

Understanding and Enhancing Cultural Ecosystem Services Supply in Historic Gardens for Sustainable Heritage Management: Lessons from Two Sites in Delhi

Mona Sood^{1*} Harveen Bhandari²

¹ Research Scholar, Chitkara School of Planning and Architecture, Chitkara University, Punjab, India

Email ID: mmsood19@gmail.com

Orcid Id: 0009-0005-3482-8935

² Principal and Dean-PhD Program, Chitkara School of Planning and Architecture, Chitkara University, Punjab, India

Email ID: harveen.bhandari@chitkara.edu.in

Orcid Id: 0000-0003-1461-8728

Abstract: Historic gardens are a nation's precious cultural and natural heritage, having both tangible and intangible values. Across the world, many historic gardens have been reduced to mere public parks or tourist attractions, facing challenges in meeting the needs of contemporary society. This study applies the Cultural ecosystem services (CES) framework to examine how spatial attributes, heritage features, and management approaches in historic gardens contribute to community well-being and sustainable heritage management. Using two emblematic sites in New Delhi—Lodi Garden, a historically layered urban park informally embedded in residents' daily lives, and Sunder Nursery, a benchmark model of heritage-led regeneration—this research compares their spatial qualities, characteristic features, and institutional arrangements that influence CES delivery. The analysis reveals that a combination of well-preserved heritage features, thematic landscapes, biodiversity zones, recreational amenities, and supporting infrastructure enables historic gardens to provide a wide spectrum of CES, including recreational, aesthetic, educational, social, spiritual, and heritage-related benefits. The study contributes to the existing body of literature on CES and heritage landscapes while offering practical insights for heritage managers and urban planners seeking to integrate CES-based strategies into the conservation and management of historic gardens.

Keywords: Historic gardens, cultural ecosystem services, community well-being, sustainable heritage management, conservation

1. INTRODUCTION

Historic gardens, recognized as living monuments (ICOMOS, 1982), are integral constituents of a nation's cultural and natural heritage, embodying both tangible and intangible values (Funsten et al., 2020). They stand among the finest expressions of human ingenuity, reflecting a unique synthesis of historical, artistic, and ecological elements (Athanasiadou, 2019; Sood & Bhandari, 2023a). These designed landscapes illustrate the enduring relationship between people and nature, transcending cultural, temporal, and geographic boundaries (Olivadese & Dindo, 2022; Cazzani et al., 2019). They serve as repositories of cultural history, biodiversity, and traditional horticultural practices, rendering them veritable treasures in the contemporary era (Nag, 2024). But “everything of value is vulnerable,” and this adage aptly encapsulates the current reality of historic gardens. Despite the existence of heritage protection regulations, numerous historic gardens worldwide face neglect, developmental pressures, institutional apathy, and insufficient funding—factors that gradually erode their artistic and cultural significance (Funsten et al., 2020; Gullino et al., 2020). This changes the manner in which these spaces are perceived and experienced, ultimately diminishing public appreciation. Often reduced to mere public parks or tourist spots, many historic gardens today face challenges in fulfilling societal needs (Paraskevopoulou et al., 2020; Sood & Bhandari, 2023a). Several researchers argue that restoration alone cannot ensure the continued relevance of heritage assets; balancing the preservation of historical and ecological integrity with the demands of contemporary society is critical (Paraskevopoulou et al., 2020; Bansal & Chhabra, 2023; Nag, 2024). These gardens must attract and engage visitors to foster sustainable, long-term relationships (Hristov et al., 2018). Conserving historic sites

in a contemporary urban context requires adaptive and sustainable management strategies that not only raise awareness and appreciation of their heritage values but also address modern-day visitor needs and enhance community well-being (Singh, 2021; Kaur & Bhandari, 2023).

In view of the above, the present study adopts the Cultural Ecosystem Services (CES hereafter) framework to explore the potential of historic gardens to deliver a wide spectrum of socio-cultural benefits, and to identify strategies for enhancing their significance and use in ways that advance sustainable heritage management and foster community well-being. Within the broader context of ecosystem services, CES are defined by the United Nations' Millennium Ecosystem Assessment (MEA, 2005) as "*the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.*" These services are particularly valuable in urban environments, as they are directly experienced and intuitively appreciated by people (Tratalos, 2016). CES in the recent past have gained recognition as an approach to – explore human-nature relationship understanding how people engage with natural environments (Gai et al., 2022); reveal the intangible benefits of ecosystems (Wangai et al., 2017); analyze the multifunctionality of natural spaces (Dushkova et al., 2021); and promote effective conservation and sustainable management of natural resources in the city (Plieninger et al., 2013). A growing body of literature demonstrates that CES of urban green spaces provide a range of well-being benefits to citizens, thereby improving quality of urban life (Dickinson & Hobbs, 2017; Wangai et al., 2017). Furthermore, CES often foster deep emotional attachment in communities, motivating greater public engagement and stewardship of the natural environment (Plieninger et al., 2013; Fish et al., 2016).

