

Impact of Material Changes on User Experience in Buddhist Sacred Landscapes: A Case Study of Anuradhapura, Sri Lanka

Nadeeshani Sandarekha*

Shereen Amendra

University of Moratuwa, Katubedda, Moratuwa

Abstract

Buddhist sacred landscapes embody both physical form and the spiritual ambience that support ritual practice and cultural continuity. In Anuradhapura, Sri Lanka's most important Buddhist heritage city, traditional materials such as stone, laterite, sand, and terracotta have historically shaped pilgrims' sensory and spiritual experiences. Since 2015, however, the introduction of modern interventions including cement pavements, granite tiles, and interlocking systems has raised concerns about material authenticity, ritual suitability, and user comfort. This study examines how the transition from traditional to modern materials affects thermal comfort, tactile perception, visual harmony, and perceived sacredness. A mixed-methods approach was employed, integrating photographic surveys, observational checklists, semi-structured interviews, and thermal comfort measurements with digital tools. Data were collected from pilgrims engaged in barefoot rituals at the Sri Maha Bodhi Complex and Ruwanweliseya Stupa. Findings indicate that traditional materials enhance comfort, sensory engagement, and spiritual ambience, while modern materials, though more durable, often create thermal discomfort and weaken tactile and symbolic qualities. The study highlights the importance of heritage-sensitive, climate-appropriate material choices in preserving the experiential and spiritual integrity of sacred landscapes.

Keywords: Sacred Landscapes, User Experience, Landscape Transformation, Ritual Comfort, Material Authenticity.

*Corresponding Author: Nadeeshani Sandarekha

E mail – nadeeshanisandareka99@gmail.com

Introduction

Anuradhapura, located in the North Central Province of Sri Lanka, is one of the world's oldest continuously inhabited cities and a UNESCO World Heritage Site. As the ancient capital and sacred center of Theravada Buddhism, the city is known for its rich landscape architecture that deeply embodies religious, cultural, and environmental values. Anuradhapura's sacred spaces - Bodhi tree gardens, stupas, procession routes, ponds, and forest monasteries - are designed to reflect the symbolic meanings tied to Buddhist cosmology and ritual practices.

These sacred landscapes were traditionally shaped using natural materials such as stone, brick, and clay, and featured earthy color palettes, textured finishes, and spatial arrangements that foster contemplation, ritual flow, and spiritual connection. This traditional landscape setting was relatively preserved until around 2015.

However, after 2015, there has been a significant increase in modern developments introduced to these sacred sites. These include tiled platforms, brightly painted concrete surfaces, steel railings, hard surface borders and artificial lighting. These changes are often intended to improve functionality, infrastructure and accommodate the increasing number of pilgrims and tourists, and they differ significantly from the traditional material and spatial vocabulary of the sites.

Post-2015 interventions have introduced changes in texture, color and form that can disrupt the sacred atmosphere, visual harmony and symbolic clarity that previously characterized these landscapes. For example, shiny tile finishes can overshadow the natural patina of ancient stone pavements, and new boundary structures can disrupt axial sight lines or the ritual flow of sacred spaces.

Despite the increasing focus on monument conservation, there is limited research that critically examines how these post-2015 material and visual changes affect perceptions of the sacredness, spiritual experience, and cultural integrity of these Buddhist sacred landscapes particularly from a landscape architectural perspective.

Therefore, this study aims to analyze and compare the state of the sacred landscape before and after 2015, focusing on how changes in materials, colors, and spatial forms affect the visual identity, cultural values, and experience quality of selected sacred sites in Anuradhapura.

Literature Review

What is sacred Landscapes?

Sacred landscapes are geographical areas imbued with spiritual, religious, and symbolic meaning, shaped through the interaction of cultural beliefs, natural features, and ritual practices such as meditation, pilgrimage, and worship. Eliade (1987) describes a sacred space as a “break in the homogeneity of space,” where the divine becomes perceptible through orientation, symbolism, and ritual use. These landscapes are both physical environments and expressions of spiritual order and cultural memory, connecting humans with the cosmos.

UNESCO recognizes sacred landscapes as cultural landscapes that integrate tangible and intangible heritage, including rituals, symbolic traditions, and community identity. De Silva (2023) notes that these landscapes function as living spaces where sacred practices and spiritual values are continuously renewed, maintaining continuity between nature, culture, and belief.

Table 7: Characteristics of Sacred Landscapes

Characteristics	Description
Symbolism	Every spatial form carries a symbolic meaning (e.g. stupa as a cosmic mountain) (Eliade & Eliade, 1987b)
Orientation and Movement	Paths designed to follow rituals or sacred instructions for spiritual movement.(De Silva, 2023)
Spatial Hierarchy	The zones are divided to improve the monks, devotees, rituals, and sacred order.(Bandaranayake, 1974a)
Material Language	Using stone, clay, wood and water to reflect purity and tradition (Ranaweera, 2017)
Sensory Experience	Designed for sound, light, scent and temperature to evoke mindfulness (Norberg-Schulz, 1980)
Continuity	Preserved through ritual, memory, and intergenerational cultural transmission (UNESCO, 2008).

In landscape architecture, sacredness arises from the interaction of material, spatial, and sensory qualities that shape spiritual experience and perception. Norberg-Schulz (1980) describes this through the concept of *genius loci* “spirit of place” where sacredness is experienced through ritual, memory, and cosmic alignment. Tuan (1977) emphasizes that lived experiences such as pilgrimage and storytelling transform ordinary spaces into sacred ones, while Eliade (1987) and Rapoport (1990) highlight that spatial order, material authenticity, and sensory harmony are essential in expressing sacred identity. In Buddhist landscapes like Anuradhapura, the use of

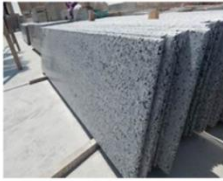



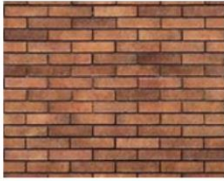








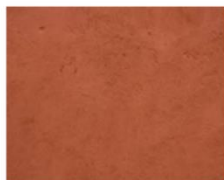

natural materials and symbolic orientation reinforces this sense of sacredness (De Silva, 2023; UNESCO, 2008).

Materiality is fundamental to defining the identity and spiritual experience of sacred landscapes. In Buddhist traditions, natural materials such as stone, clay, sand, and brick hold symbolic meanings of stability, purity, impermanence, and warmth (Bandaranayake, 1974; Norberg-Schulz, 1980). Their textures and thermal qualities enhance sensory and meditative engagement, fostering a grounded spiritual atmosphere (De Silva, 2023). Globally, charters like ICOMOS (1994) and the Nara Document on Authenticity emphasize material authenticity as vital for preserving both tangible and intangible heritage values. Thus, in Buddhist sacred landscapes, materiality links ecological balance, cultural symbolism, and spiritual continuity (Wijesuriya, 2005).

Materiality plays a key role in shaping the identity and lived experience of sacred landscapes. In Buddhist traditions, materials serve as bearers of not only functional but also symbolic meaning. Stone symbolizes solidity and stability, clay embodies purity, sand represents impermanence, and brick reflects warmth on a human scale (Bandaranaike, 1974; Norberg-Schulz, 1980). These materials also influence the sensory dimensions of sacred spaces: rough stone encourages grounding and ritual awareness, cool laterite provides thermal comfort, and earthy textures enhance meditative engagement (de Silva, 2023).

