## Chapter 9

# Lalbagh Botanical Garden-A New Leaf

* Shrigowri Mangalvedhe, Rashmi Niranjan, Theju V Gowda

## Introduction

Bangalore, is the capital of Karnataka and is popularly known as "The Garden City". It draws its name from an abundance of parks, gardens, and lush vegetation that have flourished for centuries with the presence of pleasant and favourable weather conditions. Rapid urbanization and gentrification with inadequate space for growth inside the city has  led to a chaotic urbanscape crying for respite and Bangalore has successfully conserved many cultivated open spaces , for people to get away and enjoy at leisure. These verdant gardens and parks have been integral to the city, acting not only as vital lungs amidst the bustling urban landscape but also providing multiple components of engagement and participation for the public. The two noteworthy green spaces developed during Hyder Ali's and British rule in Bangalore include Lal Bagh and Cubbon Park which are huge pockets of varieties of plantations abundant with flora and fauna coupled with impressive and aesthetically located (now heritage)buildings and points of interests with numerous other activities in its precincts . The recent additions to the city are Lumbini Gardens with boat rides and amusements, Bugle Rock Park with a Pagoda dedicated to the famous literary personalities of the Karnataka state, J.P.Park, called mini Lalbagh having sculptures depicting the farmer's daily life activities in the fields and Indira Gandhi Musical Fountain Park  to name a few .

### Lalbagh - The metamorphosis

Lalbagh Botanical Garden, a verdant oasis, with a history spanning over two centuries, presently sprawls across 240 acres in the heart of Bangalore city. As history goes, initially it was established in 1537 by Kempegowda(known as the founder of Bangalore)on a plot area of 34 acres known as Huvina-thota,(Lalbagh: From Sultan's Garden to Public Park-Vijay R Thiruvady),later expanded and renamed Kempu-thota(translation Red garden- English, Lal bagh -hindi , possibly one of the theories behind the origin of the name ) in 1569 by his son. By 1760,it was taken over and developed further under Hyder Ali 's rule, conceptualized as his private garden (The Mughal Charbagh: The Paradise Gardens on Earth)dividing the entire plot it into four, with  tree-lined pathways intersecting in the middle inspired by the Persian style Charbagh .It came under the British after the death of Tipu Sultan( Hyder Ali's son) in 1799. Lalbagh with an abundance of rose and cypress trees was called the 'Rose and Cypress Gardens 'by the British till it became a botanical garden in 1856.



**Figure 1.** Etching of 'Cypress Gardens', Lal Bagh gardens 1794- Home, Robert (from Norwegian National Library)

Corresponding Author:* Shrigowri Mangalvedhe
School of Architecture, Ramaiah Institue of Technology, Bangalore, India
e-mail: shrigauri@gmail.com

Throughout the 1900s, British and Indian horticultural experts nurtured the garden's growth. Established officially as a 'Government Botanical Garden' in 1856, Lalbagh has evolved into an internationally renowned hub for botanical research and conservation efforts focused on rare plant species. Its sprawling lawns, meticulously planned walkways, and majestic historical structures weave a captivating tapestry, whispering tales of bygone eras and botanical wonders. Notable individuals such as Major Gilbert Waugh, Dr. Nathaniel Wallich, William Munroe, Sir Mark Cubbon, Dr H.F.C. Cleghorn ,William New, A. Black, John Cameron ,Gustav Hermann Krumbiegel, a German botanist and landscape designer ,the most influential figure in the development of the garden city Bangalore ,Brindavan Gardens in Mysore which is also based on the concept of Charbagh gardens introduced in India by Mughals Rao Bahadur H.C. Javaraya,K.Nanjappa and Dr.M.H.Marigowda have served as Superintendents at Lalbagh since its inception as a Government Botanical garden. Their commitment and expertise have been pivotal in shaping Lalbagh's growth. Lalbagh's rich heritage is not merely a collection of historical structures and botanical wonders; it's a narrative woven by the community.

However, ensuring Lalbagh's continued vibrancy necessitates innovative approaches that bridge the past with the present. This essay delves into a comprehensive strategy for advancing heritage innovations in Lalbagh, leveraging cutting-edge technology, fostering community engagement, and promoting sustainable practices for future development and inclusive growth of the garden.

