evolutionary perspective suggests that beneficial contact with nature remains essential for human physical and psychological well-being even in contemporary urban settings.

Kellert's (2008) [12] foundational framework identified six elements and seventy attributes of biophilic design. This was subsequently refined into a more accessible tripartite framework by Kellert and Calabrese (2015) [11], comprising: (a) direct experience of nature—encompassing natural light, air, water, plants, animals, and landscapes within the built environment; (b) indirect experience of nature—involving natural materials, colors, forms, and processes that represent or evoke the natural world; and (c) experience of space and place—referring to spatial configurations that reflect naturally occurring characteristics, such as prospect and refuge, organized complexity, and transitional spaces.

Independently, Browning et al. (2014) [4] published the 14 Patterns of Biophilic Design through Terrapin Bright Green, categorizing patterns under three headings: Nature in the Space, Natural Analogues, and Nature of the Space. This framework has become widely adopted in professional practice due to its clarity and adaptability. A fifteenth pattern, 'Awe,' was added in 2020 (Browning & Ryan, 2020) [5]. Both frameworks draw upon extensive evidence from environmental psychology, neuroscience, and architecture, with over 500 publications supporting the documented health benefits of biophilic interventions (Browning et al., 2014) [4].

Empirical studies have demonstrated that biophilic elements reduce cortisol levels, lower blood pressure, improve cognitive function, and enhance mood (Ulrich, 1984 [18]; Kaplan, 1995 [9]; Li & Sullivan, 2016 [13]). Al Sayyed and Al-Azhari (2025) [2] recently investigated the physiological effects of biophilic design in residential settings using immersive virtual environments, finding that rooms with biophilic elements significantly reduced skin conductance levels and systolic blood pressure among participants exposed to mild stressors.

Vastu Shastra: Principles and Relevance

Vastu Shastra, derived from the Sanskrit root ‘Vas’ meaning ‘to dwell’ and ‘Shastra’ meaning ‘science’ or ‘doctrine,’ represents one of the oldest codified systems of spatial design in human civilization (Chakrabarti, 1998) [6]. Its origins are traced to Vedic literature, with the Rigveda (circa 1500–1200 BCE) containing hymns invoking Vastupati, the deity protecting dwellings. The system was subsequently elaborated in texts, such as the Manasara (Acharya, 1933) [1], Mayamatam (Dagens, 2007) [7], and Brihat Samhita (Varahamihira, sixth century CE).

The core principles of Vastu Shastra revolve around the Panchamahabhutas (five elements: earth, water, fire, air, and space), the Vaastu Purusha Mandala (a cosmological grid governing spatial organization), and directional alignment based on the sun’s path and the earth’s magnetic field (Pande Rana et al., 2025) [14]. The system prescribes room placement, building orientation, material selection, and the integration of water bodies and vegetation according to a holistic understanding of the relationship between the built form and the natural environment.

Recent scholarship has sought to de-mystify Vastu Shastra by examining its principles through the lens of modern building science. An IIT Bombay study found that Vastu-compliant structures maintained significantly more stable internal temperatures compared to conventional buildings, suggesting that Vastu guidelines for orientation and room placement optimize natural ventilation and solar heat gain. Pande Rana et al. (2025) [14] demonstrated that Vastu’s prescriptions for orientation align with principles of passive solar design, while its emphasis on natural materials corresponds with contemporary sustainability standards.

The Gap: Biophilic Design and Vastu Shastra as Parallel Systems

Despite growing academic interest in both biophilic design and Vastu Shastra individually, few studies have attempted a systematic comparison of the two systems. The intersection has been noted in passing by researchers, such as Dash and colleagues (2021) [8] and in the recent ResearchGate publication, which observed that biophilic design, universal design, and Vastu Shastra share a common philosophical orientation towards human–nature harmony. However, no study to date has mapped the specific patterns and attributes of established biophilic frameworks against Vastu’s codified prescriptions, particularly for the domain of residential interior design in the Indian urban context. This paper addresses that gap. (Figure 1)

METHODOLOGY

This study employs a qualitative, interpretive methodology combining thematic literature review with comparative framework analysis. The research follows a three-stage process.

