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Panchavati: Sacred Trees and Ecological Heritage towards Human Well-being

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Abstract

Panchavati, the sacred assemblage of five revered trees, represents one of the oldest ecological traditions embedded in the cultural landscape of India. Although widely known through epics, Puranic literature and temple traditions, Panchavati extends beyond religious symbolism and embodies a sophisticated understanding of biodiversity conservation, ecological balance, medicinal plant utilization and harmonious coexistence between humans and nature. The deliberate cultivation of selected tree species around hermitages, temples and settlements served multiple ecological and social functions, including soil conservation, microclimate regulation, habitat creation for birds and pollinators, carbon sequestration and preservation of medicinal plant resources. Traditional communities perceived these trees as sacred entities, thereby ensuring their protection through cultural practices rather than legal regulations.

Modern botanical and pharmacological investigations demonstrate that many Panchavati species possess significant bioactive compounds with antioxidant, antimicrobial, anti-inflammatory, immunomodulatory and cardioprotective activities. Simultaneously, these species contribute to ecosystem resilience through nutrient cycling, groundwater recharge, carbon storage and enhancement of local biodiversity. The Panchavati tradition therefore illustrates an integrated ecological philosophy where spiritual values, environmental stewardship and community health reinforce one another.

This review synthesizes classical literary sources, ethnobotanical knowledge and contemporary scientific literature to examine Panchavati as a multidisciplinary framework connecting sacred ecology, agroforestry and ecological sustainability. The study argues that traditional sacred grove practices continue to provide valuable insights for biodiversity conservation and ecological restoration.

Keywords: Panchavati, Sacred Trees, Ethnomedicine, Sacred Groves, Ecology, Medicinal Plants, Biodiversity Conservation, Agroforestry, Ecological Health

Introduction

Across civilizations, trees have served as symbols of continuity, resilience and life. In the Indian subcontinent, reverence for trees evolved into sophisticated ecological traditions that integrated spirituality with environmental stewardship. Among

these traditions, *Panchavati* occupies a distinctive position as a sacred assemblage of five selected tree species cultivated in hermitages, temple complexes and community landscapes. The term *Panchavati* literally denotes a grove of five sacred trees, although regional traditions differ in the exact botanical

composition. Classical literature associates *Panchavati* with spiritual practice, meditation, ecological harmony and human well-being.

The Ramayana immortalized *Panchavati* as the forest dwelling of Rama, Sita and Lakshmana, transforming it into a symbol of ideal coexistence between humans and nature. Subsequent Purāṇic literature, temple rituals and regional customs further enriched the concept by associating individual trees with divine principles, medicinal virtues and ecological functions. Sacred trees such as Bilva, Ashvattha, Tulasi, Ashoka and Khadira became integral components of cultural landscapes, while regional traditions incorporated Neem, Banyan, Amla and Banni according to local ecological conditions.

Beyond religious symbolism, *Panchavati* represents a remarkable example of indigenous ecological planning. The deliberate preservation of perennial tree species created stable microhabitats that supported biodiversity, moderated local climate, conserved soil moisture and supplied medicinal resources for surrounding communities. The ecological services provided by sacred groves anticipated many principles now recognized in restoration ecology and sustainable landscape management.

Recent advances in ethnobotany, phytochemistry and conservation biology have renewed interest in sacred groves as reservoirs of biological diversity and traditional knowledge. Numerous medicinal plants associated with *Panchavati* possess pharmacologically active compounds that continue to attract biomedical research. Simultaneously, sacred groves function as repositories of native germplasm and contribute to landscape resilience in increasingly fragmented ecosystems.

The present review reinterprets *Panchavati* through an interdisciplinary lens by integrating historical literature, botanical science, ethnomedicine, ecology and agroforestry. It seeks to demonstrate that the *Panchavati* tradition represents not merely a cultural heritage practice but an enduring ecological paradigm capable of informing contemporary approaches to environmental conservation and human well-being.