Globally, heritage conservation frameworks, such as the ICOMOS Venice Charter and the Nara Document on Authenticity (1994), highlight material authenticity as a cornerstone for the protection of both tangible and intangible values (ICOMOS, 1994; Wijesuriya, 2005). In Buddhist sacred landscapes, materiality combines spiritual symbolism, ecological harmony, and embodied user experiences, underscoring its importance in maintaining sacred identity.












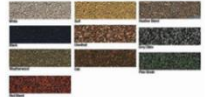
Table 2: Natural Materials, Texture, and Color Palettes

Material	Texture	Color Tone	Symbolic Meaning
Stone (Granite) 	Rough/Hard 	Grey, Beige 	Stability, strength, connection to earth
Brick 	Matte/Porous 	Terracotta 	Warmth, tradition, human-scale design
Sand 	Loose/Uneven 	Golden/Beige 	Ecological harmony, rootedness
Laterite 	Textured/Fired 	Deep Red 	Ecological harmony, rootedness
Terracotta 	Textured/Fired 	Deep Red 	Ecological harmony, rootedness

The tactile and thermal properties of materials play an important role in shaping ritual comfort and user perception of sacred landscapes. Traditional materials such as sand, laterite, and granite have a natural ability to regulate heat, keeping them relatively cool underfoot and allowing for barefoot rituals for extended periods. Their uneven, porous texture also supports a grounded, meditative experience by strengthening physical connections with the earth. In contrast, modern interventions such as cement blocks and glazed tiles often absorb and radiate excessive heat, creating discomfort during peak sunlight hours. Although these artificial surfaces may appear durable, they risk disrupting the sensory-spiritual balance by discouraging barefoot practices central to Buddhist worship (Wijesooriya, 2005).

Material authenticity is vital for preserving the cultural, spiritual, and ecological integrity of sacred landscapes such as Anuradhapura. According to the ICOMOS and Nara Documents (1994), authenticity extends beyond material preservation to include intangible values like rituals, ceremonies, and pilgrimage routes that sustain cultural continuity. Traditional materials such as granite, laterite, and terracotta naturally align with local climate and spiritual symbolism, reinforcing the sacred connection between humans and nature (Bandaranayake, 1974; Silva, 2017). However, modern substitutions such as concrete, ceramic tiles, and brightly painted surfaces disrupt this harmony, introducing visual incongruity, thermal discomfort, and a loss of tactile and ritual coherence (Jokilehto, 2006; ICOMOS, 1994). These material and design changes such as LED lighting and steel barriers further weaken the spiritual ambience and symbolic integrity of Buddhist heritage sites, distancing worshippers from the meditative and sacred experience central to these landscapes. Therefore, conserving material authenticity and spatial harmony is essential to uphold the sacred “sense of place” and ensure the continuity of spiritual experience (De Silva, 2013; UNESCO, 2015).

Table 3: Modern Material Texture and Color Palettes

Material	Texture	Color Tone	Symbolic Meaning
Concrete 	Smooth/ Hard 	Grey, 	Industrial, Impersonal, Reduces tactile engagement and ritual feel
Cement Interlock Paving 	Flat Uniform 	Terracotta 	Functional, Visually uniform, Breaks organic aesthetic of paths
Polished Granite Tiles 	Smooth/polished 	Dark gray/Black 	Modern elegance ,Reduce natural , tactile experience
Asphalt/ Bitumen 	Hard/Rock 	Dark gray/Black 	Durable, practical visually intrusive and industrial

Sacred landscapes in Sri Lanka have historically embodied Buddhist cosmology, ritual practices, and ecological principles, expressed through natural materials such as granite, laterite, clay plaster, and terracotta (Silva, 2017; Wijesuriya, 2005). However, in recent decades, modernization, tourism growth, and infrastructure improvements have introduced cement finishes, artificial tiles, and brightly painted surfaces, disrupting the traditional visual and material vocabulary (Jokkilehto, 2006).

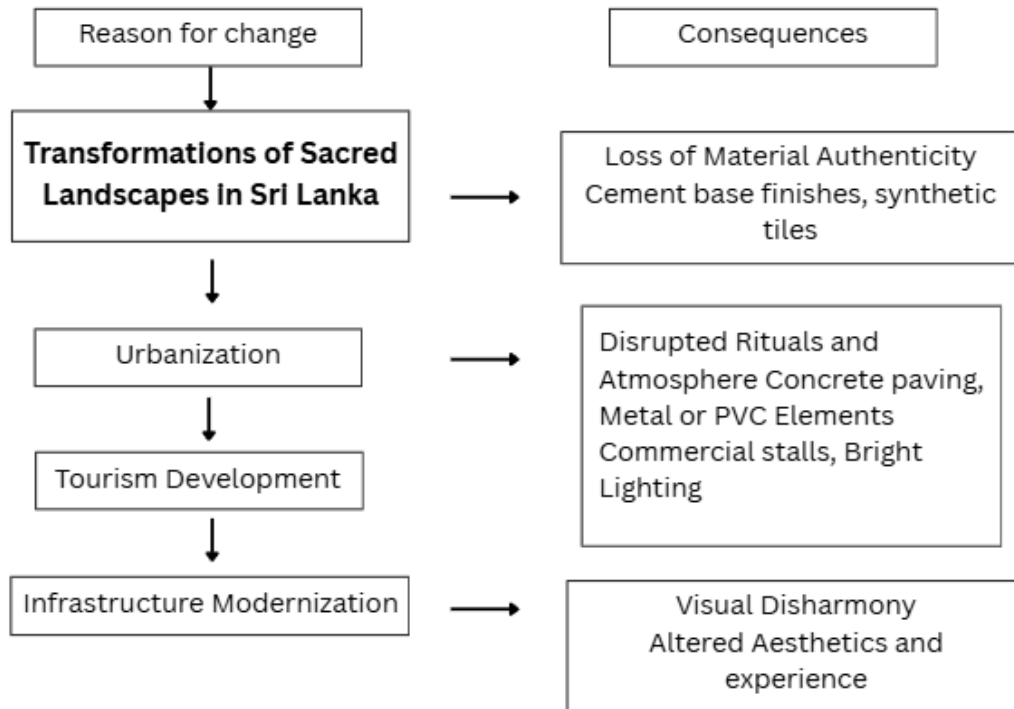


Fig. 1: Transformation of Sacred Landscape in Sri Lanka
Source: author

Since 2015, interventions in the sacred city of Anuradhapura have combined the reintroduction of traditional materials such as stone pavements, terracotta bricks and laterite with the use of modern surfaces including cement interlocking, granite tiles and concrete walkways. While traditional materials reinforce ritual symbolism, tactile comfort and spiritual integrity, modern inclusions prioritize durability, drainage and accessibility but often disrupt the visual harmony and symbolic depth of the sacred setting. These contrasting approaches highlight a tension between heritage conservation and modernization, underscoring the need for conservation strategies guided by material authenticity to maintain both cultural meaning and user experience (Silva, 2017; Perera, 2018; ICOMOS, 1994).