Humans have created walled forts, barricaded cities, and now creating smart cities that have technological savvy points and spaces but also should consider more green open spaces as vital spaces that claim rejuvenation or recreational spaces for the citizens. In the process of making things safe and human accessible and digital, the ecosystem of the cities is not given importance and this is leading to  a disturbed environment   in the urban area, directly or indirectly having effect both on the people as well as  other living beings and urban wildlife, which do use these built and natural heritage spaces (Urban Garden Design, Kate Gould, Kyle Books, Octopus Publishing Group Ltd. isbn 978 0 85783 4874.page 7,), to enhance their experiences of life in the ever changing environment.

**Reimagining Lalbagh: A Tapestry Woven with Technology, Community, and Inclusivity**

As the city's population has tripled in, resulting in an increase of land use and land cover, the balance between nature, people and ecology of the city is in danger. (Asbagh, N. B. 2023).  Hence, it's even more legible and high commitment by the citizens and concerned governing bodies of the city to safeguard the existing green public parks with emphasis upon planting the local species of flora and fauna. Lalbagh Botanical Garden, a historical and botanical marvel, pulsates with untapped potential. While technology offers exciting opportunities for heritage innovation, ensuring an inclusive and engaging user experience requires a deeper understanding of space and its impact on visitors and vice versa. This essay proposes a novel approach that integrates Henri Lefebvre's concept of "Social Production of Space "and phenomenology, the study of lived experience of the garden, its design and development.

Lalbagh's transformation transcends physical space; it also fosters social interaction. This not only deepens engagement with history but also breaks down social barriers, creating a space for connection. Taking insights from theories of Lefebvre that space is not merely physical, but a social construct shaped by human interaction and power dynamics to study the user experience of the garden and by integrating it with phenomenology, the study of lived experience. Lalbagh's development can prioritize the diverse needs and interpretations of its visitors. Lefebvre highlights the importance of "participatory space," where communities actively co-create and shape their environment. The focus on inclusivity extends to accessibility which is of paramount importance in a garden to experience and perceive the different parts of the garden moving around, to be informed and engaged at all times.

In retrospect, Lalbagh's future lies in embracing innovative heritage strategies that weave technology, community engagement, and inclusivity into its very fabric. By integrating Lefebvre's concept of social space production and the principles of phenomenology, Lalbagh can transform from a historical site into a vibrant, inclusive space that celebrates its rich built and natural heritage for generations to come. By understanding how visitors interact with and perceive Lalbagh, we can curate heritage innovations that enhance user experience and foster a sense of belonging for all. Secondary studies sourced from online research papers were compiled to examine the approaches and methodologies. Archival records and interviews with the staff about the developments in the recent years were noted. Pre and post exit surveys were conducted with visitors. Digital maps and records from the concerned departments were compiled.

**Beyond the Physical: Rethinking Space through Phenomenology**

Phenomenology emphasizes individual perception and interpretation of space. Lalbagh's current structure, while beautiful, might not cater to the diverse needs of all visitors. Imagine a visually impaired visitor struggling to navigate the garden or a child yearning for an interactive way to learn about the flora. By integrating phenomenology, Lalbagh can transform into a space that caters to these varied experiences. If parks are properly designed and managed, it is possible for tourism to be consistent with protected area objectives. (Butler, 1992). Since 1912, the Lalbagh flower show has been held twice in the year. One in the month of January on the Republic Day and the second show in the year is held on Independence Day. This is the most challenging and gives scope for the technology to be used in its full sense to manage the event as many visitors and other users come to the Lalbagh to experience the flower show. The Lalbagh can impose certain regulatory constraints to protect the heritage areas of the botanical park.