Stage 1: Literature Identification and Review. A comprehensive search was conducted across Scopus, Web of Science, Google Scholar, and ResearchGate using keyword combinations including ‘biophilic design,’ ‘Vastu Shastra,’ ‘interior design India,’ ‘nature-based design,’ and ‘residential well-being.’ The search covered publications from 2008 to 2025. Additionally, primary Vastu texts in English translation—Manasara (Acharya, 1933) [1], Mayamatam (Dagens, 2007) [7]—and seminal biophilic design texts (Wilson, 2017 [21]; Kellert et al., 2008 [10]; Browning et al., 2014 [4]; Kellert & Calabrese, 2015 [11]) were reviewed.

Stage 2: Thematic Mapping: Six thematic dimensions were identified through inductive coding of recurring principles across both systems: (1) orientation and natural light; (2) natural materials and

textures; (3) spatial organization and the courtyard typology; (4) water integration; (5) natural ventilation and air quality; and (6) vegetation and green elements. Each dimension was examined for convergences and divergences between the biophilic and Vastu frameworks.

Stage 3: Framework Synthesis: Based on the thematic analysis, a conceptual integration framework was developed that positions Vastu-informed strategies within the structure of Kellert and Calabrese's (2015) [11] biophilic design framework. This synthesis was further contextualized through the specific constraints and opportunities of contemporary urban Indian residential interiors.

The study is limited to the analysis of existing literature and frameworks. It does not include empirical fieldwork, such as surveys or case studies, which are recommended as directions for future research.

Findings and Analysis

The thematic analysis reveals substantial convergence between biophilic design patterns and Vastu Shastra principles across all six identified dimensions. These convergences are discussed below, followed by a summary mapping in Table 1.

Orientation and Natural Light

The primacy of natural light is foundational to both systems. Vastu Shastra places particular emphasis on the east–west solar axis, prescribing east-facing entrances to maximize morning sunlight exposure and assigning specific activities to rooms based on the sun's daily trajectory (Pande Rana et al., 2025) [14]. The northeast (Ishanya) is designated as the most auspicious direction, associated with water and light, and is traditionally kept open and unobstructed.

In the biophilic framework, 'Visual Connection with Nature' (Pattern 1) and 'Dynamic and Diffuse Light' (Pattern 6) in Browning et al.'s (2014) [4] taxonomy directly address the role of natural light in reducing stress and supporting circadian rhythms. Kellert and Calabrese (2015) [11] similarly identify natural light as the first attribute under 'Direct Experience of Nature.' The correspondence is not merely thematic but operational: both systems advocate maximizing daylight penetration into habitable spaces, positioning primary living areas along the solar path, and minimizing obstructions to light.

In the urban Indian context, where apartments often face light-deprived orientations due to plot constraints, this convergence has practical significance. Designers drawing on both Vastu and biophilic rationale can make evidence-based arguments for light wells, clerestory openings, reflective surfaces, and room-function allocation based on light availability.

Natural Materials and Textures

Vastu Shastra has historically prescribed the use of natural, locally sourced materials—wood, stone, clay, and metals—as integral to maintaining energetic balance within a dwelling (Acharya, 1933) [1]. The Manasara text specifies preferred wood species for different structural and interior elements, and the selection of stone types is governed by their perceived elemental associations. The use of natural materials is understood not merely as a construction choice but as a means of connecting the built space with the earth element (Prithvi).

Biophilic design echoes this emphasis through the 'Natural Analogues' category (Browning et al., 2014) [4], which advocates the use of natural materials, biomorphic forms, and organic textures to create indirect experiences of nature. Kellert and Calabrese (2015) [11] further identify 'natural materials,' 'age, change, and the patina of time,' and 'natural colors' as distinct attributes under indirect experience of nature. Research demonstrates that exposure to natural materials, such as wood reduces sympathetic nervous system activity and promotes psychological comfort (Tsunetsugu et al., 2007) [17].

For urban Indian residences, this convergence supports the use of traditional materials—teak, rosewood, Kota stone, terracotta tiles, jute textiles, and brass fittings—not merely as aesthetic or cultural

choices, but as biophilic design strategies with measurable wellness benefits. This reframing is particularly relevant in an era when synthetic and industrially processed materials dominate Indian interior design markets.