Historical Evolution of the *Panchavati* Concept

The concept of *Panchavati* occupies a distinctive position in the cultural and ecological history of the Indian subcontinent. The Sanskrit term *Panchavati* literally denotes "a grove consisting of five sacred trees." Classical literature portrays such groves as ideal habitats for contemplation, spiritual practice, education, and harmonious interaction between human society and nature. Although the specific

composition of *Panchavati* varies regionally, the underlying philosophy remains constant: the conservation of ecologically and culturally significant tree species through sacred traditions.

The most celebrated reference to *Panchavati* occurs in the *Valmiki Ramayana*, where Lord Rama, Sita, and Lakshmana established their forest hermitage on the banks of the Godavari River. The narrative depicts the grove as a landscape of exceptional biological richness, abundant water resources, flowering trees, birds, and wildlife. Rather than serving merely as a mythological setting, *Panchavati* represents an ecological ideal where human habitation is integrated with natural ecosystems without degrading environmental integrity.

Subsequent Purāṇic literature, Āgamic traditions, and regional religious practices further expanded the symbolism of *Panchavati*. Various sacred texts associate particular trees with specific deities and cosmic elements, thereby reinforcing their protection through ritual observances. Such traditions effectively transformed ecological conservation into a cultural obligation, ensuring the survival of valuable native species over centuries.

Regional traditions across India adapted *Panchavati* according to local ecological conditions. In Karnataka, combinations involving Ashvattha (*Ficus religiosa*), Bilva (*Aegle marmelos*), Banyan (*Ficus benghalensis*), Neem (*Azadirachta indica*), Amla (*Phyllanthus emblica*), and Banni (*Prosopis cineraria* or related species) have been maintained in temple precincts and village commons. These regional adaptations demonstrate the dynamic relationship between traditional ecological knowledge and local biodiversity.

From an environmental perspective, *Panchavati* may be interpreted as an early community-based conservation strategy where religious values ensured long-term protection of ecologically important species without formal legal institutions. Such sacred landscapes contributed significantly to biodiversity preservation and ecological resilience throughout history.

Further, it is worth noting here that *Panchavati* is one model. There are similar models like the *Rāshi vana*, *Nakshatra vana*, *Panchabhoota vana*, *Devara kādu*, *Charaka vana*, Neem-Peepal-Bayan combination, Neem-Peepal *vivāh* (marriage) etc. All such concepts serve similar purpose as the *Panchavati*.

Botanical Diversity and Ecological Significance

The botanical composition of *Panchavati* differs among textual traditions and geographical regions, yet certain species occur repeatedly because of their

ecological adaptability, medicinal importance, and cultural significance. Table 1 shows a typical

Table 1: Typical Panchavati tree combinations in various regions.

Spiritual Forest Type & Primary State / Region	The Five Representative Sacred Trees / Plants
Pan-India Standard (Central, Northern, & Western India)	1. Peepal (<i>Ficus religiosa</i>) 2. Banyan / Vata (<i>Ficus benghalensis</i>) 3. Bilva / Bael (<i>Aegle marmelos</i>) 4. Amla (<i>Phyllanthus emblica</i>) 5. Ashoka (<i>Saraca asoca</i>)
Arid & Semi-Dry Zone (Rajasthan, Punjab, Haryana)	1. Peepal (<i>Ficus religiosa</i>) 2. Banyan (<i>Ficus benghalensis</i>) 3. Bilva / Bael (<i>Aegle marmelos</i>) 4. Neem (<i>Azadirachta indica</i>) 5. Shami (<i>Prosopis cineraria</i>)
Southern Evergreen Zone (Tamil Nadu, Karnataka, Kerala)	1. Ashwatha (Peepal) 2. Audumbara / Gular (<i>Ficus racemosa</i>) 3. Bilva (<i>Aegle marmelos</i>) 4. Nimba / Neem (<i>Azadirachta indica</i>) 5. Vanni / Shami (<i>Acacia ferruginea</i>)
Nashik Pilgrimage Core (Maharashtra State)	Five Standalone Banyan Trees (Five distinct individual Vats)
Jain Tirthankar Van (Gujarat, Rajasthan, Maharashtra)	1. Bargad / Vata (<i>Ficus benghalensis</i>) 2. Sal (<i>Shorea robusta</i>) 3. Peepal (<i>Ficus religiosa</i>) 4. Ashoka (<i>Saraca asoca</i>) 5. Mahua (<i>Madhuca indica</i>)
Navgraha Van / Vatika (Pan-India Astrological)	1. Arka / Rui (<i>Calotropis gigantea</i>) 2. Palash (<i>Butea monosperma</i>) 3. Khair (<i>Acacia catechu</i>) 4. Apamarga (<i>Achyranthes aspera</i>) 5. Shami (<i>Prosopis cineraria</i>)