Methodology

This study employs a mixed-methods case study approach to examine how material transitions influence user experience in Buddhist sacred landscapes, integrating both qualitative and quantitative techniques for a holistic understanding of comfort, ritual behavior, and spiritual perception. The Sri Maha Bodhi Precinct and Ruwanweliseya Stupa were purposively selected as study sites due to their historical and spiritual significance, high levels of ritual activity, and recent material transformations, which provide contrasting examples of traditional and modern sacred landscape design. These sites also attract a diverse range of users, including pilgrims, monks (Theros), and tourists, making them ideal for investigating how material changes affect user comfort, ritual flow, and the preservation of sacred spatial identity.

Participants were selected using purposive sampling, focusing on individuals actively engaged in barefoot rituals to ensure firsthand experience with both traditional and modern materials. The sample includes 10–15 pilgrims per study area, aged 18–55, alongside monks, pilgrims and site caretakers, providing informed perspectives on ritual practices, comfort, and sacred perception. This approach ensures that the participants are directly relevant to the study objectives and able to provide rich, context specific insights.

Data were collected through photographic surveys, observational checklists, semi-structured interviews, thermal comfort measurements, and authentic visual analysis, allowing triangulation of qualitative, visual, and quantitative evidence. Limitations include restricted access to some sacred areas, potential social desirability bias, thermal comfort measurements taken at specific times, and the relatively small sample size, which may limit generalizability. These limitations are explicitly acknowledged to provide context for interpreting the results, while the triangulated, mixed-methods approach helps mitigate their impact.

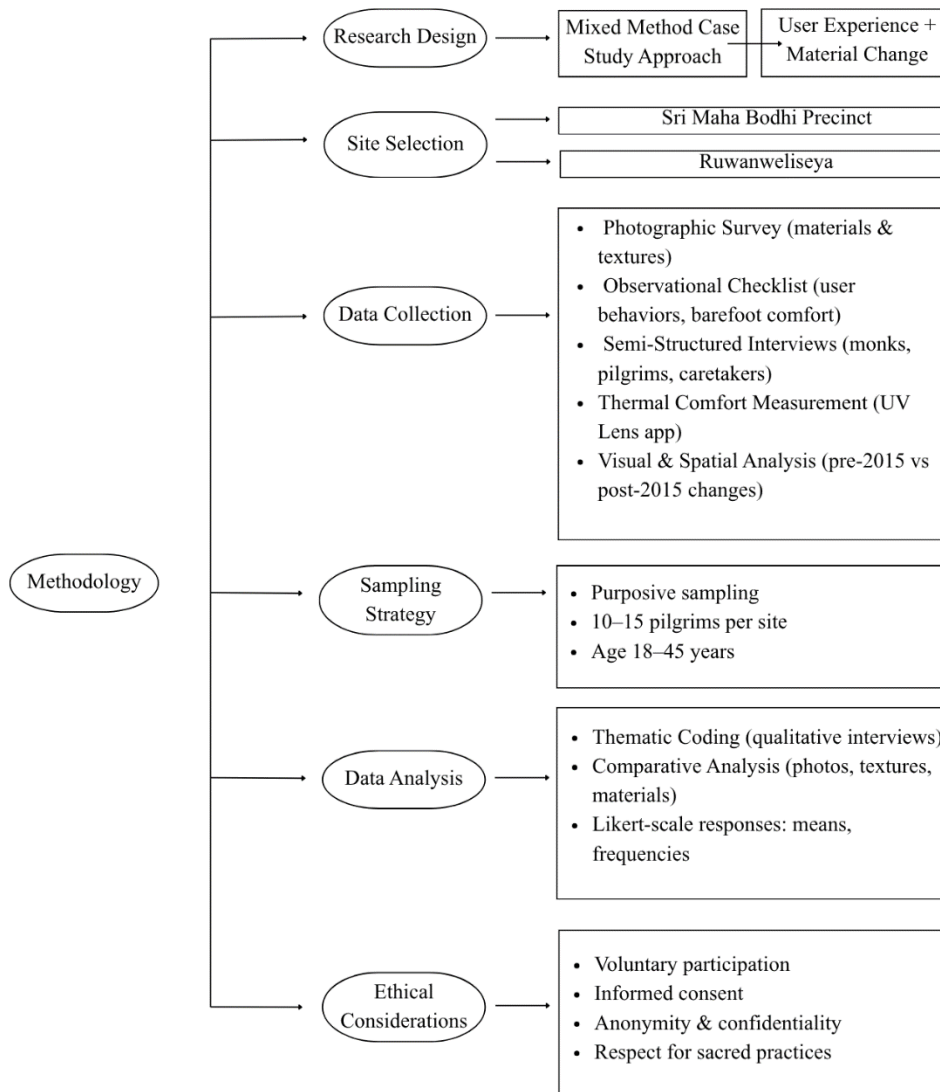


Fig. 3: Research Design
 Source: author

The study utilized a purposive sampling technique, emphasizing on individuals who were engaged in barefoot rituals within the selected sacred locations. This approach made certain that participants had firsthand experience with the physical attributes and spiritual ambience of the locations they were studying. As the most active participants in the rituals, pilgrims between the ages of 18 and 55 were included in the target group. A sample of roughly 10 to 15 people was chosen from each study area based on selection criteria that emphasized knowledge of

The study employed multiple tools to capture both tangible and experiential aspects of Anuradhapura's sacred landscapes. Photographic surveys documented materials, textures, and spatial arrangements, while observation checklists recorded user interactions such as barefoot walking and ritual circulation. Semi-structured interviews with Theros, pilgrims, and temple custodians provided insights into experiences and cultural perspectives. Digital tools, including UV lenses, measured surface thermal exposure to assess comfort levels, and visual analyses evaluated adherence to sacred design principles. Together, these tools created a triangulated dataset for a comprehensive understanding of the material and experiential impacts on ritual flow, comfort, and sacred perception.