Spatial Organisation and the Courtyard Typology

Perhaps the most architecturally significant convergence lies in spatial organization. The Vaastu Purusha Mandala, the sacred geometry underlying Vastu spatial planning, places the Brahmarshana (central void) at the heart of the dwelling. This central open space—traditionally manifested as the courtyard (aangan)—serves simultaneously as a source of light, ventilation, rainwater collection, and social gathering (Chakrabarti, 1998) [6]. The courtyard house is one of the oldest and most persistent residential typologies in Indian architecture, present across climate zones from the havelis of Rajasthan to the nalukettu houses of Kerala.

In biophilic terms, the courtyard directly addresses several patterns: ‘Visual Connection with Nature’ (Pattern 1), ‘Non-Visual Connection with Nature’ (Pattern 2), ‘Prospect’ (Pattern 11), and ‘Refuge’ (Pattern 12). The spatial sequence of moving from enclosed rooms through transitional thresholds into an open, sky-lit court resonates with Appleton’s (1975) [3] prospect-refuge theory and with the biophilic attribute of ‘transitional spaces’ (Kellert & Calabrese, 2015) [11]. The courtyard offers what Kaplan (1995) [9] described as ‘soft fascination,’ a restorative experience through undemanding engagement with natural stimuli.

While the traditional courtyard is rarely feasible in contemporary urban apartments, its underlying principles can be reinterpreted. Internal light wells, double-height living areas open to balconies, Juliette windows facing planted shafts, and open-plan kitchens with garden views can all serve as contemporary analogues of the Vastu Brahmarshana—maintaining the functional essence of the central void within compact footprints (Figure 2).

Water Integration

Water holds a central position in both frameworks. Vastu Shastra assigns water to the northeast quadrant of the dwelling and prescribes the inclusion of water bodies—wells, ponds, or tanks—as essential for energetic and environmental balance. The Mayamatam describes elaborate guidelines for the placement and dimensions of water features within temple and residential complexes (Dagens, 2007) [7].

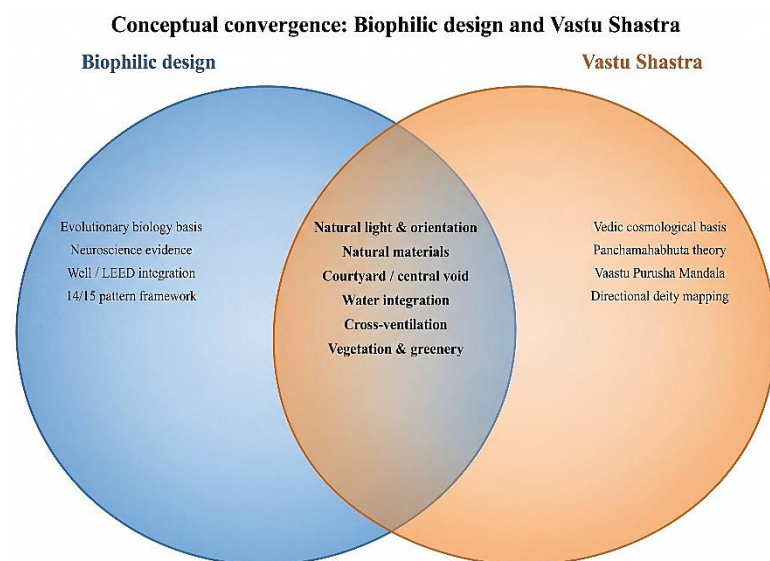


Figure 1. Conceptual convergence between biophilic design and vastu shastra, showing shared and distinct principles.