Significance of the study

Historic gardens occupy a paradoxical position—they are widely visited and ecologically significant, yet their socio-cultural potential is often overlooked. While they may be valued for their beauty or recreational opportunities, their role as spaces of emotional, cognitive, and spiritual enrichment remains under-recognized. Urban planning and conservation policies frequently focus on ecological restoration or tourism promotion, but pay limited attention to the cultural and experiential dimensions that are critical for sustained community engagement and heritage stewardship. Understanding and enhancing CES in historic gardens is therefore not only about conserving physical landscapes, but also about revitalizing the intangible connections people form with these spaces. In the context of rapid urbanization and growing pressures on heritage resources, such an approach can help ensure both their long-term conservation and continued social relevance. Despite a growing body of research on CES in urban green spaces, historic gardens—arguably among the most distinctive forms of urban greenery—have received limited attention from this perspective. Similarly, literature on historic garden conservation has rarely addressed the role of CES in sustainable heritage management. This research seeks to bridge these gaps by exploring the myriad CES offered by historic gardens and their related well-being benefits, and by identifying strategies to enhance these services as a means of securing their conservation, relevance, and community value. This study, in particular, seeks to answer two research questions: What is the potential of historic gardens to deliver CES? What spatial attributes and characteristic features of historic gardens contribute to CES supply? How can the CES supply of historic gardens be enhanced to support their sustainable management?

2. LITERATURE REVIEW

Cultural Ecosystem Services represent the cultural and social benefits people derive from ecosystems (Gai et al., 2022). The *Millennium Ecosystem Assessment* (MEA, 2005) identifies ten categories of CES: cultural diversity; spiritual and religious values; knowledge systems; educational value; inspiration; aesthetic values; social relations; sense of place; cultural heritage values; and recreation and ecotourism. To assess the potential of historic gardens to provide CES, this study conducted a systematic literature review with the aim of identifying the spatial attributes and characteristic features of these gardens that generate CES. The ten MEA categories were used as guiding themes, and relevant scholarly literature was searched using these categories (and their conceptual equivalents) as keywords, given that many studies on historic gardens do not explicitly use CES terminology. Following precedents in earlier CES studies (Plieninger et al., 2013; Wangai et al., 2017; Dai et al., 2019), overlapping categories were combined for analytical clarity:

“knowledge systems” with “educational value,” “cultural diversity” with “cultural heritage value,” and “aesthetic value” with “inspiration.” This approach allowed for a more integrated understanding of how historic gardens supply CES, particularly those most directly experienced by local communities. The findings from this review are summarized below.

Recreation and Tourism: The MEA (2005) defines recreation and ecotourism as the tendency for people to choose where to spend their leisure time based in part on the characteristics of natural or cultivated landscapes. In the context of historic gardens, their unique material and immaterial qualities in historical, cultural, botanical, aesthetic, and social domains consolidate them as distinctive recreational and tourist destinations (Silva & Carvalho, 2023). Their natural, historical, and architectural qualities attract visitors and offer opportunities for recreation and entertainment (Lausi et al., 2022). Good infrastructure and adequate facilities (such as café, library, museum, shops, parking, safety measures, public conveniences etc), as well as effective management measures positively influence visitor experiences, leading to increased visit frequency and income generation (Saeed et al., 2017). The gardens’ physical and natural aspects—such as ease of access, scenic beauty, visual diversity, plant richness, and heritage elements—offer opportunities for both passive activities (walking, relaxation, observing nature) and active recreation (exercise, playing, events etc.), thereby motivating frequent visits (Rostami et al., 2015; Aliyas & Nezhad, 2019).

Social Relations: According to the MEA (2005), ecosystems influence the types of social relations established in particular cultures. Historic gardens function as important community gathering spaces, providing opportunities for social interaction and relationship-building (Rostami et al., 2015). They serve as venues for cultural events, concerts, festivities, exhibitions, and performances (Singh, 2021), bringing together individuals from diverse cultural backgrounds to share experiences, exchange ideas, and build social solidarity based on shared values (Aliyas & Nezhad, 2019; Abdelhamid & Elfakharany, 2020). Such interactions foster community bonds, encourage inclusive participation, and strengthen a sense of collective identity.

Aesthetic Values: According to the MEA (2005), many people perceive beauty and aesthetic value in various aspects of ecosystems, which in turn inspire art, folklore, architecture, and other forms of creative expression. Historic gardens are often described as living works of art, reflecting the ingenuity, creative design abilities, architectural and artistic skills, craftsmanship, techniques, and horticultural practices of specific eras or societies (Athanasiadou, 2019; Cazzani et al., 2019; Silva & Carvalho, 2023). Their physical and natural features—including traditional architecture, diverse plantings, water features, and scenic views—are visually pleasing, arouse interest, and contribute to their historical significance (Lausi et al., 2022; Rostami et al., 2015). Throughout history, gardens have inspired painters, sculptors, writers, and musicians, who have drawn from their beauty, symmetry, and tranquility to produce artistic masterpieces (Rohde & Krausche, 2020). In addition to artistic inspiration, historic gardens motivate public support for conservation and provide opportunities for scientific and academic research, particularly when they showcase rare plant species or significant heritage structures (Singh, 2021). Their photogenic qualities also encourage visitors to share and promote them on digital and social media platforms, extending their cultural influence. These gardens’ beauty plays a vital role in shaping visitors’ perceptions and enhancing their overall experience, with elements such as lighting, seating, cleanliness, and well-maintained heritage structures further elevating their aesthetic appeal (Paraskevopoulou et al., 2020; Aliyas & Nezhad, 2019).

Educational / Knowledge Systems: The MEA (2005) defines knowledge systems as the traditional and formal systems of understanding developed by different cultures in response to their ecosystems, while educational values highlight how ecosystems provide the basis for formal and informal learning. Historic gardens act as dynamic learning environments where visitors can gain knowledge about environmental processes, cultural history, architecture, and the human–nature relationship (Hristov, 2017). Interpretation panels, heritage education programs, and innovative methods such as virtual museums facilitate this learning (Cazzani et al., 2019). They preserve and transmit traditional horticultural skills, design techniques, and cultural beliefs to new generations (Afentina et al., 2017), while also serving as venues for environmental education and research-based activities (Singh, 2021).