A typical one is explained here.

Among the *Panchavati* trees these, **Bilva (*Aegle marmelos*)** occupies a central place owing to its association with Lord Shiva and its extensive use in Ayurveda. The tree tolerates drought, improves soil quality, supports insect diversity, and produces fruits rich in vitamins, tannins, coumarins, and alkaloids. Modern pharmacological investigations have

demonstrated antioxidant, antidiabetic, antimicrobial, and gastroprotective activities.

Ashvattha (*Ficus religiosa*), commonly known as the sacred fig, represents one of the most ecologically significant trees in South Asia. Its extensive canopy supports hundreds of bird, insect, and epiphytic species while providing nesting habitats and food resources. Its deep root system contributes to groundwater recharge and soil stabilization, making it an important component of traditional landscape ecology.

Tulasi (*Ocimum tenuiflorum*), revered in household courtyards across India, combines medicinal importance with ecological value. Rich in eugenol, ursolic acid, rosmarinic acid, and essential oils, Tulasi exhibits antimicrobial, antiviral, anti-inflammatory, and immunomodulatory properties. Its flowers attract numerous pollinating insects, thereby enhancing local ecological interactions.

Ashoka (*Saraca asoca*), traditionally associated with feminine fertility and prosperity, is an important medicinal species used extensively in Ayurvedic gynecological formulations. The tree also serves as an ornamental species that supports urban biodiversity and contributes to landscape aesthetics.

Khadira (*Acacia catechu*), widely distributed in dry deciduous forests, contributes to nitrogen cycling, soil improvement, and sustainable agroforestry systems. Catechin and catechu tannins extracted from its bark possess significant medicinal and industrial applications.

The ecological value of *Panchavati* therefore extends beyond symbolic associations. Each constituent species contributes unique ecosystem services including carbon sequestration, pollinator support, nutrient cycling, habitat formation, and microclimatic regulation.

Placement of *Panchavati* plants in the land

A traditional Vaastu-based layout for a *Panchavati* (a sacred grove of five trees), detailing their specific directional placements, associated deities, and elemental connections.

The arrangement is centred around the Vata (Banyan) tree, (figure 1) which is positioned in the middle and associated with Shiva and Prakriti (Nature). This arrangement places the Bilva tree in a position of supreme importance, serving as the axis around which the other four sacred trees and their respective elemental and divine spheres are organized.



Figure 1: Arrangement of the Panchavati plants

The figure also shows the placement of four other sacred trees in the ordinal directions, each linked to one of the four elements:

- **Northeast (Ishanya):** This direction is designated for the Ashvattha (Peepal) tree. It is associated with the element of Water and the deity Vishnu. The diagram also notes a connection to Tulasi in this sector.
- **Southeast (Agneya):** The Karaveera (Oleander) tree is placed here, representing the element of fire. It is associated with Surya (the Sun) and mentions Bili Ekke (White Calotropis) as a secondary plant.
- **Southwest (Nairutya):** This corner features the Vidira (Bamboo) tree, linked to the element of Earth (*Bhumi*). The deities associated with this direction are Ganesha and Durga.
- **Northwest (Vayavya):** The Ashoka tree is positioned in this direction, corresponding to the element of Air/Wind. It is associated with the deity Vayu and the goddess Ambika/Parvati.