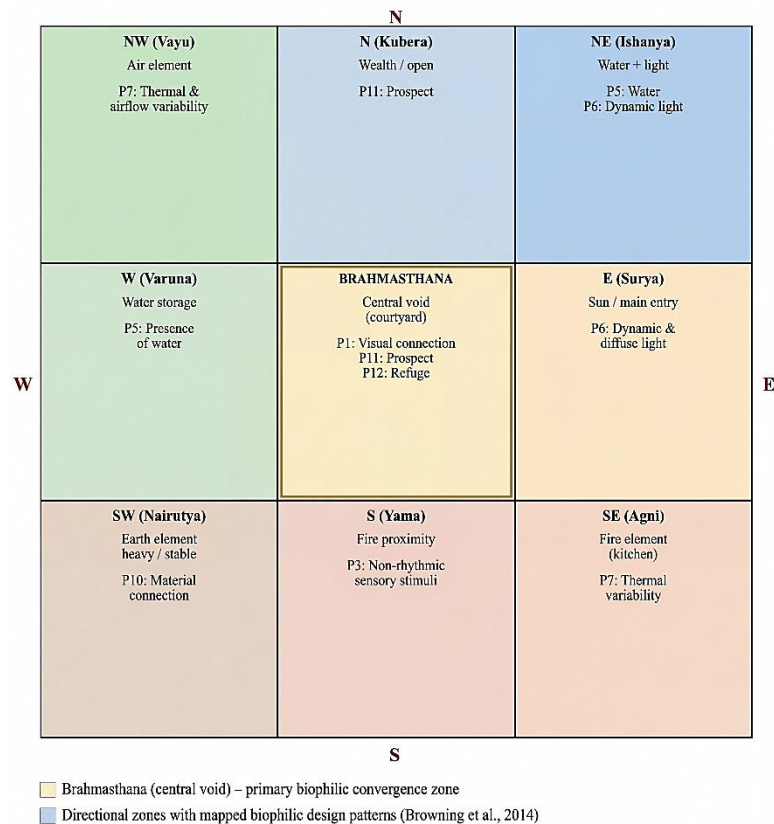
Vaastu purusha mandala: biophilic design pattern mapping

Figure 2. Vaastu Purusha Mandala with biophilic design patterns (Browning et al., 2014) mapped to each directional zone.

Biophilic design identifies ‘Presence of Water’ (Pattern 5 in Browning et al., 2014) [4] as a distinct pattern, noting that the sight, sound, or touch of water reduces stress, enhances mood, and lowers heart rate. Kellert and Calabrese (2015) [11] list water as a primary attribute under direct experience of nature.

In urban Indian apartments, this convergence can be realized through tabletop water fountains, aquariums, reflecting bowls at entrances, or even audio installations that reproduce the sound of flowing water—strategies that satisfy both Vastu placement guidelines and biophilic evidence for multi-sensory water exposure.

Natural Ventilation and Air Quality

Vastu Shastra assigns the element of air (Vayu) to the northwest quadrant and emphasizes cross-ventilation as a design imperative. The system’s insistence on specific window placements and room arrangements is functionally aligned with optimizing natural airflow through the dwelling (Pande Rana et al., 2025) [14]. The Vastu principle of maintaining the northeast as open and unobstructed also facilitates the entry of cool morning breezes, particularly in the Indian subcontinent’s climatic context.

In biophilic design, ‘Non-Rhythmic Sensory Stimuli’ (Pattern 3) and ‘Thermal and Airflow Variability’ (Pattern 7) both address the role of naturally varying air movement in maintaining physiological comfort and alertness. Kellert and Calabrese (2015) [11] include ‘natural ventilation’ as an attribute under direct experience of nature, noting that mechanically uniform air environments are associated with ‘sick building syndrome’ and reduced occupant satisfaction.

The practical convergence is directly relevant to Indian residential interiors, where rising air conditioning dependency has contributed to sealed-envelope apartment designs. Designers can leverage both Vastu directional principles and biophilic evidence to advocate for operable windows, stack ventilation, and spatial layouts that facilitate cross-ventilation—strategies that simultaneously reduce energy consumption.

Vegetation and Green Elements

Vastu Shastra prescribes specific plant species and their placement within the residential compound. The Tulsi plant (*Ocimum sanctum*), traditionally placed in the northeast courtyard, carries both sacred significance and documented air-purifying properties (Prakash & Gupta, 2005) [15]. Vastu texts also prescribe trees in specific directions—neem in the northwest, for instance—reflecting an empirical understanding of microclimatic benefits.