Cultural Diversity and Cultural Heritage Values: In the MEA (2005) classification, cultural diversity refers to how ecosystem diversity supports the diversity of cultural traditions and expressions. Cultural heritage values reflect the high regard societies have for maintaining historically important landscapes and culturally significant features. Historic gardens embody these values through their layered histories, integrating influences from different eras. They serve as cultural symbols, representing traditional beliefs, ancestral practices, and local heritage (Afentina et al., 2017). They often reflect a confluence of architectural styles, horticultural practices, and design philosophies, demonstrating the adaptive fusion of cultures over time (Cazzani et al., 2019). Historic gardens also serve as platforms for the transmission of intangible heritage, including traditional gardening techniques, festivals, and rituals (Singh, 2021). As living archives, they preserve and celebrate the cultural richness of the societies that created and nurtured them, ensuring the continuity and renewal of diverse heritage expressions across generations (Sood & Bhandari, 2023). Maintaining the historic character of these living monuments positively influences community awareness, strengthens cultural identity, and encourages visitation (Paraskevopoulou et al., 2020; Abdel-Rahman, 2017).

Sense of Place: Sense of place, according to the MEA (2005), refers to the value people associate with recognized environmental features that evoke feelings of identity and belonging. In historic gardens, residents' involvement, the gardens' historical significance, and the variety of experiences they offer foster emotional and functional attachment (Rostami et al., 2015). These landscapes connect individuals to their cultural and ancestral roots, contributing to collective memory and a sense of belonging within the community (Afentina et al., 2017). They also encourage community engagement and stewardship, reinforcing their identity as valued cultural landscapes (Abdel-Rahman, 2017).

Spiritual and Religious Values: The MEA (2005) describes spiritual and religious values as the importance many communities attach to ecosystems for spiritual or religious purposes. Historic gardens often embody symbolic representations of paradise, reflecting harmony between humanity and nature (Florence Charter, 1982). Their peaceful settings evoke feelings of calmness, tranquility, and closeness to nature, offering visitors a respite from daily stress (Rostami et al., 2015). These spaces provide quiet zones for meditation, contemplation, and personal reflection, strengthening their role as spiritual environments (Aliyas & Nezhad, 2019).

Table 1 presents the seven CES categories identified in the Millennium Ecosystem Assessment (MEA, 2005), highlighting indicators that can be used for evaluation of historic gardens.

CES category	Indicators Identified for Evaluation of CES in Historic Gardens	Reference Studies
Recreation & Tourism	Events, festivals, and attractions; Active recreation (exercise, jogging, cycling, playing games, group activities); Passive recreation (walking, relaxing, observing biodiversity, enjoying scenic beauty); feeling safe; Visitor facilities (cafés, libraries, museums, shops, parking,); security; Physical attributes (ease of access, traditional elements, open views, greenery, plant diversity, restorative qualities)	Rostami et al., 2015; Aliyas & Nezhad, 2019; Saeed et al., 2017; Lausi et al. 2022; Silva & Carvalho, 2023
Social relations	Opportunities to meet friends/family; Social spaces and activities; Public/community participation; Cultural exchange and solidarity through events, performances, and ceremonies	Rostami et al., 2015; Aliyas & Nezhad, 2019
Aesthetic Value	Attractive features (built heritage, flora, fauna, water elements); Visual diversity and greenery; Architectural and artistic details; Quality/diversity of plantings, garden furniture, cleanliness, and special decorative features (fountains, railings, sculptures); Overall attractiveness, scenic beauty, and vistas	Rostami et al., 2015; Paraskevopoul et al., 2020; Lausi et al. 2022; Aliyas &

		Nezhad, 2019
Education/ Knowledge System	Learning about history, culture, and biodiversity; Interpretation and display methods; Knowledge of architectural, botanical, and landscape heritage; Heritage education programs; Use of educational tools and social media; Preservation of traditional skills and techniques; Environmental education initiatives or other learning activities	Hristov, 2017; Afentina et al., 2017; Cazzani et al., 2019, Singh, 2021
Cultural heritage Value	Conservation of built heritage and monuments; Preservation of cultural narratives, traditions, and historic landscape patterns; Interpretation of past land use and design principles; Representation of diverse cultural traditions in design and use; Influence of multiple cultural styles; Spaces supporting intercultural interaction and understanding	Rostami et al., 2015; Afentina et al., 2017 (12); Cazzani et al., 2019; Singh, 2021
Sense of place	Recognized environmental features that evoke sense of belonging; Identity and attachment linked to historical features and narratives; Emotional connection with landscapes; Contribution to community pride and place-based identity, Memories associated with the place; Community participation and engagement	MEA, 2005; Rostami et al., 2015; Afentina et al., 2017;
Spiritual/ Religious value	Spaces for religious practices, meditation, and reflection; Quiet and noise free spaces contributing to mental peace, sacred features, Feel connected / close to nature, elements that refresh mind, religious rituals associated with the garden	Florence Charter, 1982; Rostami et al., 2015; Aliyas & Nezhad, 2019

Table 1. Sub-Categories and Indicators of CES Supply in Historic Gardens

3. RESEARCH METHODOLOGY

This research adopts a qualitative, multiple case study approach to explore how CES are manifested and enhanced in historic gardens so that these landscapes remain relevant and widely beneficial. Using two emblematic sites in New Delhi – Lodi Garden and Sunder Nursery – this paper investigates the spatial attributes, inherent values, and institutional arrangements that support the delivery of CES and enable sustainable outcomes. Data collection combined field observations and photographic documentation to record physical features, spatial arrangements, and visitor activities relevant to CES delivery. Visitor surveys and informal interviews were conducted to capture user perceptions, experiences, and the perceived benefits of the gardens. Secondary information was gathered from the official websites of both gardens, and existing scholarly literature to understand design strategies, management practices, and institutional frameworks. The data were thematically analyzed in relation to the seven CES categories identified by the study, enabling a comparative assessment of how each site delivers and sustains CES in the urban heritage context. Together they offer lessons about how CES can be enhanced in historic gardens to meet modern needs and engage local communities.