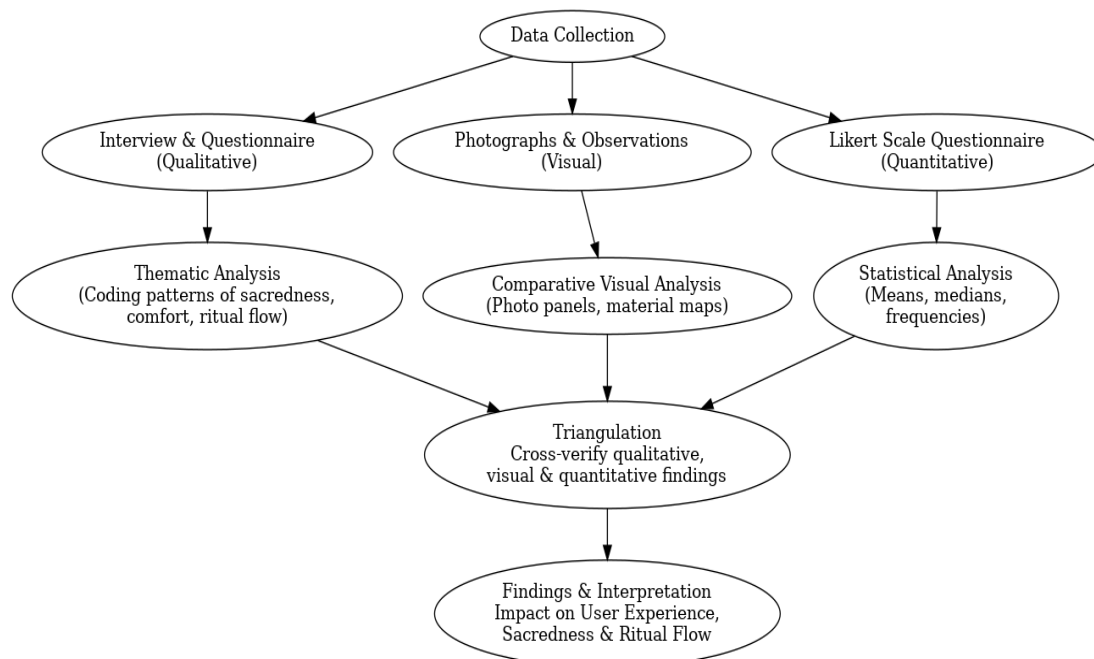
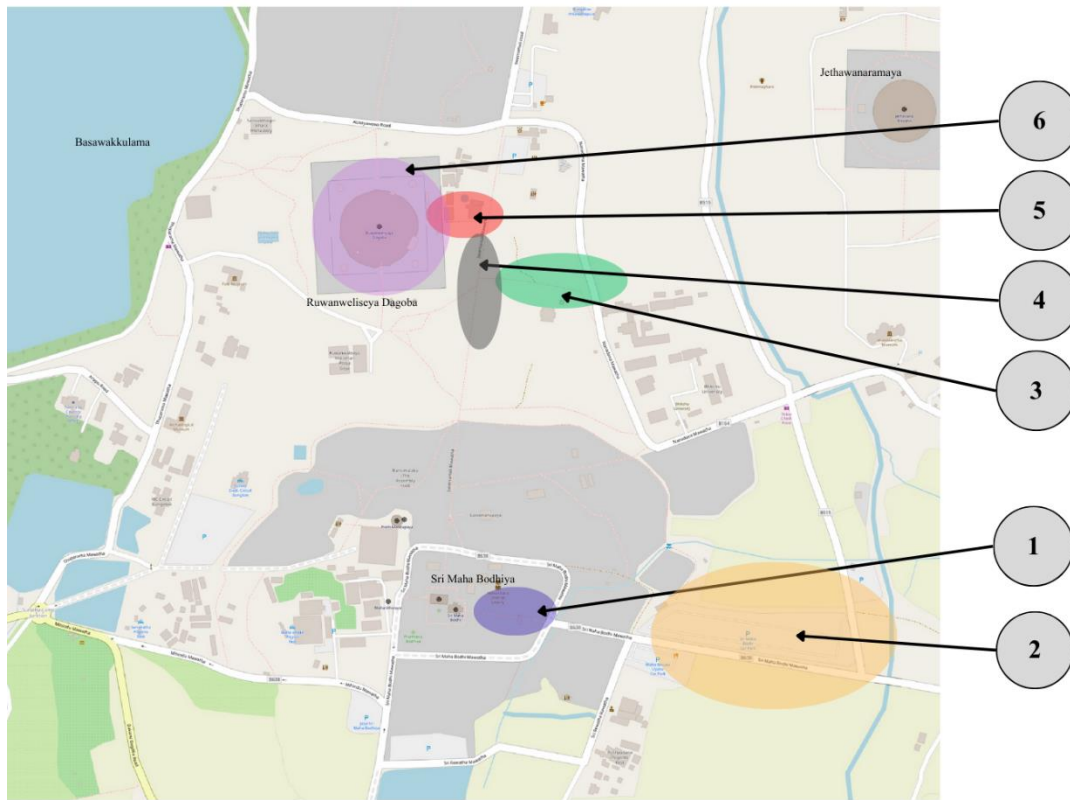


Fig. 4: Data Analysis techniques
Source: author

The diagram illustrates a triangulated analysis approach combining qualitative (interviews, thematic analysis), visual (photographs, observations), and quantitative (Likert-scale, descriptive statistics) methods. Findings from all three streams were cross-verified to assess the impact of material changes on user experience, ritual flow, and sacredness.

Study area, Two significant Buddhist sacred sites in the Anuradhapura heritage landscape the Ruwanweliseya Stupa and its environs and the Sri Maha Bodhi Complex are the subject of this study. The Sri Maha Bodhi Complex, one of the most sacred pilgrimage sites in Sri Lanka, has special historical and spiritual significance. Devotees who participate in barefoot ritual practices there can directly witness changes in the earth's composition. In a similar vein, the Ruwanweliseya Stupa, a major Buddhist shrine, is visited by large numbers of people every day and has experienced amazing changes from conventional natural earth systems to contemporary material interventions.

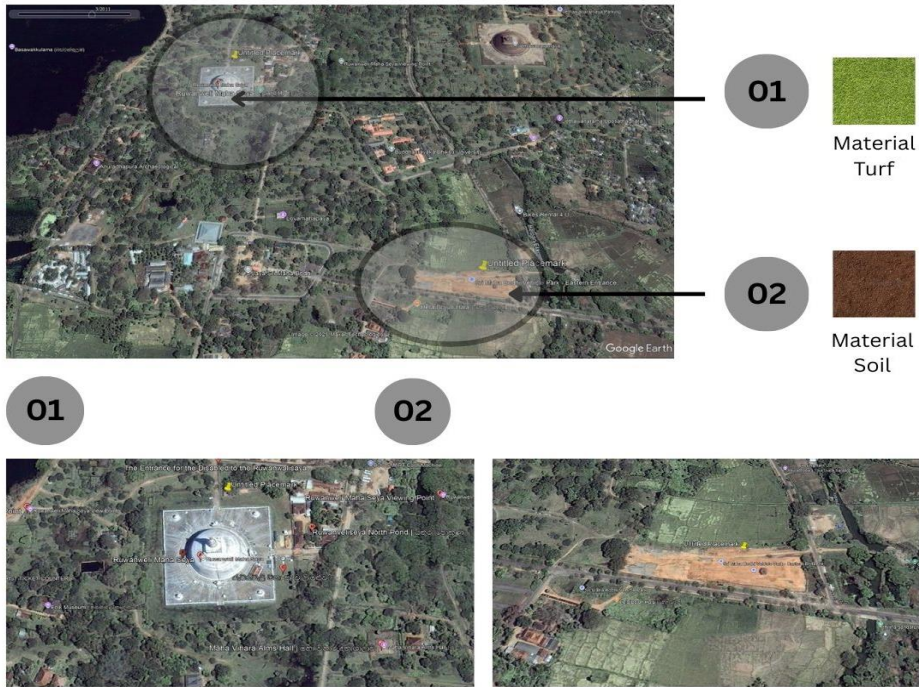


- 1 Study Area 01- Main entrance (Sri Maha Bodhi)
- 2 Study Area 02- Sri maha bodhi car park
- 3 Study Area 03- Ruwanweliseya precinct
- 4 Study Area 04- Swarnamali mawatha
- 5 Study Area 05- Main Access to Ruwanweliseya
- 6 Study Area 06- Surrounding of Ruwanweliseya