Biophilic design's first pattern, 'Visual Connection with Nature,' emphasizes direct contact with living vegetation, while 'Biomorphic Forms and Patterns' (Pattern 9) and 'Material Connection with Nature' (Pattern 10) address the indirect representation of plant life through forms, textures, and decorative motifs. Living walls, indoor planters, balcony gardens, and botanical artwork are all established biophilic strategies with documented effects on stress reduction, air quality improvement, and occupant satisfaction (Browning et al., 2014) [4].

For urban Indian apartments, the convergence enables designers to frame indoor plant scaping, vertical gardens on balconies, herb-growing kitchen windows, and nature-inspired surface patterns not as decorative afterthoughts but as integrated design strategies supported by both traditional knowledge and contemporary evidence. (Table 1).

DISCUSSION

Convergences and Their Implications

The thematic mapping reveals that the convergence between biophilic design and Vastu Shastra is not incidental but structural. Both systems operate from a foundational premise that the built

Table 1. Thematic mapping of biophilic design patterns and vastu shastra principles.

Thematic dimension	Vastu shastra principle	Biophilic design pattern / attribute	Application in urban Indian residences
Orientation & Light	East-facing entrance; northeast open; solar axis planning	P1: Visual Connection with Nature; P6: Dynamic & Diffuse Light; Direct Experience: Natural Light	Light wells, clerestory openings, room-function allocation by light availability
Natural Materials	Prescribed use of wood, stone, clay, metals; earth element (Prithvi)	P10: Material Connection with Nature; Indirect Experience: Natural Materials, Colours	Teak, Kota stone, terracotta, jute, brass; locally sourced finishes
Spatial Organisation	Brahmasthan (central void); Vaastu Purusha Mandala; courtyard (aangan)	P11: Prospect; P12: Refuge; Experience of Space: Transitional Spaces	Internal light wells, double-height volumes, open-plan with garden views
Water Integration	Northeast water placement; wells, ponds; Jala element	P5: Presence of Water; Direct Experience: Water	Tabletop fountains, reflecting bowls, aquariums, water-sound installations
Ventilation & Air	Northwest for Vayu; cross-ventilation; open northeast	P3: Non-Rhythmic Sensory Stimuli; P7: Thermal & Airflow Variability	Operable windows, stack ventilation, cross-ventilation layouts
Vegetation & Greenery	Tulsi in northeast; prescribed species by direction; garden integration	P1: Visual Connection with Nature; P9: Biomorphic Forms; P10: Material Connection	Vertical gardens, herb windows, botanical motifs, indoor planters

Note: Pattern numbers refer to Browning et al. (2014). Experience categories refer to Kellert and Calabrese (2015).

environment should be conceived as an interface between human inhabitation and the natural world, rather than as an enclosure that excludes nature. The key difference lies in their epistemological registers: Vastu Shastra encodes its principles in cosmological and spiritual language, while biophilic design articulates equivalent principles through the discourse of evolutionary biology, environmental psychology, and neuroscience. The substantive content, however, overlaps considerably.

This convergence has three significant implications for Indian interior design practice. First, it offers practitioners a culturally resonant vocabulary for implementing biophilic strategies. In a market where clients frequently request ‘Vastu-compliant’ interiors, designers can leverage the established cultural authority of Vastu to introduce evidence-based biophilic interventions that might otherwise be dismissed as Western or decorative trends. Second, it provides an intellectual framework for moving beyond the reductive, rule-based application of Vastu (e.g., ‘the kitchen must face southeast’) towards an understanding of the principles underlying such rules—principles that can be adapted to the constraints of modern apartment design without sacrificing their intent. Third, it positions Indian design knowledge as a contributor to, rather than merely a recipient of, global biophilic design discourse.

A Conceptual Framework for Integration

Based on the analysis, this paper proposes a three-tier conceptual framework for integrating biophilic and Vastu-informed strategies in urban Indian residential interiors:

Tier 1: Foundational Principles (applicable to all projects): Maximize natural light through orientation-conscious planning; specify natural, locally sourced materials for primary surfaces; ensure at least one zone of visual or physical connection to vegetation.

Tier 2: Spatial Strategies (adaptable to project scale): Incorporate a ‘central breathing space’ analogous to the Brahmasthana, even if reduced to a double-height volume or a skylit corridor; design for cross-ventilation where feasible; include a water element in the entry or living zone.