**Technology as a Bridge, not a Barrier: Technological Integration with a Human Touch**

Randomly and alarmingly the growing city of Bangalore with increase in population, calls for a balance between the needs of the human for an infrastructure both physical and digital which help sustain not only people but the nature and ecological environments of the city. The sustainability connections between natural vegetation, manmade vegetation, parks in the city, animals, birds, insects, pets and other creatures are invisible to bear eyes and need more attention. As the many old trees along the main roads nearby Lalbagh are cut down for widening roads for traffic movement, the peripheral edge of Lalbagh is directly affected by the sound and air pollution unlike the transition and buffer areas which save the National Protected Areas of the world without threatening the natural resources (Deborah J Chavez, et al. 2008). The locals and residents around the boundary of Lalbagh were the important stakeholders and participants (who otherwise are not part of decision making in developing countries, as they follow top-down decision-making habits), who helped in innovative heritage ideas so the future residents are also beneficiaries of the natural urban wealth. Some residences along the roads winding the edge of the botanical garden enjoy a good view of the Lalbagh. Likewise engaging in creative activities like photography, painting, nature study and observation using various techniques and Technology. Today's generation of tech-savvy population, a humanitarian approach plays a crucial role in enhancing user experience and promoting inclusivity at Lalbagh. However, it's vital to ensure these advancements complement, rather than replace, the inherent beauty and wonder of the botanical garden. The Cell phone App and a website usage will assist people in moving around the park and can enhance the understanding, the perception, views of the visitor and the administrative vision of the manager.

**Shaping the Future: Rethinking Space Creation, Interactive and Immersive Experiences:**

**1. Interactive Heritage Exhibits:**

Visitors stepping into the Lalbagh Gate can encounter a touchscreen exhibit that details its colonial architectural style and illuminates the vision of its architect, Colonel John Garret. Interactive maps can showcase how Lalbagh's layout has evolved over time, offering a dynamic view of its historical transformation. Multimedia presentations bring to life the captivating stories of the builders and designers, making their contributions vivid and memorable.

Picture walking into the historic Glasshouse to find exhibits that use touchscreens to display historical photographs, architectural blueprints, or even 3D models can be an engaging way of bringing about knowledge to the visitors. These models can showcase the structure's original design, highlighting its intricate glasswork and cast-iron framework. These interactive exhibits go beyond mere information; they educate about Lalbagh's rich history and instil a deeper appreciation for the craftsmanship and visionary architecture that define its marvels.

By integrating these modern, interactive elements, Lalbagh not only preserves its own history but also engages visitors in a way that deepens their understanding and admiration for this cultural landmark. The blend of technology and history creates an enriching experience that makes every visit to Lalbagh unforgettable. The enhancement of the built environment with consideration of salutogenic design approach in reference to Bhardwaj et al, within Lalbagh can be made available to the visitors and users to click images and photos for better experiences. And dissemination of these images builds the public image

of the site in Lalbagh. (Acar, S. 2018). The botanical garden can be highlighted with photo capture points inside the park that emphasize the heritage characteristics.

**2. AR-powered Historical Reconstructions:**

Through the magic of Augmented Reality (AR), Lal Bagh's heritage can come alive. Visitors can download a dedicated Lalbagh AR app and point their phones at specific buildings. The app can overlay 3D reconstructions onto their view, revealing the structures in their original glory. Envision the majestic Lalbagh Gate restored to its pristine condition, complete with its vibrant paintwork and ornate details. AR technology can also be used to showcase the bygone grandeur of structures like the Bandstand, the Krumbeigal house, the M.H.Marigowda library and a few other structures depicting it bustling with activity during its heyday as a venue for concerts and social gatherings. These AR experiences not only enhance the visitor experience but also provide a window into the past, fostering a deeper connection with Lalbagh's rich history.

**3. Holographic Tours with Historical Figures:**

State-of-the-art holographic technology has the capability to project lifelike images of historical figures intricately linked to Lalbagh, enabling visitors to engage directly with these personalities and gain a first-person perspective on their vision for the garden. For instance, a holographic representation of Gustav Hermann Krumbiegel, a German botanist and the visionary behind the design of the garden could provide in-depth insights into the garden design process.

Additionally, a holographic projection of notable 19th-century botanists, who can recount their fascinating experiences of working in Lalbagh, detailing the exotic and diverse flora they studied and cultivated can be projected. These interactive, holographic tours do far more than convey historical facts; they personalize the entire learning experience, making it deeply engaging. They also leave an indelible mark on visitors by fostering a profound sense of connection with the influential individuals who have shaped the enduring legacy of Lalbagh.

Through such innovative technology, the past comes vividly to life, encouraging visitors to develop a deeper understanding and appreciation of the historical, architectural nuances, princely and botanical heritage of Lalbagh.