Fig. 5: Study Area Context
Source: author

Data Analysis

2011



2025

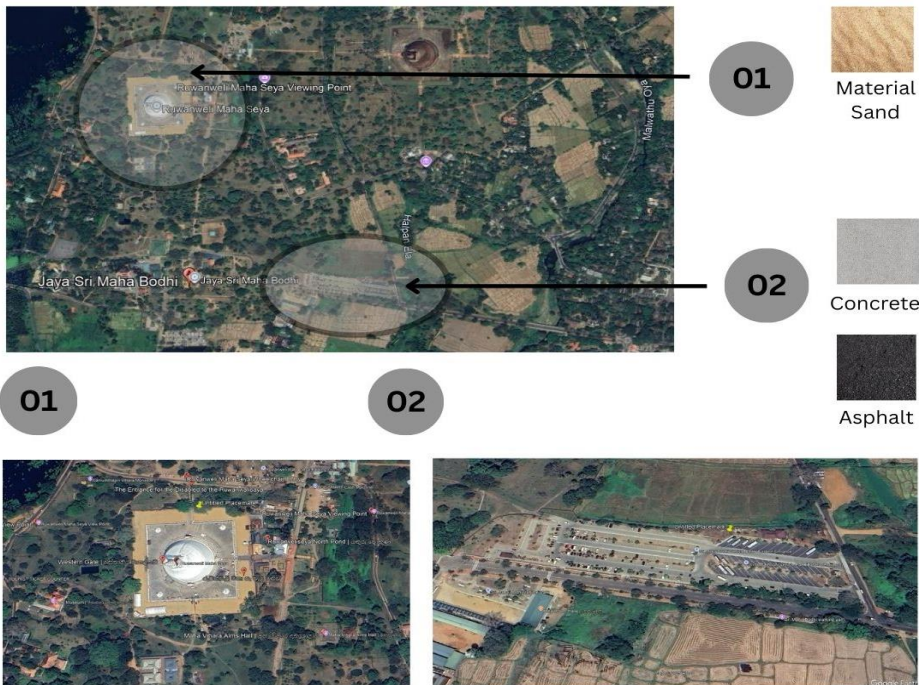


Fig. 6: Temporal Comparison of Flooring (2011-2015)
 Source: Google Earth Pro

Study Area 01 – Main Entrance (Sri Maha Bodhi)



Fig. 7: Study Area 01 Main Entrance (Sri Maha Bodhi)
Source: Google Earth Pro



Fig. 8: 2011-Main Entrance (Sri Maha Bodhi)
Source: www.google.com



Fig. 9: 2025-Main Entrance (Sri Maha Bodhi)
Source: author

Table 4: Material Comparison of Main Entrance

Feature	2012 (Pre-2015)	2025(Post-2015)	Key Observation
Material	Cement interlock blocks	Terracotta / clay brick units	Shift from modular industrial paving to a more traditional clay-based material.
Texture	Hard, uniform, slip-resistant	Slightly rougher, porous, earthy	Clay offers a natural texture but is more responsive to heat and weathering.
Visual Impact	Gray-tone industrial pattern	Warm, earthy reddish hues	Creates a more spiritually resonant and organic entrance experience.
Implication	Functional and durable, but lacks cultural tone	Enhances cultural identity and visual warmth	Improved integration with the sacred precinct's historic and spiritual character.

Table 5: Average User Perception by Parameters of Study Area 01

	Old Material	New Material
Material Type	1.42	4.1
Surface Texture & Tactility	1.56	4.21
Thermal Comfort	3.53	7.75
Perceived Sacredness	2.93	7.56

The comparative analysis between old and new flooring materials reveals distinct differences in user perception and environmental performance within Buddhist sacred landscapes. As shown in materials used before 2015 primarily cement interlocking blocks scored considerably lower across all key parameters, including material type (1.42), surface texture and tactility (1.56), thermal comfort (3.53), and perceived sacredness (2.93). In contrast, the post-2015 introduction

Study Area 02 – Sri Maha Bodhi Car Park



Fig. 10: Study Area 02 – Sri Maha Bodhi Car Park
Source: Google Earth Pro



Fig. 11: 2015- Sri Maha Bodhi Car Park
Source: www.google.com



Fig. 12: Sri Maha Bodhi Car Park
Source: author

Table 6: Material Comparison of Sri Maha Bodhi Car Park

Feature	2015	2025 (Post-Change)	Key Observation
Material	Natural turf grass on soil	Combination of cement paving and asphalt surfacing	Natural, eco-friendly surface replaced with hard, impermeable vehicular surfaces.
Texture	Soft, uneven, absorbent	Hard, smooth, high-friction	Surface shift favors vehicle access, reduces comfort for pedestrians and pilgrims.
Visual Impact	Green, natural, blends into sacred setting	Dark, engineered, urban tone	Visual warmth and spiritual simplicity replaced by industrial design.
Implication	Supports occasional pilgrim use, eco-integration	Prioritizes mass vehicle flow and maintenance ease	Sacred precinct increasingly shaped by traffic demands over spiritual ambiance.

Table 7: Average User Perception of Study Area 02

	Old Material	New Material
Material Type	4.32	1.28
Surface Texture & Tactility	4.43	1.45
Thermal Comfort	8.9	2.62
Perceived/ Sacredness	8.78	2.93

In contrast, the new flooring materials comprising terracotta and other heritage-sensitive natural compositions demonstrated substantial improvement across all parameters. The recorded scores were material type (4.4), surface texture and tactility (4.3), thermal comfort (8.5), and perceived sacredness (8.4), indicating a strong correlation between material authenticity and user satisfaction. Respondents noted improved barefoot comfort, thermal regulation during ritual hours, and enhanced spiritual connection with the sacred environment. The tactility of the new surfaces, coupled with their natural porosity and muted color tones, contributed to a more immersive and culturally coherent experience.

Overall, the analysis confirms that the transition from modern industrial materials to traditional, natural ones significantly improved both the physical comfort and the perceived sacred quality of the spaces. These results underscore the importance of heritage-sensitive material selection in sacred landscape conservation, emphasizing that materials are not merely functional elements but carriers of spiritual symbolism and cultural continuity.