4. STUDY AREA

Delhi, India's capital, is home to some of the country's most cherished historic gardens, which serve as vital green lungs and cultural anchors in a rapidly urbanizing metropolis. Among these, Lodi Garden and Sunder Nursery stand out for their heritage significance, aesthetic appeal, and deep connection with the

city's residents. While Lodi Garden is a free-access urban park, Sunder Nursery operates as a managed heritage landscape, charging a modest entry fee for visitors and offering nominal membership packages for local residents. These differing access models, coupled with distinct management approaches, provide an ideal basis for comparing how spatial attributes, heritage features, and visitor engagement strategies influence the delivery of CES.

Lodi Garden, New Delhi: It is a 90-acre heritage park in the heart of New Delhi, lies between Safdarjung Tomb and Khan Market. It is home to remarkable monuments from the Sayyid, Lodi, and Mughal dynasties, including Muhammad Shah's Tomb, Sikandar Lodi's Tomb, Shisha Gumbad, and Bara Gumbad, all exemplifying refined Indo-Islamic architecture. As there is little architecture dating to the Sayyid and the Lodi periods still standing, Lodi Gardens is an important archaeological site, and is protected by the Archaeological Survey of India (ASI). Originally landscaped in 1936 under Lady Willingdon in the English picturesque style, the garden features meandering pathways, serene water bodies, grassy mounds, and diverse plantings that harmoniously blend historic charm with ecological richness (Figure 1).



Figure 1: Lodi Garden - where nature and history blend harmoniously

Sunder Nursery, New Delhi: The heritage park located along the historic Grand Trunk Road and adjacent to the UNESCO World Heritage Site of Humayun's Tomb, was originally established in the early twentieth century as Azim Bagh, or the "great garden," to propagate plants for New Delhi during the British colonial period. Within its 90 acres stand nine Mughal-era garden tombs, of which three monuments - Sundarwala Burj, Sundarwala Mahal and the Lakkarwala Burj - are of national significance. In 2007, a collaborative initiative between the Central Public Works Department, the Archaeological Survey of India, and the Aga Khan Trust for Culture set out to transform Sunder Nursery into a vibrant urban park that integrates heritage conservation, ecological restoration, and community engagement. This park has been internationally recognized for its conservation and sustainability approach, receiving high-level awards that underscore its role as a model for urban heritage revitalization. The project emphasized the revival of traditional craftsmanship and techniques, while introducing Delhi's first arboretum, themed gardens, ecological zones, and leisure amenities such as an amphitheatre, educational facilities, a lakeside restaurant and a restored 17th-century Mughal water tank known as the Lotus Pond (Figure 2). Visitors are guided along a central axis through sequences of well-preserved monuments, landscaped gardens, biodiversity habitats, and cultural spaces.



Figure 2: Layout Plan of Sunder Nursery Highlighting Key Areas of Interest

Table 2 compares the characteristic features and spatial qualities of Lodi Garden and Sunder Nursery that contribute to the wide range of CES provided by these heritage parks

CES Dimension	Lodi Garden	Sunder Nursery
Recreation	<ul style="list-style-type: none"> - Dedicated jogging/cycle tracks, open-air gym, children's swings, picnic lawns, yoga zones - Well-preserved historic monuments, Bonsai Park, Japanese garden, lake with fountains - Rich biodiversity: black kites, parakeets, squirrels, kingfishers - Year-round events: concerts, heritage walks, art shows - Amenities: seating, signage, toilets, lighting, security 	<ul style="list-style-type: none"> - Delhi's first arboretum with 300+ tree species - Three UNESCO-listed monuments, amphitheatre, lotus pond, Garden of Delight, Specialized gardens (rose, canna, herb), flower valley, nursery beds - Lake, rivulets, biodiversity zones, - Exclusive children's garden with swings, treehouse, mazes, zip line, sand pits - Nature trails, heritage walks, picnic zones, weekend farmer's market - Wheelchair & pram-friendly walkways for universal accessibility - Year-round cultural events, exhibitions, workshops - Visitor amenities: café, food kiosks, shops, parking, restrooms, lighting, signage, security
Aesthetic Value	<ul style="list-style-type: none"> - Indo-Islamic tombs (e.g., Bara Gumbad, Shisha Gumbad) with striking architecture - Seasonal floral displays, ancient trees, tree-lined paths - Sculptures, themed gardens (rose, bamboo, bonsai) - Ponds, mounds, native shrub zones - Visually layered experience attracting artists & photographers 	<ul style="list-style-type: none"> - Persian garden-inspired design with Mughal symmetry - Iconic monuments set in formal landscaped settings - Seasonal plantings, manicured lawns, scenic pathways, Victorian benches - Water channels with marble fountains, lotus pond - Contrasting natural biodiversity zones and heritage architecture - Public art installations and sculptures
Social Relations	<ul style="list-style-type: none"> - Functions as a "green living room" for the city drawing families, nature lovers, cyclists, walkers, and fitness enthusiasts, - Community hub: attracts senior groups, yoga clubs, families - Venue for diverse activities such as music and dance performances, cultural events spring flower shows, heritage walks, festivals, and art exhibitions - Promotes cross-generational, inclusive social engagement 	<ul style="list-style-type: none"> - Amphitheatre for music, dance, theatre, Sufi evenings, festive events - Sunday bazaars, street performances, community kitchen garden workshops - School field trips, guided tours, communal planting events - Ideal for picnics, yoga sessions, family outings, and group meetings. - Inclusive participation from people with disabilities and diverse cultures