**4.Interactive Exhibits within Structures:**

Not all of Lalbagh's heritage structures may be accessible to the public due to preservation concerns and being administrative edifices. Interactive exhibits can bridge this gap. Transforming selects structures, like the Lalbagh library building, into immersive learning experiences can be a good initiative. Visitors can interact with touchscreens within the building that display historical blueprints, allowing them to virtually explore the interior layout and its various functions over time. Audio guides, narrated by prominent historical figures associated with the building, can offer a personalized perspective on its significance. Additionally, augmented reality (AR) experiences can be layered onto the physical space. Pointing a phone at specific areas can reveal 3D models depicting the original furnishings or showcasing the bustling activity that once took place within the building. These interactive exhibits cater to a wider audience and ensure that visitors gain a comprehensive understanding of Lalbagh's rich architectural heritage, even for structures with restricted access.

Additionally, the audio guides can transport back in time through the voices of prominent historical figures. Imagine hearing stories and anecdotes directly from individuals who played significant roles in the building's history. These narratives can offer unique insights and personal connections to the past, making the visit much more engaging and informative.

AR experiences take this interactive journey a step further. By pointing the phone at designated areas within the building, 3D models of the original furnishings and decor could be viewed. This technology can even recreate scenes of bustling activity, giving a firsthand look at what the building was like when it was fully operational. These virtual layers add depth and context to the physical space, making the history of Lalbagh come alive in a way that static displays cannot. Citizens can become online members to benefit from use of augmented reality and other online services. Overall, these interactive exhibits can make heritage

preservation more inclusive and educational. They ensure that every visitor, regardless of accessibility restrictions, can appreciate and understand the rich architectural heritage of Lalbagh.

### 5. Augmented Reality (AR) Experiences:

Layer historical information and captivating stories onto Lalbagh's physical heritage using AR technology can bring an immersive experience for visitors to Lalbagh. Visitors pointing their phones at the majestic Lalbagh Glass House and seeing it come alive through AR and animated projections can depict scenes from its past, showcasing grand botanical exhibitions or the daily lives of its residents. AR experiences can be further enhanced with interactive elements. An AR app to unlock hidden layers of history of Kempegowda tower and see a historical photograph overlaid onto the current structure, revealing its appearance in a bygone era can take back visitors in time. Visitors can trigger different historical narratives or visuals by touching specific points on the structure, fostering a sense of participation and discovery. Walking along the Bandstand, the app can play a recording of a past musical performance that once took place there. This technology can breathe life into seemingly ordinary elements of Lalbagh, transforming them into portals to the past with the sensory elements all in action to perceive the space better.

### 6. Interactive Kiosks:

Strategically placed throughout Lalbagh, interactive kiosks equipped with touchscreens can provide visitors with a wealth of information at their fingertips. A kiosk near the Rose Garden displaying detailed information on various rose varieties, including their history, botanical characteristics, and even care tips. These kiosks can also be used to showcase historical timelines of Lalbagh's development, highlighting significant events and milestones. Additionally, they can serve as platforms for promoting ongoing conservation efforts within the garden, allowing visitors to learn about the challenges and successes of Lalbagh's preservation journey. Partnering with educational institutions or NGOs to develop engaging and informative content for these kiosks can be a useful initiative. The kiosks can be multilingual and accessible to visitors with diverse needs.

### 7. Virtual Tours:

Not everyone can visit Lalbagh in person. Virtual tours can bridge this gap and make the garden's beauty accessible to a global audience. Imagine a 360-degree virtual tour that takes viewers on a captivating journey through Lalbagh's diverse landscapes. The tour can showcase the vibrant flower beds, the majestic trees, and the architectural marvels within the garden. Interactive elements like hotspots can provide additional information on specific points of interest, allowing viewers to explore at their own pace. These virtual tours can be hosted on Lalbagh's website or social media platforms, reaching a wider audience and promoting the garden internationally. Partner with virtual reality production companies to create high-quality, immersive tours that capture the essence of Lalbagh.

### 8. Digital Documentation and Preservation:

Lalbagh's heritage deserves to be preserved not just physically but also digitally. Utilize cutting-edge technologies like 3D laser scanning and high-resolution photography to create detailed digital records of the garden's structures, landscapes, and even plant life. Imagine a 3D model of the Lalbagh Gate that captures every intricate detail, from its ornate carvings to its weathered brickwork. This digital documentation not only serves as a valuable archival resource but also facilitates future restoration efforts (L.S.Odhner, 2022). In case of unforeseen damage, these digital records can be used to guide reconstruction with historical accuracy. Additionally, it allows remote access for researchers and scholars studying Lalbagh's history and horticulture. Partnering with universities or technology companies specializing in digital preservation to create a comprehensive digital archive of Lalbagh can bring about the interests of the stakeholders.