Table 2: The Panchavati plants/trees

Direction	Primary plant/tree	Ground-level / Surrounding plant
Center (Kendra)	Bilwa <i>Aegle marmelos</i>	Drona (Thumbe) <i>Leucas aspera</i>
Northeast (Ishanya)	Ashvattha (Peepal) <i>Ficus religiosa</i>	Tulasi <i>Ocimum tenuiflorum</i>

Direction	Primary plant/tree	Ground-level / Surrounding plant
Southeast (Agneya)	Karaveera (Oleander) <i>Nerium oleander</i> *	Bili Ekke (White Calotropis) <i>Calotropis procera</i>
Southwest (Nairutya)	Vidira (Bamboo) <i>Bambusa arundinacea</i> *	Durva (Bermuda Grass) <i>Cynodon dactylon</i>
Northwest (Vayavya)	Ashoka <i>Saraca asoca</i> *	Shanka Pushpa <i>Convolvulus pluricaulis</i>

Ethnomedicinal Importance of Panchavati Species

Traditional medical systems have long recognized the therapeutic potential of Panchavati species. Classical Ayurvedic literature, regional folk medicine, and indigenous healing traditions describe numerous applications for these plants in preventive and curative healthcare.

Bilva fruits and leaves have been employed in gastrointestinal disorders, dysentery, diabetes, inflammatory diseases, and digestive dysfunctions. Experimental studies indicate the presence of marmelosin, aegeline, and various flavonoids contributing to these pharmacological effects.

Tulasi remains one of the most extensively investigated medicinal herbs worldwide. Contemporary research demonstrates antioxidant, adaptogenic, anti-inflammatory, antimicrobial, antiviral, and immunoregulatory activities. Its essential oils have attracted interest for respiratory disorders, metabolic diseases, and stress management.

Ashvattha bark, leaves, and latex are traditionally utilized in wound healing, diabetes management, asthma, and inflammatory disorders. Phytochemical analyses have identified flavonoids, phenolic compounds, sterols, and glycosides with potential therapeutic applications.

Ashoka bark is regarded as an important uterine tonic within Ayurveda and continues to be incorporated into several classical formulations for women's reproductive health. Scientific studies indicate anti-inflammatory and antioxidant activities associated with polyphenolic constituents.

Khadira possesses antimicrobial, antioxidant, anti-inflammatory, and wound-healing properties. Extracts have shown efficacy against several microbial pathogens and have applications in oral healthcare and dermatological conditions.

It is important to recognize that while many

traditional uses are increasingly supported by pharmacological investigations, therapeutic application should rely upon validated clinical evidence and appropriate medical supervision. Traditional knowledge provides valuable leads for biomedical research but should not substitute evidence-based clinical practice without adequate evaluation.

***Panchavati* and Traditional Agroecology**

Traditional agricultural systems recognized the ecological benefits of maintaining diverse perennial vegetation within cultivated landscapes. *Panchavati* exemplifies such integrated land-use planning by combining tree conservation with agricultural productivity and rural livelihoods.

Sacred trees improve soil organic matter through litter decomposition, regulate nutrient cycling, reduce erosion, enhance groundwater infiltration, and moderate local temperatures. Their canopies provide shelter for pollinating insects and natural predators of agricultural pests, thereby contributing indirectly to crop productivity.

Traditional agroforestry systems surrounding temples and village settlements often incorporated sacred trees as ecological buffers that enhanced landscape heterogeneity. Such multifunctional landscapes simultaneously supplied fruits, medicinal resources, fuelwood, fodder, shade, and cultural services.

Recent ecological studies emphasize that diversified tree-based agricultural systems exhibit greater resilience to climatic variability than monocultural systems. *Panchavati* thus represents an indigenous model of climate-resilient landscape management rooted in centuries of practical experience.

Sacred Groves, Biodiversity and Ecosystem Services

Sacred groves constitute one of the oldest forms of community-managed biodiversity conservation. Protected through religious beliefs and customary laws, these landscapes often preserve remnant patches of native vegetation that harbor rare and endemic species.