Cultural Heritage Value	<ul style="list-style-type: none"> - Historic tombs of Mohammed Shah, Sikander Lodi, etc. - Showcases Indo-Islamic funerary architecture and reflects evolution of Delhi's medieval built heritage - Rare plant species & traditional landscape design - Symbol of Delhi's cultural identity 	<ul style="list-style-type: none"> - Six World Heritage Monuments and over 20 restored historic structures - 16th-century tomb garden with pavilions, tanks, baradari - Showcases Mughal-period craftsmanship, ornamental plasterwork - Living museum combining heritage preservation with contemporary use
Educational Value	<ul style="list-style-type: none"> - On-site signage and panels on flora, fauna, monuments - Guided walks, pamphlets by INTACH - School workshops on heritage, botany, environmental science - Demonstrates historical architecture and horticultural traditions 	<ul style="list-style-type: none"> - 20-acre micro-habitat zone, 30-acre biodiversity zone - 80 bird species, 36 butterfly species for nature study - Interpretive panels, heritage walks, model farms - Workshops on heritage conservation, bee awareness, vermin-composting - Storytelling, seasonal crafts, creative activities for children
Sense of Place	<ul style="list-style-type: none"> - Deep public attachment; generations of family visits - Site for regular community-driven events and activities - Embeds cultural memory and local identity - Emotional refuge for urban dwellers in a rapidly modernizing city 	<ul style="list-style-type: none"> - Blend of heritage, horticulture, and ecological zones fosters emotional attachment - Venue for community activities, volunteer programs, and personal commemorations (bench dedications) - Recognized as a cultural and natural asset of Delhi
Spiritual Value	<ul style="list-style-type: none"> - Quiet, meditative spaces with scenic views - Lush greenery, water features, floral zones promote healing - Shaded groves and silent corners ideal for reflection and mindfulness - Sense of inner calm, spiritual upliftment through nature immersion 	<ul style="list-style-type: none"> - Quiet, shaded tree enclaves and tranquil water features - Lotus pond, lush greenery, and biodiversity zones create a serene setting - Support

Table 2. Key Spatial and Heritage Features of Lodi Garden and Sunder Nursery Supporting CES Supply

Both Lodi Garden and Sunder Nursery illustrate how Delhi's historic landscapes can evolve into multifunctional public spaces where cultural heritage, ecological value, and contemporary urban life coexist. Findings from open interviews with citizens and local visitors, combined with personal observations from field studies, reveal that these heritage parks offer a rich mix of passive and active recreation within aesthetically pleasing landscapes that integrate both natural and man-made elements. Their scenic surroundings, cultural venues, and well-maintained facilities contribute significantly to social, psychological, and physical well-being. Known as *Delhi's paradise*, these sites host cultural events, social gatherings, and community activities, while fostering strong community ties. They hold immense educational value, supporting both formal and informal learning about nature, culture, and history. Serene spaces within the gardens offer opportunities for relaxation, reflection, and spiritual fulfillment, while the landscape's natural features help visitors connect with nature, reduce stress, and enhance mental wellness.

Embedded in the daily lives and memories of citizens, these gardens instill a sense of belonging and identity. They stand as exemplary models of adaptive reuse, meeting contemporary urban needs while preserving cultural and ecological significance. Attracting residents, tourists, students, and researchers alike,

they function not only as recreation destinations but also as active sites for conservation, biodiversity enhancement, environmental awareness, and artistic display.

Their success demonstrates how heritage conservation can be harmonized with modern recreational demands through thoughtful design, good infrastructure, effective management, and active community participation. For instance, in Lodi Garden, the *Green Circle*—a group of environmentally conscious walkers—advocates for responsible upkeep and has influenced NDMC’s management decisions in favour of the garden’s historic character. Such examples illustrate how providing multiple CES can inspire community engagement, strengthen social bonds, and promote shared responsibility for heritage preservation.

5. DISCUSSION

This study sought to explore the CES of historic gardens through two contrasting yet complementary case studies—Lodi Garden and Sunder Nursery in New Delhi. The analysis responds to three guiding research questions:

(a) Potential of historic gardens to provide CES

The findings affirm that historic gardens hold substantial potential to provide a wide spectrum of CES, ranging from recreational and aesthetic benefits to educational, spiritual, and heritage values, thereby reinforcing their role as vital socio-cultural assets in urban landscapes. While Lodi Garden exemplifies a historically layered urban park whose monuments and landscape have been informally appropriated by the city’s residents for decades, Sunder Nursery represents a benchmark model of heritage regeneration, restored through a public-private partnership that intentionally integrates conservation, biodiversity, and community engagement.

Lodi Garden, with its rich biodiversity, expansive manicured lawns, and iconic Indo-Islamic tombs, attracts a diverse demographic for passive recreation, heritage appreciation, exercise, and photography. Sunder Nursery, on the other hand, expands the CES portfolio by combining heritage restoration with active programming such as cultural events, educational workshops, and biodiversity awareness initiatives. These sites go beyond their ecological value, functioning as multifunctional spaces where heritage, recreation, education, and community engagement intersect. Both gardens attract a broad spectrum of visitors—residents, tourists, students, and heritage enthusiasts—illustrating their accessibility and inclusiveness.