**Sustainable Practices and Technological Integration**

**1. Energy-efficient Retrofitting with Heritage in Mind:**

Lalbagh's historical structures deserve to be preserved, but so does the environment. Implementing energy-efficient upgrades that minimize the environmental impact while maintaining the historical character of the buildings. Installing solar panels on rooftops to generate clean electricity for powering lights, irrigation systems, and other electrical appliances within the garden can be implemented. Traditional incandescent bulbs with energy-efficient LED lighting can be replaced that provide bright illumination while consuming significantly less power. Another key aspect is rainwater harvesting. Installing rainwater collection systems that capture rainwater from rooftops as well as storm water and store it for later use in irrigation, reducing reliance on municipal water supplies. Implementing solar powered vehicles to tour the park for elderly citizens, especially abled people, to reduce carbon footprint (Amanda et al, 2023). Thus, restoration and adaptive reuse of all old built structures will further add on to reduction in carbon footprint.

**2. Digital Heritage Documentation:**

The meticulous documentation of heritage sites is crucial for preservation and future restoration. Utilizing cutting-edge technologies like 3D laser scanning and high-resolution photography can create detailed digital records of Lalbagh's structures. 3D laser scanning captures the precise geometry of the buildings, including intricate details like mouldings, sculptures, and architectural ornamentation. High-resolution photography documents the current condition of the structures, including any cracks, weathering, or areas requiring repair. These digital records can be archived online, allowing for remote access by researchers, students, and restoration specialists around the world (Giada, et al,2023). Additionally, they serve as a valuable historical resource for future generations to compare with the current state of the structures and plan for ongoing conservation efforts.

By implementing these strategies that combine sustainable practices with technological integration, Lalbagh can become a model for responsible heritage management. From energy-efficient upgrades to digital documentation, these approaches ensure the long-term preservation of Lalbagh's historical legacy, while minimizing its environmental impact and fostering a deeper appreciation for its built heritage beauty and its significance in future.

**3. Artificial Intelligence (AI) for Adaptive Reuse and Management:**

Lalbagh's heritage structures hold immense potential for new purposes. Explore the application of Artificial Intelligence (AI) to identify opportunities for adaptive reuse while ensuring historical integrity. AI algorithms can analyse data on visitor traffic patterns, space utilization, and public needs within Lalbagh. Based on this analysis, AI can suggest sustainable and creative ways to repurpose underutilized structures. For instance, an AI system might recommend converting a historical building into a green technology exhibition space or an educational centre focused on sustainable horticulture practices. This approach ensures the structures remain relevant and contribute to Lalbagh's overall sustainability goals. Additionally, AI can be utilized for improved management of the garden. Bharadwaj et al says the traditional water management at community and regional level can be fruitful with applications of IoT and AI-powered irrigation systems that optimize water usage based on real-time weather data and plant needs. AI can also be used for predictive maintenance, analysing sensor data from the structures to identify potential problems before they escalate, minimizing repair costs and ensuring the long-term preservation of these heritage assets. Partner with AI research institutions or technology companies to explore the potential of AI for adaptive reuse and sustainable management within Lalbagh.

**4. Smart Waste Management Systems:**

Lalbagh, with its vast expanse and diverse flora, inevitably generates waste. Implement smart waste management systems for a cleaner and more sustainable future. This can involve installing designated bins for different waste categories – organic waste from plants, recyclable materials like plastic bottles, and general waste. Sensor-equipped bins can be used to monitor waste levels and optimize collection schedules, reducing unnecessary fuel consumption by waste collection vehicles. Additionally, explore composting initiatives for organic waste generated from garden maintenance. The resulting compost can be used as a natural fertilizer, enriching the soil and promoting healthy plant growth within Lalbagh. Partner with waste management companies specializing in sustainable practices to develop an efficient and environmentally friendly waste management plan for Lalbagh. Promoting waste reduction and responsible disposal through signage and educational campaigns can further enhance Lalbagh's commitment to sustainability.

By embracing these sustainable practices and technological advancements, Lalbagh can not only preserve its heritage but also become a leader in environmental responsibility. From AI-powered management to smart waste solutions, these approaches ensure Lalbagh thrives as a vibrant green space for generations to come.