Study Area 03 - Ruwanweliseya Precinct



Fig. 13: Study Area 03 Ruwanweliseya Precinct
Source: Google Earth Pro

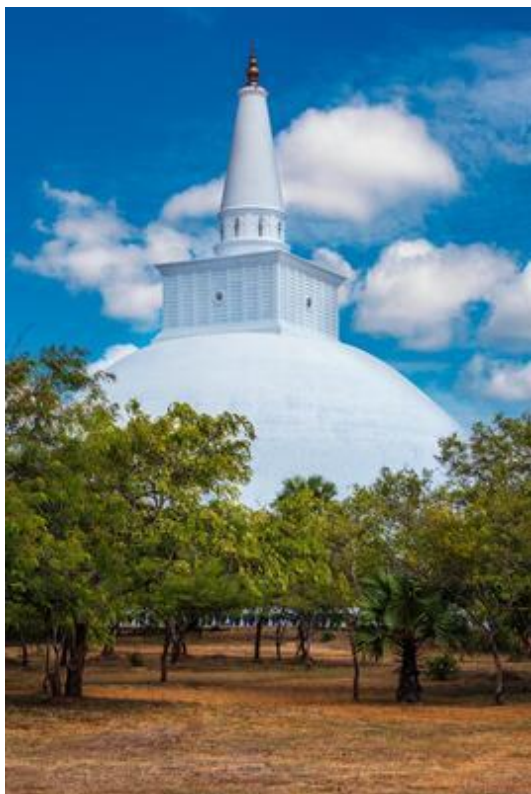


Fig. 14: 2010- Ruwanweliseya Precinct
Source: www.google.com



Fig. 15: 2025 Ruwanweliseya
Source: author

Table 8: Ruwanweliseya Precinct

Feature	2010 (Soil Surface)	2025 (Natural Grass Turf)	Key Observation
Material	Bare soil / compacted earth	Natural grass turf	Enhancement of material through organic greenery, reversing typical hardscaping.
Texture	Dry, loose, can become dusty	Soft, cool, and even	Grass introduces comfort and a climate-responsive surface.
Visual Impact	Minimalist and humble	Verdant and serene	Greenery uplifts sacredness without overpowering historic identity.
Implication	Traditional raw sacred terrain	Eco-conscious, pilgrimage-friendly upgrade	Balances heritage value with improved environmental and experiential quality.

Table 9: Average User Perception of Study Area 03

	Old Material	New Material
Material Type	2.5	4.4
Surface Texture & Tactility	3.9	4.3
Thermal Comfort	7.25	8.5
Perceived/ Sacredness	6.9	8.4

The parameter-based assessment shows a distinct improvement in visitor perceptions of the new materials. The old materials scored more moderately on the parameters material type (2.5), surface texture and touch (3.9), thermal comfort (7.25), and perceived sacredness (6.9) - showing they performed adequately functionally, but were lacking in cultural and spiritual quality. The new materials had a significant improvement in score across all parameters - material type (4.4), surface texture and touch (4.3), thermal comfort (8.5), and perceived sacredness (8.4) - resulting in a better tactile property with improved thermal properties, and strong alignment with the sacred and cultural identity of the site. Overall, these findings show materials choice affects both functional performance and aesthetic-spirituality experience, thus demonstrating the importance of heritage sensitive design in sacred landscapes.

The findings demonstrate improvement in visitors' perceptions of the new flooring materials. A difference had occurred in comparison to the old materials, this time the new flooring scored better in material type, surface texture, thermal comfort and perceived sacredness, demonstrating improvements in tactile comfort, cultural authenticity, and spiritual connection.

These also reflected the impact of heritage sensitive materials choice on functional and the overall visitor experience in sacred landscapes.

Study Area 04 – Swarnamali Mawatha



Fig. 16: Study Area 03 Ruwanweliseya Precinct
Source: Google Earth Pro



Fig. 17: 2014- Swarnamali mawatha
Source: [Www.google.com](http://www.google.com)

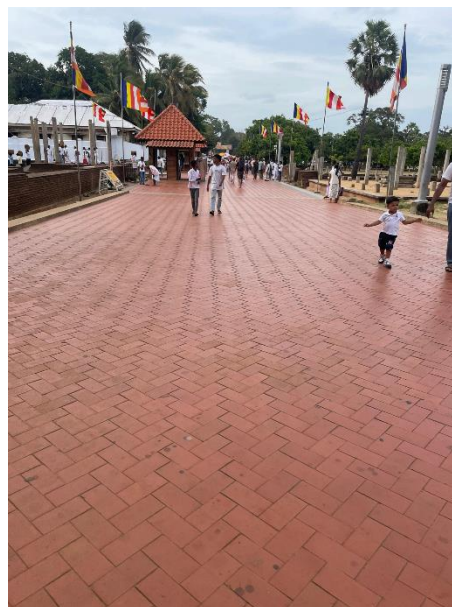


Fig. 18: 2025-Swarnamali mawatha
Source: author

Table 10: Material Comparison of Swarnamali Mawatha

Feature	2014-Cement Interlock Paving	2025–Terracotta Interlock Paving	Key Observation
Material	Industrial cement interlock blocks	Traditional terracotta interlock paving	Shift from modern/industrial utility material to traditional, heritage-inspired paving
Texture	Hard, uniform, flat, slightly coarse	Earthen, porous, slightly rough, natural	Transition from artificial hardness to organic, breathable texture enhancing barefoot comfort
Visual Impact	Dull gray, mechanical, functional look	Warm reddish-brown, earthy, blends with sacred setting	Movement from utilitarian appearance to culturally resonant, visually sacred harmony
Implication	Prioritized durability and easy maintenance, but spiritually less engaging	Enhances ritual authenticity, barefoot comfort, and sacred ambience	Clear shift toward materials that restore cultural identity, ritual comfort, and sacred symbolism

Table 11: Average User Perception of Study Area 04

	Old Material	New Material
Material Type	1.62	4.17
Surface Texture & Tactility	1.57	4.69
Thermal Comfort	3.28	8
Perceived Sacredness	2.9	7.87

Visitor perceptions improved markedly with the new terracotta/clay flooring compared to the old cement interlocking surface. The old flooring scored low on material type (1.62), texture (1.57), comfort (3.28), and sacredness (2.9), showing limited cultural and spiritual value. The new flooring scored much higher material type (4.17), texture (4.69), comfort (8), and sacredness (7.87), reflecting enhanced authenticity, comfort, and spiritual connection. Overall, the findings highlight that material choice significantly affects both functional performance and the experiential quality of sacred landscapes.