The success of these gardens suggests that historic landscapes are not only repositories of cultural and ecological value but also dynamic urban commons that can strengthen social cohesion, foster cultural continuity, and enhance psychological well-being when well managed. The results further indicate that the multifunctionality of historic gardens increases the range and intensity of CES delivery, contributing to urban well-being and sustainability. These findings align with Rostami et al.(2017) and Paraskevopoulou et al. (2020), who argue that although historic gardens were built in a completely different era, they can still meet the social, cultural, and psychological needs of contemporary visitors while retaining their heritage values—bestowing upon them a “timeless value.”

(b) Spatial attributes and characteristic features that generate CES

The case studies highlight that specific spatial features—both tangible and intangible—play a decisive role in shaping CES. Notably, Sunder Nursery’s zoned design—comprising a heritage core, horticultural areas, and an urban biodiversity park—facilitates the coexistence of multiple CES within distinct yet interconnected spaces. Lodi Garden’s more open, unified landscape offers sweeping vistas and high restorative potential. The presence of heritage monuments and landscape features in both gardens reinforces a strong sense of place, connects visitors to historical narratives, and enhances aesthetic enjoyment. Varied garden typologies (theme gardens or thematic plantations, seasonal floral displays, water elements, sculptures, art installations, and biodiversity zones) create layered aesthetic experiences and habitat variety, enhancing visual interest and ecological richness. Path networks, shaded seating, amphitheatres, and open lawns encourage community events, cultural performances, social interaction, and physical activity, while biodiversity zones,

signage, interpretive panels, heritage information panels, and guided trails provide cognitive engagement and learning opportunities.

Connectivity and accessibility also play a significant role in enhancing CES. Multiple entry points, well-linked pathways, and visual corridors facilitate movement, exploration, and inclusive access for diverse user groups. Providing visitor facilities such as restrooms, safety and security measures, lighting, parking, café/food outlets, and shops selling garden products like plant seeds, fruits, vegetables, and organic products supports recreational and leisure experiences. The findings indicate that a historic garden's spatial heterogeneity, heritage features, landscape elements, natural beauty, flora and fauna, accessibility, and physical infrastructure contribute to delivery of CES in urban areas.

(c) Enhancing the CES of historic gardens

The case studies of Lodi Garden and Sunder Nursery offer rich insights into how historic gardens can provide and enhance a wide spectrum of CES in urban contexts. Both spaces demonstrate that historic gardens, when well-conserved and innovatively programmed, can become vibrant public domains that reinforce cultural continuity, promote community well-being, and support sustainable urban development.

Integrated Heritage and Landscape Management: Both gardens illustrate the value of integrated conservation, where architectural heritage and landscape elements are preserved in harmony. Lodi Garden retains its Indo-Islamic monuments within an English picturesque landscape framework, while Sunder Nursery embeds Mughal-era monuments into a contemporary, multifunctional heritage park. This layering of time and space makes them powerful carriers of cultural memory and identity. Maintaining such spatial and historical coherence is key to enhancing CES like aesthetic appreciation, sense of place, and cultural heritage value. Regular upkeep of monuments and landscape elements, with sensitivity to both heritage authenticity and ecological health, ensures sustained attractiveness and functionality.

Multi-functional Use and Inclusivity: Lodi Garden and Sunder Nursery cater to diverse user needs, blending leisure, fitness, relaxation, education, and spiritual retreat. By integrating walking and cycling tracks, barrier-free pathways, multilingual signage, shaded rest areas, and child-friendly spaces yoga lawns, and amphitheaters, the gardens not only promote recreational CES but also create socially inclusive environments that invite participation across demographics. The careful balance between active and passive zones, and the incorporation of informal gathering areas, enhances the social cohesion and democratic use of space. Hosting heritage walks, biodiversity trails, cultural performances, and school outreach programs encourages diverse audiences to engage meaningfully with the garden's values.

Environmental Design and Aesthetics: The aesthetic value of both gardens is reinforced by their rich plant diversity, careful spatial organization, seasonal planting, ponds, water channels, and art installations. These elements not only create pleasing sensory environments but also elevate the gardens' ability to evoke emotional connection and spiritual engagement. The gardens become places of daily refuge in a chaotic city—enhancing psychological well-being and promoting restorative experiences. Design interventions that foreground natural rhythms, biodiversity, and scenic views can significantly elevate the experiential quality of historic gardens.

Heritage Interpretation and Education: Sunder Nursery stands out in its strategic use of interpretive signage, QR codes, visitor maps, and thematic trails to convey the significance of its heritage and ecological features. Lodi Garden, too, incorporates monument signage and tree information, supported by INTACH's educational publications. By facilitating formal and informal learning, the gardens promote environmental and cultural literacy. This suggests the need to develop engaging educational programming, such as school visits, environmental awareness sessions, and heritage walks to enhance educational CES.

Community Participation and Stewardship: A vital component in sustaining CES is community involvement. In both cases, local advocacy groups and NGOs such as INTACH, The Aga Khan Trust for Culture (AKTC), and the Green Circle play an active role in protecting and nurturing the gardens. Their involvement in decision-making, maintenance oversight, and program development encourages collective ownership. Initiatives such as volunteer gardening, citizen awareness programs, “adopt a tree/bench” schemes, and community events build a sense of ownership and long-term care.