Tier 3: Sensory and Experiential Enrichment: Introduce non-rhythmic sensory stimuli through operable fenestration allowing variable breezes and soundscapes; use biomorphic forms and traditional Indian decorative patterns (jali screens, rangoli-inspired floor patterns, kolam motifs) as natural analogues; incorporate aromatic plants in kitchen and wellness zones.

This tiered approach allows designers to calibrate the depth of biophilic–Vastu integration according to project constraints, client receptivity, and budget, while maintaining a coherent design philosophy rooted in human–nature harmony. (Figure 3).

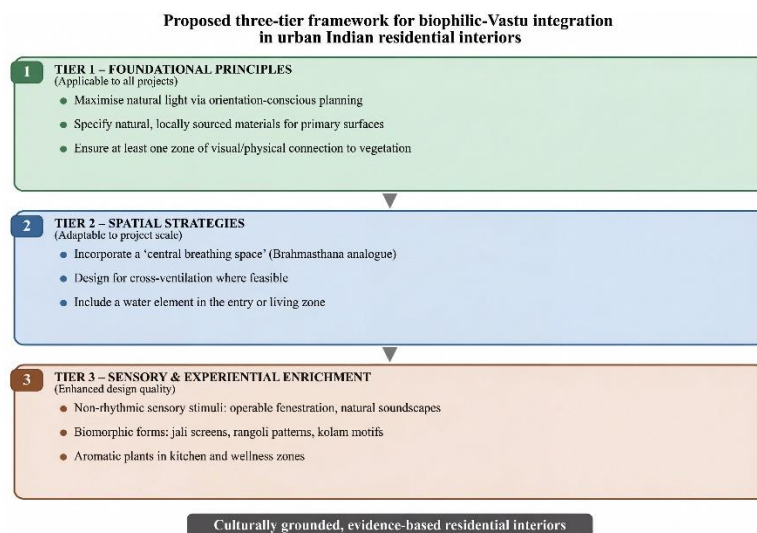


Figure 3. Proposed three-tier conceptual framework for integrating biophilic and Vastu-informed design strategies in urban Indian residential interiors.

Implications for Design Pedagogy

The findings carry direct implications for interior design and architecture education in India. Currently, Vastu Shastra and biophilic design are typically taught as separate subjects—the former often as a cultural studies or heritage module, the latter as a sustainability or environmental design elective. The convergences identified in this study suggest the value of an integrated pedagogical approach where students learn to recognize the scientific rationale underlying traditional design knowledge and to apply evidence-based frameworks that honor cultural context.

Design studios could assign projects that require students to redesign a contemporary apartment using both a biophilic design scorecard (such as the 14 Patterns framework) and Vastu spatial principles, documenting the convergences and creative compromises involved. Such exercises would cultivate critical thinking about the relationship between tradition and evidence, a competency increasingly valued in Indian design practice (Reddy, 2025) [16].

CONCLUSION

This paper has demonstrated that biophilic design and Vastu Shastra, though separated by millennia and by their epistemological frameworks, converge on a remarkably consistent set of principles for creating residential interiors that foster human–nature connection. Across six thematic dimensions—orientation and light, natural materials, spatial organization, water integration, ventilation, and vegetation—the two systems share substantive prescriptions that can be operationalized in contemporary urban Indian residences.

The proposed conceptual framework offers Indian interior designers a structured, tiered approach to integrating these parallel knowledge systems, enabling culturally grounded yet evidence-based design practice. For design educators, the findings underscore the value of interdisciplinary curricula that bridge traditional Indian spatial knowledge with global wellness design standards.

The study is limited by its reliance on literature review and conceptual analysis; empirical validation through case studies, post-occupancy evaluations, and experimental research is recommended as a critical next step. Future studies could quantitatively measure wellness outcomes in Indian apartments designed using the proposed integrated framework, compare occupant satisfaction in biophilic-only versus biophilic–Vastu-integrated interiors, and examine the economic feasibility of such strategies across housing segments.

As Indian cities continue to grow and the demand for wellness-oriented residential design intensifies, the recognition that ancient Indian architectural wisdom and contemporary biophilic science point in the same direction offers a powerful foundation for design innovation—one that is at once globally informed and deeply rooted in Indian cultural identity.

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