Study Area 05 - Main Access to Ruwanweliseya

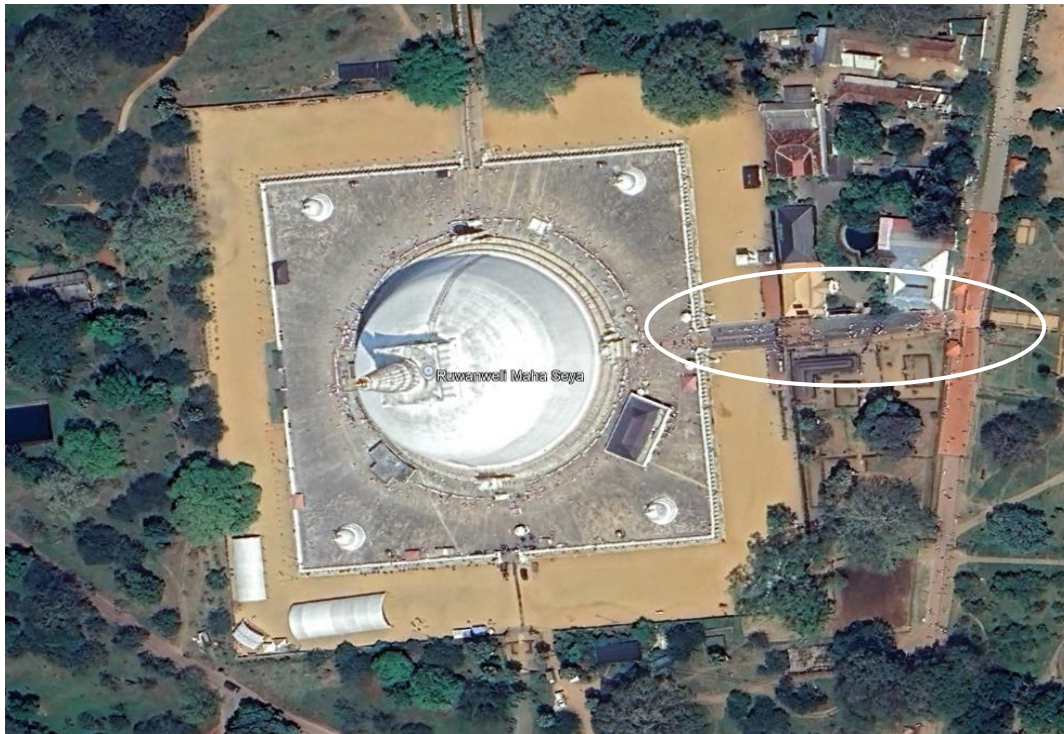


Fig. 19: Main Access to Ruwanweliseya
Source: Google Earth Pro



Fig. 20: 2011- Main Access to Ruwanweliseya
Source: www.google.com



Fig. 21: 2025- Main Access to Ruwanweliseya
Source: author

Table 12: Main Access to Ruwanweliseya

Feature	2011 – Concrete Paving	2025 – Granite Tile Paving	Key Observation
Material	Cast concrete blocks; utilitarian and cost-effective	Polished granite tiles; durable and prestigious	Transition from purely functional material to high-end, durable natural stone.
Texture	Hard, flat, slightly rough; prone to cracks and uneven wear	Smooth, polished, refined; heat-retentive under the sun	Comfort trade-off: concrete was neutral but rough, granite offers elegance but can cause barefoot discomfort.
Visual Impact	Dull gray, plain, industrial look; minimal sacred expression	Shiny, elegant, monumental feel; enhances temple aesthetics	Clear shift from mundane utility to an aura of prestige and sacred visual enhancement.
Implication	Focused on traffic durability and low maintenance	Prioritizes heritage aesthetics and long-term prestige, but may reduce thermal comfort	Move from functional/modernist approach to aesthetic-sacred integration with cultural value.

Table 13: Average User Perception of Study Area 05

	Old Material	New Material
Material Type	1.68	4.15
Surface Texture & Tactility	1.66	4.28
Thermal Comfort	3.31	8.21
Perceived/ Sacredness	2.84	8.25

The parameter-based analysis demonstrates a clear improvement in user perception and experiential quality following the transition from interlock paving to granite tile paving. The old interlock material recorded comparatively low values across all parameters material type (1.68), surface texture and tactility (1.66), thermal comfort (3.31), and perceived sacredness (2.84) indicating that while it provided basic functionality and durability, it lacked the sensory richness and cultural harmony expected in a sacred environment. In contrast, the granite tile paving achieved significantly higher scores 4.15 for material type, 4.28 for surface texture, 8.21 for thermal comfort, and 8.25 for perceived sacredness—reflecting substantial improvement in comfort, visual appeal, and alignment with the sacred identity of the site. These findings highlight that the transition to granite tiles enhanced both physical comfort and spiritual resonance, offering a more cohesive and dignified material expression consistent with the traditional aesthetics of Anuradhapura’s sacred landscapes. Overall, the results underscore the importance of material authenticity and tactile experience in preserving the sanctity and user well-being within sacred settings.

Study Area 06 Surrounding of Ruwanweliseya



Fig. 22: Surrounding of Ruwanweliseya
Source: Google Earth Pro



Fig. 23: 2015- Surrounding of Ruwanweliseya
Source: www.google.com



Fig. 24: 2025- Surrounding of Ruwanweliseya
Source: author

Table 14: Main Access to Ruwanweliseya

Feature	2015 (Natural Grass Turf)	2025 (Soil Surface)	Key Observation
Material	Natural grass turf	Bare soil / compacted earth	Enhancement of material through organic greenery, reversing typical hardscaping
Texture	Soft, cool, and even	Dry, loose, can become dusty	Grass introduces comfort and a climate-responsive surface
Visual Impact	Verdant and serene	Minimalist and humble	Greenery uplifts sacredness without overpowering historic identity
Implication	Eco-conscious, pilgrimage-friendly	Traditional raw sacred terrain	Balances heritage value with improved environmental and experiential quality

Table 15: Average User Perception of Study Area 06

	Old Material	New Material
Material Type	4.46	3.53
Surface Texture & Tactility	4.45	3.61
Thermal Comfort	8.46	6.15
Perceived/ Sacredness	8.37	6.62

The parameter-based analysis reveals a clear decline in visitor satisfaction and experiential quality following the transition from the old flooring material to the new one. As shown in Table 4.18, the old material achieved consistently higher scores across all parameters material type (4.46), surface texture and tactility (4.45), thermal comfort (8.46), and perceived sacredness (8.37) demonstrating its strong compatibility with the cultural, tactile, and spiritual expectations of users. In contrast, the new flooring material received noticeably lower ratings material type (3.53), surface texture (3.61), thermal comfort (6.15), and perceived sacredness (6.62) suggesting a reduction in comfort, authenticity, and ritual appropriateness. Visitors expressed that, although the new material may offer a modern aesthetic or structural durability, it failed to sustain the sensory and spiritual harmony that characterized the original design. Overall, the results indicate that the old material provided a more cohesive balance between functionality, comfort, and sacred atmosphere, underscoring the importance of preserving traditional materials in maintaining the integrity of sacred landscapes

Table 16: Main Access to Ruwanweliseya

Studied Area 01	Moderate canopy coverage. Trees are located on both sides providing partial shade to the area surrounding the path, notably at the margins. The path itself is primarily open.
Studied Area 02	Very little canopy coverage. The majority of the area is exposed to the sky with a few trees scattered along the top edges that offer small patches of shade.
Studied Area 03	Moderate canopy coverage. Most of the observed trees are found in the background and at the sides, while the majority of the main grassy area is mostly exposed to full sunlight.
Studied Area 04	Very little canopy coverage. The walkway is almost fully exposed to the sky overhead with only a few trees visible in the distant background.
Studied Area 05	Extremely little canopy coverage. The walkway and immediate surroundings are fully exposed to the sky with no overhead canopy cover from any trees.
Studied Area 06	Extremely little canopy coverage. The area surrounding the white dome is fully exposed to the sunlight with absolutely no tree coverage.