**5. Mobile application:**

Increase in numbers of visitation to parks during the end of COVID-19 pandemic and later periods, it is become mandatory to check the movement of visitors in parks and its impact on ecology of the park as per the studies of Creany et al, compared to historic patterns (Geng., et al 2020) and conditions. Catering to the tech-savvy generation, Lalbagh can develop engaging mobile apps. These apps can be a one-stop shop for all things Lalbagh, offering comprehensive information on the garden's history, plant varieties, ongoing events, and educational resources. Interactive maps can guide visitors through the garden, with GPS functionality ensuring they never get lost. Audio guides narrated by prominent botanists and historians can provide insightful commentary on specific plant species and landmarks. Also, apps that can guide a particular category of interest of people inside the garden and points of interest can be based on historic interest and timeline, of the garden, cultural points and botanical points of interest for limited availability of time of visitors and the experiences they want to look for when visiting the garden.

**6. Sensory Gardens for All: A Multisensory Experience:**

A haven for all senses within Lalbagh, a design dedicated to a sensory garden with sections catering to visitors with visual impairments or other sensory needs. Raised beds with easy-to-reach fragrant herbs like mint or Tulsi will allow visitors to experience the textures and aromas of these plants. Braille signage with detailed descriptions of the plants and their uses can be incorporated alongside the raised beds. Wind chimes and water features can create a calming soundscape, while textured pathways made from materials like pebbles or wood can provide tactile stimulation. Consider establishing this sensory garden within a proposed Children's Garden, creating a dedicated space for interactive learning and exploration that caters to all abilities. Workshops can be conducted for visually impaired children, teaching them about plant identification through touch and smell. Sensory gardens promote inclusivity, ensuring Lalbagh becomes a welcoming space for everyone to experience the beauty and diversity of the plant world. This creates a space for interactive learning and exploration that caters to a wider audience. Physical tours cum workshops for school children and college students, by engaging them in cleaning the rose gardens, de grassing, and engaging in other such environmentally interactive activities can be conducted (Kumar, et al,2016).  The existing roadways inside the Lalbagh are adequate and care needs to be taken to implement only pebbled pathways to make it ecofriendly and sustainability appropriate.

**Findings:**

By observing the dynamic growth of Bangalore, it's clear that Lalbagh Botanical Gardens can thrive only by striking a delicate balance between nature, people, park, and city. To achieve this, a bold and intelligent approach is necessary to elevate the visitor experience and cater to diverse users, propelling the gardens to international standards. This harmonious balance can be achieved by: - 1) Preserving natural habitats and ecosystems while incorporating innovative, eco-friendly designs.2) Fostering community engagement through inclusive programs, events, and activities. 3)Enhancing visitor experience through immersive storytelling, interactive exhibits, and digital platforms.4) Integrating sustainable practices, such as renewable energy, waste management, and water conservation.5) Showcasing the garden's cultural significance through heritage innovation and restoration of historic landmarks.6) Encouraging collaboration between stakeholders, including citizens, experts, and authorities. By adopting this multi-faceted approach, Lalbagh Botanical Gardens can become a world-class destination, attracting visitors from across the globe while remaining deeply rooted in its local heritage. The gardens can serve as a model for urban planning, demonstrating how nature, people, and city can coexist in harmony. As Bangalore continues to grow, Lalbagh can evolve into a vibrant, inclusive, and sustainable oasis, offering a unique blend of natural beauty, cultural richness, and innovative spirit. By embracing this vision, we can ensure the gardens remain a cherished treasure for generations to come, contributing to the city's reputation as a hub of creativity, innovation, and environmental stewardship.

**Conclusion:**

With the implementation of these strategies, Lalbagh Botanical Garden can undergo a transformative journey, evolving into a thriving hub of heritage innovation that harmoniously integrates nature, technology, and community engagement. This iconic garden, nestled in the heart of the city, can become a beacon of sustainability, showcasing the perfect blend of tradition and modernity. As a living museum, Lalbagh can breathe new life into its rich history, leveraging digital storytelling, augmented reality experiences, and interactive exhibits to captivate visitors and share the garden's fascinating tales. The garden's cultural significance can be further amplified through immersive events, festivals, and workshops that celebrate India's botanical heritage, traditional crafts, and art forms. Lalbagh can also become a dynamic classroom, offering innovative educational programs that focus on botanical research, conservation, and sustainability. By engaging with local communities, schools, and universities, the garden can foster a deeper understanding of the natural world and inspire the next generation of environmental stewards.