Ecological investigations across India demonstrate that sacred groves possess greater plant diversity, improved soil quality, enhanced carbon storage, and richer faunal communities than surrounding disturbed habitats. They function as ecological refugia supporting birds, reptiles, mammals, fungi, pollinating insects, and microorganisms essential for ecosystem functioning.

The conservation philosophy embedded within *Panchavati* contributed to maintaining ecological connectivity between forest fragments and agricultural landscapes. Such traditional institutions continue to provide valuable lessons for landscape restoration, ecological resilience, and community participation in conservation.

Beyond biodiversity, sacred groves generate ecosystem services including groundwater recharge, climate moderation, erosion control, nutrient cycling, carbon sequestration, and cultural identity. These services directly contribute to ecological health and human well-being by sustaining environmental quality and strengthening community relationships with nature.

***Panchavati*, Ecological Health and Human Well-being**

The increasing frequency of climate change, biodiversity loss, environmental degradation and lifestyle-related diseases has renewed scientific interest in traditional ecological practices that integrate human well-being with ecosystem conservation. The *Panchavati* tradition exemplifies such an integrated approach by recognizing that environmental health and human health are mutually dependent.

The selection of perennial tree species in *Panchavati* contributes significantly to ecological stability. Deep-rooted trees enhance groundwater recharge, reduce soil erosion, regulate hydrological cycles and improve soil organic matter through continuous litter deposition. Their extensive canopies moderate local temperatures by reducing heat stress, increasing humidity and improving microclimatic conditions, particularly in rural settlements and temple landscapes.

The biological diversity associated with *Panchavati* extends beyond the trees themselves. Sacred groves provide nesting sites for birds, refuges for reptiles and mammals, and food resources for pollinating insects and beneficial arthropods. Such ecological interactions support natural pest regulation and contribute to ecosystem resilience. Recent ecological studies increasingly recognize that small protected vegetation patches can function as biodiversity reservoirs within fragmented landscapes.

From a public health perspective, sacred green spaces influence both physical and psychological well-being. Exposure to tree-rich environments improves air quality, reduces particulate pollution, lowers ambient temperature and promotes recreational and spiritual activities that reduce psychological stress. Traditional communities intuitively understood these benefits and therefore

established sacred groves close to settlements and temples where social and cultural life was concentrated.

Medicinal plants associated with *Panchavati* further contribute to preventive healthcare. Their continued cultivation preserves valuable genetic resources that may support future pharmaceutical discovery. Consequently, *Panchavati* represents an integrated ecological-health model where environmental conservation simultaneously strengthens community health and cultural continuity.

Discussion

The *Panchavati* tradition demonstrates an extraordinary convergence of ecological wisdom, botanical knowledge, medicinal practice and cultural values. Rather than separating religion, science and environmental management into independent domains, traditional communities embedded conservation ethics within everyday religious practices. Such cultural mechanisms created powerful social institutions for protecting ecologically significant species across generations.

Modern conservation biology increasingly acknowledges the importance of indigenous and community-based conservation systems. Sacred groves preserved through customary practices frequently contain higher levels of biodiversity than surrounding landscapes subjected to intensive agriculture or urbanization. Their protection through cultural norms has often proven more durable than externally imposed regulatory frameworks.

Botanical investigations reveal that many *Panchavati* species possess exceptional ecological adaptability and medicinal importance. The coexistence of multiple perennial species within a single sacred landscape enhances structural diversity, supports pollinator communities and stabilizes ecosystem functions. Such diversity contrasts with monocultural plantations that frequently exhibit reduced ecological resilience.

Ethnomedicinal traditions associated with *Panchavati* illustrate the sophisticated empirical knowledge accumulated through centuries of observation. Although certain traditional therapeutic claims require additional clinical validation, numerous phytochemical investigations confirm the presence of biologically active compounds with antioxidant, antimicrobial, anti-inflammatory and immunomodulatory properties. This convergence between traditional knowledge and modern biomedical research provides opportunities for interdisciplinary collaboration.