Governance, Funding, and Institutional Frameworks: Lodi Garden and Sunder Nursery benefit from relatively strong institutional support – through NDMC and AKTC respectively. However, Sunder Nursery sets a benchmark by leveraging public-private partnerships (PPPs) and aligning its management model with UNESCO World Heritage values. Sustainable CES provisioning depends heavily on such frameworks. Controlled entry fees (as in Sunder Nursery), eco-friendly food kiosks, and heritage-themed retail can generate funds for ongoing maintenance without compromising the site’s cultural integrity. Historic gardens across the globe can enhance their CES by adopting hybrid governance models, earmarked funding, and adaptive reuse strategies that respect heritage values while encouraging innovation.

6. CONCLUSION

The aim of this study was to explore the Cultural Ecosystem Services (CES) supply of historic gardens, the factors that determine this supply, and ways to enhance these services so that such landscapes remain relevant and widely beneficial. Using two emblematic sites in New Delhi—Lodi Garden and Sunder Nursery—this research examined the spatial attributes, inherent values, and institutional arrangements that support CES delivery and enable sustainable outcomes. The findings reaffirm that historic gardens are not static relics but vibrant socio-cultural ecosystems that provide diverse CES, ranging from recreation and learning to spiritual enrichment and heritage connection.

Owing to their cultural, architectural, and botanical heritage, historic gardens have the potential to deliver multiple benefits to citizens. Both case studies demonstrate that a combination of well-preserved heritage features, thematic landscapes, biodiversity zones, recreational amenities, and supporting infrastructure can significantly enhance CES delivery. The study also highlights that visitor needs can be met without compromising the authenticity of heritage landscapes, provided there is visionary planning, strong governance, and active community engagement. This research positions CES not only as a framework for assessing non-material benefits but also as a sustainable approach to enhancing the vitality, relevance, and stewardship of heritage gardens in modern urban life. Amid contemporary urban challenges—ranging from climate change and biodiversity loss to deteriorating mental health and cultural alienation—historic gardens offering multiple CES can emerge as multifaceted assets that improve urban quality of life.

The study holds both theoretical and practical implications. It contributes to the growing body of literature on historic garden management and CES, while providing actionable insights for practitioners, urban planners, conservation experts, and policymakers on integrating CES considerations into heritage management strategies. Future research could capture and compare visitor perceptions across diverse demographic groups, examine differences in CES provision between historic and contemporary gardens, and conduct cross-cultural comparisons with other national and international case studies. Such work would deepen understanding of how different management models, cultural contexts, and spatial designs influence CES outcomes, ultimately guiding more sustainable and community-centered stewardship of historic gardens worldwide.

REFERENCES

1. Abdel-Rahman, N. H. (2017). Alexandria’s cultural landscapes: Historical parks between originality and deterioration. *WIT Transactions on the Built Environment*, 170, 73–83. <https://doi.org/10.2495/CC170081>
2. Abdelhamid, M. M., & Elfakharany, M. M. (2020). Improving urban park usability in developing countries: Case study of Al-Shalalat Park in Alexandria. *Alexandria Engineering Journal*, 59(1), 311–321. <https://doi.org/10.1016/j.aej.2019.12.042>
3. Afentina, A., McShane, P., Plahe, J., & Wright, W. (2017). Cultural ecosystem services of rattan garden: The hidden values. *European Journal of Sustainable Development*, 6(3), 360–360. <http://ecsdev.org/ojs/index.php/ejsd/article/view/527>
4. Aliyas, Z., & Masoudi Nezhad, S. (2019). The role of historical Persian gardens as urban green spaces: Psychological, physical, and social aspects. *Environmental Justice*, 12(3), 132–139. <https://doi.org/10.1089/env.2018.0034>
5. Athanasiadou, E. (2019). Historic gardens and parks worldwide and in Greece: Principles of acknowledgement, conservation, restoration and management. *Heritage*, 2(4), 2678–2690. <https://doi.org/10.3390/heritage2040165>
6. Bansal, K., & Chhabra, P. (2022). Values-based decision-making for conserving built heritage. In *2022 International Conference on Decision Aid Sciences and Applications (DASA)* (pp. 1770–1774). IEEE. <https://doi.org/10.1109/DASA54658.2022.9765068>