As a vibrant social space, Lalbagh can bring people together, transcending age, culture, and socio-economic boundaries. The garden's scenic landscapes, walking trails, and recreational areas can be designed to promote physical activity, mental well-being, and community bonding. By incorporating sustainable practices, such as rainwater harvesting, organic gardening, and waste management, Lalbagh can serve as a model for eco-friendly urban planning. The fusion of tradition and technology can be showcased through innovative garden designs, incorporating native plants, and sustainable materials. The garden's historic landmarks, such as the Glass House and Kempe Gowda Tower, can be restored and repurposed as hubs for innovation, education, and community engagement.

By embracing heritage innovation, Lalbagh Botanical Garden can become a testament to the power of collaboration, creativity, and sustainability. This beloved garden can evolve into a thriving ecosystem that not only preserves the past but also shapes the future, weaving together the life lines of tradition, technology, and community. As a vibrant tapestry, Lalbagh can continue to inspire, educate, and nurture generations to come, solidifying its position as a cultural and environmental treasure in the heart of the city.

**References**

Doravari, A., & Bhardwaj, M. (2023). *Evaluating the Role of City Improvement Trusts or Boards in Shaping Salutogenic Character of Urban Areas: Case of Bangalore City*. https://doi.org/10.38027/iccaua2023en0095

Kumar Vinod, H. A., Rana, B.A. (2016):"Analysis Of Land Use And Land Cover Change Of Bangalore Urban Using Remote Sensing And GIS Techniques " International Journal of Informative & Futuristic Research (ISSN: 2347-1697), Vol. 4 No. (3), November 2016, pp. 5545-5555, Paper ID: IJIFR/V4/E3/037.

Asbagh, N. B. (2023). Analysing the Divine Proportion or the Golden Ratio on the Plan and Façade of the Churches in the Walled City of Famagusta, North Cyprus. In H. A. Nia & R. Rahbarianyazd (Eds.),

Convergence of Contemporary Thought in Architecture, Urbanism, and Heritage Studies, (pp.217-223) Cinius Yayınları. https://doi.org/10.38027/ICCAUA2023EN0024

Deborah, J., Chavez., Patricia, L., Winter., James, D., Absher. (2008). Recreation visitor research: studies of diversity. 210 doi: 10.2737/PSW-GTR-210

Natalia, Hanazaki. (2023). Information Technology for Participatory, Dynamic Administration of Brazilian National Parks. Journal of park and recreation administration, doi: 10.18666/jpra-2023-11528

Amanda, Templeton., Alan, Fyall., Jill, Fjelstul., Asli, D.A., Tasci. (2023). Electric Vehicle Infrastructure as a Driver of the Sustainability Agenda in the US National Park System. Journal of park and recreation administration, 41(2) doi: 10.18666/jpra-2023-11650

L., S., Odhner. (2022). The Future of Documentation: Unified System Design. doi: 10.5594/m001964

Giada, Bartolini., Anna, De, Falco., Francesca, Giuliani., Massimiliano, Martino. (2023). Digital Techniques for the Documentation, Diagnosis, and Safety Assessment of Architectural Heritage. Rilem book series, 641-653.
doi: 10.1007/978-3-031-39603-8_52

Creany, N. E., Monz, C. A., D'Antonio, A., Sisneros-Kidd, A., Wilkins, E. J., Nesbitt, J., & Mitrovich, M. (2021). Estimating trail use and visitor spatial distribution using mobile device data: An example from the nature reserve of orange county, California USA. *Environmental Challenges*, *4*, 100171. https://doi.org/10.1016/j.envc.2021.100171

Chavez, D. J., Winter, P. L., & Absher, J. D. (2008). *Recreation visitor research: studies of diversity*. https://doi.org/10.2737/psw-gtr-210

De, A. (2008). Multiple City. Penguin Books India. http://books.google.ie/books?id=lM5zWSMZBccC&pg=PR4&dq=De,+A.+(2008).+Multiple+City.+India:+Penguin+Books+Limited.&hl=&cd=1&source=gbs_api

Stuart, C. M. V. (2015). Gardens of the Great Mughals (Classic Reprint). http://books.google.ie/books?id=W6oSswEACAAJ&dq=Gardens+of+the+Great+Mughals+-C.M.+Villiers+Stuart,+2015.+Publisher+Forgotten+Books.&hl=&cd=3&source=gbs_api

Mysore Horticultural Society ,M.H.S. (1991).Glass House- The Jewel of Lalbagh, Bangalore.