The *Panchavati* concept also offers important insights for sustainable landscape planning. Urbanization and

agricultural intensification have contributed to declining tree cover and fragmentation of native vegetation. Integrating culturally important native tree species into urban parks, educational institutions, temple precincts, agricultural landscapes and community forests may simultaneously enhance biodiversity conservation, ecosystem services and public engagement in environmental stewardship.

Furthermore, *Panchavati* highlights the ethical dimension of ecological conservation. Sacredness functioned historically as a social mechanism that discouraged exploitation while encouraging long-term protection. Contemporary environmental education may benefit from recognizing the cultural and spiritual values that motivate conservation behavior alongside scientific arguments for biodiversity preservation.

Conclusion

Panchavati represents far more than a symbolic collection of five sacred trees. It embodies a comprehensive ecological philosophy in which biodiversity conservation, medicinal plant preservation, sustainable resource management and human well-being are understood as interdependent dimensions of a unified natural order.

Historical literature, regional traditions and ethnobotanical knowledge collectively demonstrate that *Panchavati* served as a practical model for integrating environmental stewardship into everyday cultural life. The deliberate protection of selected tree species generated multiple ecological benefits, including habitat conservation, carbon sequestration, soil stabilization, groundwater recharge and maintenance of biological diversity. Simultaneously, these species provided valuable medicinal resources that supported community healthcare through traditional systems of medicine.

Contemporary scientific investigations increasingly validate many ecological and pharmacological observations associated with *Panchavati* species. While traditional beliefs should be interpreted within their cultural context, modern botanical and biomedical research confirms that sacred trees contribute significantly to ecosystem functioning and possess substantial therapeutic potential. Their conservation therefore represents both a cultural responsibility and an ecological necessity.

In an era characterized by accelerating biodiversity loss and environmental instability, the *Panchavati* tradition offers an enduring model of coexistence between humans and nature. The preservation and restoration of sacred groves, integration of native medicinal trees into agroforestry systems, and documentation of associated traditional knowledge

may contribute significantly to future strategies for ecological restoration and community well-being.

The *Panchavati* tradition thus remains a living testament to the profound understanding that ecological integrity, cultural continuity and human health flourish together when nature is treated not merely as a resource but as a sacred partner in sustaining life.

Table 3. Representative Panchavati Species and Their Traditional Significance

Common Name	Traditional Significance	Major Ecological Function
Bilva	Sacred to Shiva; medicinal tree	Drought tolerance, pollinator support
Ashvattha	Sacred fig; meditation tree	Habitat for birds and insects
Tulasi	Sacred household herb	Pollinator attraction, medicinal value
Ashoka	Sacred feminine symbol	Ornamental biodiversity support
Khadira	Ritual and medicinal tree	Nitrogen cycling and soil improvement

Table 4. Selected Ethnomedicinal Properties of Panchavati Species

Species	Major Bioactive Constituents	Modern Pharmacological Evidence
<i>Aegle marmelos</i>	Marmelosin, flavonoids	Antidiabetic, antioxidant
<i>Ocimum tenuiflorum</i>	Eugenol, ursolic acid	Anti-inflammatory, antimicrobial
<i>Ficus religiosa</i>	Polyphenols, sterols	Antioxidant, antimicrobial
<i>Saraca asoca</i>	Polyphenols, tannins	Anti-inflammatory activity
<i>Acacia catechu</i>	Catechin, tannins	Antimicrobial, antioxidant

Table 5. Ecological Contributions of Panchavati Sacred Groves

Ecological Service	Contribution
Carbon sequestration	Long-term biomass accumulation
Pollinator conservation	Habitat for bees, butterflies and insects
Soil conservation	Reduction of erosion and improvement of fertility
Water conservation	Enhanced infiltration and groundwater recharge
Biodiversity conservation	Refuge for native flora and fauna
Microclimate regulation	Temperature moderation and humidity maintenance
Cultural ecosystem services	Spiritual practices and community identity

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