7. Cazzani, A., Brumana, R., & Zerbi, C. (2019). Management plans and Web GIS software applications as active and dynamic tools to conserve and valorize historic public gardens. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 42(2/W15), 291–298. <https://doi.org/10.5194/isprs-archives-XLII-2-W15-291-2019>
8. Dai, P., Zhang, S., Chen, Z., Gong, Y., & Hou, H. (2019). Perceptions of cultural ecosystem services in urban parks based on social network data. *Sustainability*, 11(19), 5386. <https://doi.org/10.3390/su11195386>
9. Dickinson, D. C., & Hobbs, R. J. (2017). Cultural ecosystem services: Characteristics, challenges and lessons for urban green space research. *Ecosystem Services*, 25, 179–194. <https://doi.org/10.1016/j.ecoser.2017.04.014>
10. Dushkova, D., Ignatieva, M., Konstantinova, A., & Yang, F. (2021). Cultural ecosystem services of urban green spaces: How and what people value in urban nature? In V. Vasenev, E. Dovletyarova, R. Valentini, Z. Cheng, C. Calfapietra, L. Inostroza, & M. Leuchner (Eds.), *Advanced technologies for sustainable development of urban green infrastructure* (pp. 292–318). Springer. https://doi.org/10.1007/978-3-030-75285-9_28
11. Fish, R., Church, A., & Winter, M. (2016). Conceptualising cultural ecosystem services: A novel framework for research and critical engagement. *Ecosystem Services*, 21, 208–217. <https://doi.org/10.1016/j.ecoser.2016.09.002>
12. Funsten, C., Borsellino, V., & Schimmenti, E. (2020). A systematic literature review of historic garden management and its economic aspects. *Sustainability*, 12(24), 10679. <https://doi.org/10.3390/su122410679>
13. Gai, S., Fu, J., Rong, X., & Dai, L. (2022). Users' views on cultural ecosystem services of urban parks: An importance-performance analysis of a case in Beijing, China. *Anthropocene*, 37, 100323. <https://doi.org/10.1016/j.ancene.2022.100323>
14. Gullino, P., Pomatto, E., Gaino, W., Devecchi, M., & Larcher, F. (2020). New challenges for historic gardens' restoration: A holistic approach for the Royal Park of Moncalieri Castle (Turin Metropolitan Area, Italy). *Sustainability*, 12(23), 10067. <https://doi.org/10.3390/su122310067>
15. Hristov, D., Naumov, N., & Petrova, P. (2018). Interpretation in historic gardens: English Heritage perspective. *Tourism Review*, 73(2), 199–215. <https://doi.org/10.1108/TR-04-2017-0067>
16. International Council on Monuments and Sites. (1982). *Historic gardens: The Florence Charter – 1982*. <https://www.icomos.org/en/what-we-do/>
17. Kaur, P., & Bhandari, H. (2023, August). Smart perspective for redevelopment of historic cities. In *2023 Second International Conference on Smart Technologies For Smart Nation (SmartTechCon)* (pp. 1205–1210). IEEE. <https://doi.org/10.1109/SmartTechCon57526.2023.10391413>
18. Lausi, L., Amodio, M., Sebastiani, A., Fusaro, L., & Manes, F. (2022). Assessing cultural ecosystem services during the COVID-19 pandemic at the Garden of Ninfa (Italy). *Annali Di Botanica*, 12, 63–75. <https://doi.org/10.13133/2239-3129/17681>
19. Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Biodiversity synthesis*. World Resources Institute.
20. Nag, A. (2025). Comparative analysis of historic landscapes: Revitalizing heritage gardens for modern tourism. In *Integrating architecture and design into sustainable tourism development* (pp. 97–128). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-6684-9540-7.ch006>
21. Olivadese, M., & Dindo, M. L. (2022). Historic and contemporary gardens: A humanistic approach to evaluate their role in enhancing cultural, natural, and social heritage. *Land*, 11(12), 2214. <https://doi.org/10.3390/land11122214>
22. Paraskevopoulou, A., Klados, A., & Malesios, C. (2020). Historical public parks: Investigating contemporary visitor needs. *Sustainability*, 12(23), 9976. <https://doi.org/10.3390/su12239976>
23. Plieninger, T., Dijks, S., Oteros-Rozas, E., & Bieling, C. (2013). Assessing, mapping, and quantifying cultural ecosystem services at community level. *Land Use Policy*, 33, 118–129. <https://doi.org/10.1016/j.landusepol.2012.12.013>
24. Rohde, M., & Krausche, M. (Eds.). (2020). *Historic gardens and society: Culture–nature–responsibility*. Stiftung Preussische Schlösser und Gärten Berlin Brandenburg.
25. Rostami, R., Lamit, H., Khoshnava, S., Rostami, R., & Rosley, M. (2015). Sustainable cities and the contribution of historical urban green spaces: A case study of historical Persian gardens. *Sustainability*, 7(10), 13290–13316. <https://doi.org/10.3390/su71013290>
26. Saeed, M., Qasim, M., Mumtaz Khan, M., & Ali, T. (2017). Historic gardens can attract more visitors by providing more facilities: A case study of three Mughal gardens of Pakistan. *Pakistan Journal of Agricultural Sciences*, 54, 45–50. <http://pakjas.com.pk/papers/2671.pdf>
27. Silva, S., & Carvalho, P. (2023). Visit and management of historic gardens during COVID-19 from the owners/managers' perspective: Portugal as a case study. *Sustainability*, 15(3), 2229. <https://doi.org/10.3390/su15032229>
28. Singh, P. (2021). Conserving the spirit of a historic garden: The Florence Charter on historic gardens – Interpreted, expanded, adapted and illustrated in the Indian context. INTACH.
29. Sood, M., & Bhandari, H. (2023). Exploring the significance of historic gardens in context to cultural diversity: The case of the Royal Gardens of Punjab. *ShodhKosh: Journal of Visual and Performing Arts*, 4(2), 95–106. <https://doi.org/10.29121/shodhkosh.v4.i2CDSAD.2023.597>
30. Sood, M., & Bhandari, H. (2023a). Integrating smart technologies in heritage interpretation of historic gardens for enhancing visitor experiences. In *3rd International Conference on Technological Advancements in Computational Sciences (ICTACS) 2023* (pp. 1249–1255). IEEE. <https://doi.org/10.1109/ICTACS59847.2023.10390015>

31. Tratalos, J. A., Haines-Young, R., Potschin, M., Fish, R., & Church, A. (2016). Cultural ecosystem services in the UK: Lessons on designing indicators to inform management and policy. *Ecological Indicators*, 61, 63–73. <https://doi.org/10.1016/j.ecolind.2015.03.040>
32. Wangai, B., Burkhard, B., Kruse, M., & Müller, F. (2017). Contributing to the cultural ecosystem services and human wellbeing debate: A case study application on indicators and linkages. *Landscapes Online*, 50, 1–27. <https://doi.org/10.3097/LO.201750>