Issar, T. P. (1988). The city beautiful : a celebration of the architectural heritage and city-aesthetics of Bangalore. http://ci.nii.ac.jp/ncid/BB18257835

Jayapal, M. (1997). Bangalore: The story of a city. https://ci.nii.ac.jp/ncid/BB07444998

Jayaram, S. (2021). Bangalore's Lalbagh. http://books.google.ie/books?id=qoLXzgEACAAJ&dq=Bangalore%E2%80%99s+Lalbagh-+A+Chronicle+of+the+Garden+and+the+City.+Suresh+Jayaram.+2021&hl=&cd=1&source=gbs_api

Eagles, P. F. J. (2001). Guidelines for Tourism in Parks and Protected Areas of East Asia. IUCN. http://books.google.ie/books?id=hCtT2EsAdegC&printsec=frontcover&dq=(Guidelines+for+Tourism+in+Parks+and+Protected+Areas+of+East+Asia.+Paul+F+J+Eagles,+Margaret+E.Bowmen,+Teresa+Chang+Hung+Tao,+2001,+ISBN+2-8317-0579-7)&hl=&cd=1&source=gbs_api

Nagendra, H. (2016). Nature in the City. Oxford University Press. http://books.google.ie/books?id=goM8DwAAQBAJ&printsec=frontcover&dq=Nature+in+the+City-+Bengaluru+in+the+Past,+Present+and+Future+by+Harini+Nagendra,+Oxford.+2016.&hl=&cd=1&source=gbs_api

Mishra, P. K., & Sullere, S. K. (1994). Heritage of India Past and Present. http://books.google.ie/books?id=R5WbQgAACAAJ&dq=Heritage+of+India-Past+and+Present+by+P.K.Mishra,+S.K.Sullerey.+1994&hl=&cd=1&source=gbs_api

Ramaswamy, S. V., & Razi, B. A. (1973). Flora of Bangalore District. http://books.google.ie/books?id=oxe1AAAAIAAJ&q=Flora+of+Bangalore+District,+by+S.V.Ramaswamy,+B.A.Razi,+Prasaranga,+University+of+Mysore,+1973.&dq=Flora+of+Bangalore+District,+by+S.V.Ramaswamy,+B.A.Razi,+Prasaranga,+University+of+Mysore,+1973.&hl=&cd=2&source=gbs_api

Mugaḷi, R. R. (1946). The Heritage of Karnāṭaka, in Relation to India. http://books.google.ie/books?id=URdQAmfooYEC&q=Heritage+of+Karnatka+in+Relation+to+India.+1946&dq=Heritage+of+Karnatka+in+Relation+to+India.+1946&hl=&cd=7&source=gbs_api

Ray, H. P., & Kumar, M. (2014). Indian World Heritage Sites in Context. http://books.google.ie/books?id=NvTZoQEACAAJ&dq=Indian+World+Heritage+Sites+in+Context.+2014. &hl=&cd=1&source=gbs_api

Mallik, A., Chaudhury, S., Chandru, V., & Srinivasan, S. (2018). Digital Hampi: Preserving Indian Cultural Heritage.                                                                                  Springer. http://books.google.ie/books?id=SsRTDwAAQBAJ&printsec=frontcover&dq=Digital+Hampi:+Preserving+ Indian+Cultural+Heritage.+Anupama+Mallik+et+al.+2018.&hl=&cd=1&source=gbs_api

Nair, J. (2005). The Promise of the Metropolis. http://books.google.ie/books?id=wePZAAAAMAAJ&q=Nair,+J.+(2007).+The+Promise+of+the+Metropolis :+Bangalore%27s+Twentieth+Century.+India:+Oxford+University+Press.&dq=Nair,+J.+(2007).+The+Pro mise+of+the+Metropolis:+Bangalore%27s+Twentieth+Century.+India:+Oxford+University+Press.&hl=&c d=1&source=gbs_api