**Table 17: Observational Records of Thermal Comfort (Daytime-First Day)
 10-08-2025**

	Studied Area 01	Studied Area 02	Studied Area 03	Studied Area 04	Studied Area 05	Studied Area 06
Day time	3.00pm	1.00pm	2.00pm	2.30pm	2.20pm	1.00pm
Weather Condition	Partly cloud	sunny	Sunny	Sunny	Sunny	Sunny
UV Index	2	8	4	7	10	5
Specific Heat Capacity (J/kgK)	800	840	2000	800	790	800
Reflection Factor (%)	20	40	15	20	20	30
Flooring Material	Terracotta	Cement	Grass	Terracotta	Granite Tile	Sand
Surface Texture	Rough/ Slightly Rough	Rough	Soft	Rough/ Slightly Rough	Glossy	Soft
Barefoot Use Observed	yes	No	Yes	yes	Yes	Yes
User Discomfort	Mild signs	Severe Reaction	Mild signs	Mild signs	Severe Reaction	Neutral

Field observations conducted from 10-08-2025 show that traditional materials such as terracotta, grass, and sand were advantageous for thermal comfort and carrying out barefoot rites, while modern materials such as cement and granite tiles exhibited higher heat reflectance which caused user discomfort.

**Table 18: Observational Records of Thermal Comfort (Daytime-First Day)
10-08-2025**

	Studied Area 01	Studied Area 02	Studied Area 03	Studied Area 04	Studied Area 05	Studied Area 06
Day time	3.00pm	1.00pm	2.00pm	2.20pm	2.20pm	1.00pm
Weather Condition	Sunny	sunny	Sunny	Sunny	Sunny	Sunny
UV Index	8	11	4	9	10	9
Specific Heat Capacity (J/kgK)	800	840	2000	800	790	800
Reflection Factor (%)	20	40	15	20	20	30
Flooring Material	Terracotta	Cement	Grass	Terracotta	Granite Tile	Sand
Surface Texture	Rough/Slightly Rough	Rough	Soft	Rough/Slightly Rough	Glossy	Soft
Barefoot Use Observed	yes	No	Yes	Yes	Yes	Yes
User Discomfort Observation	Severe Reaction	Severe Reaction	Mild signs	Severe Reaction	Severe Reaction	Neutral

As of 11-08-2015, natural materials, namely terracotta and sand, offered comfortable surface temperature for bare feet, while cement and granite tiles had higher heat retention and caused discomfort and limited interaction for users during peak sun hours.

**Table 19: Observational Records of Thermal Comfort (Evening time-First Day)
10-08-2025**

	Studied Area 01	Studied Area 02	Studied Area 03	Studied Area 04	Studied Area 05	Studied Area 06
Day time	5.00pm	5.30pm	6.00pm	5.20pm	5.20pm	5.10pm
Weather Condition	Partly cloud	Overcast	Overcast	Partly cloud	Partly cloud	Overcast
UV Index	1	1	0	0	0	1
Specific Heat Capacity (J/kgK)	800	840	2500	790	790	800
Reflection Factor (%)	20	40	15	20	20	30
Flooring Material	Terracotta	Cement	Grass	Terracotta	Granite tile	Sand
Surface Texture	Rough/Slightly Rough	Rough	Soft	Rough/Slightly Rough	Glossy	Soft
Barefoot Use Observed	yes	No	Yes	Yes	Yes	Yes
User Discomfort Observation	Neutral	Mild signs	No	Neutral	Neutral	Neutral

On the evening of October 8, 2025, it was noted that all materials exhibited a substantial decrease in surface heat. Conventional materials such as terracotta and sand maintained comfortable temperatures conducive for barefoot practices, while contemporary materials, including cement and granite tiles, were slightly warm with increased usability compared to daytime conditions

**Table 20: Observational Records of Thermal Comfort (Evening time-Second Day)
 11-08-2025**

	Studied Area 01	Studied Area 02	Studied Area 03	Studied Area 04	Studied Area 05	Studied Area 06
Day time	5.00pm	5.30pm	6.00pm	5.20pm	5.20pm	5.10pm
Weather Condition	Partly cloud	Overcast	Overcast	Partly cloud	Partly cloud	Overcast
UV Index	2	1	0	1	1	2
Specific Heat Capacity (J/kgK)	800	840	2500	790	790	800
Reflection Factor (%)	20	40	15	20	20	30
Flooring Material	Terracotta	Cement	Grass	Terracotta	Granite Tile	Sand
Surface Texture	Rough/ Slightly Rough	Rough	Soft	Rough/ Slightly Rough	Glossy	Soft
Barefoot Use Observed	yes	No	Yes	Yes	Yes	Yes
User Discomfort Observation	Neutral	Mild signs	No	No	No	Yes

Evening observations on November 8, 2025 indicated that all materials observed provided general thermal comfort as surface temperatures decreased with less solar heat loading. Traditional materials, terracotta tile and sand, provided the most pleasant 'barefoot' experience, while cement and granite tiles were cooler than the previous day but still retained residual heat which influenced occupant comfort

The analytical framework for this study is designed to examine the interplay between material characteristics, environmental conditions, and visitor experience within Anuradhapura's sacred landscapes. The framework integrates multiple layers of analysis, beginning with the documentation of material types, textures, and thermal properties, followed by observational studies of visitor interactions, particularly barefoot and ritual practices. Visitor perceptions were assessed through semi-structured interviews and structured questionnaires, capturing experiential dimensions such as comfort, tactile engagement, aesthetic appreciation, and perceived sacredness. Quantitative data, including material properties and thermal indices, were analyzed alongside qualitative insights to identify patterns in visitor experience relative to changes in flooring materials. This integrative approach allows for a comparative evaluation of

pre- and post-intervention materials, highlighting how functional durability, cultural authenticity, and experiential quality intersect. The framework ultimately informs design recommendations for heritage-sensitive interventions that enhance both the physical and spiritual dimensions of sacred landscapes.

Overall Result and discussion

The results of the study indicate a discernible link between material alteration and user experience in Anuradhapura's sacred sites. Traditional materials such as terracotta, laterite, granite, and sand consistently provided good thermal comfort, tactile comfort, and spirituality that supported barefoot ritual action and remained responsive to the sacred. Observed surfaces that were rough or slightly porous remained cooler (reflectivity 20–30%) and were preferred for ritual comfort. At the same time, modern materials, such as cement and granite tiles, with high reflectivity (38–42%) and heat retention, produced significant thermal stress and user discomfort, especially when the sun was at its highest. Quantitative data recorded that for traditional forms users reported higher average comfort levels/states while interviews indicated that modern forms were not conducive to the ritual flow, visual harmony, or sacredness transcendence.

Thematic analysis from interviews and field notes emphasised the unison between spiritual experience and comfort: over-moderating sites detracts from the meditative, cultural experience found in the sacred environment. This collective evidence drives the return for heritage-sensitive and climate-sensitive landscape practice focused on preserving the authentic materiality of Buddhist sacred sites while being able to support the newly termed 'worshippers of today'. The evidence collectively indicates that traditional material systems are superior for ecological, cultural, and experiential purposes, safeguarding the continuity of ritual actions and the unity of the user environment.

Recommendations

Based on the findings, a number of recommendations have been made to inform the conservation and design of sacred sites. First, the use of traditional materials should be prioritized, as they provide comfort, tactile resonance, and ritual suitability that is not supplied by modern materials. Second, climate responsive interventions such as shade, vegetation, and porous surfaces should be incorporated to maximize thermal comfort, and improve barefoot experience. Third, conservation practice should use heritage frameworks, such as ICOMOS and the Nara Principles, to maintain authenticity and respect the cultural significance. Fourth, the design of barefoot paths and rest areas should be enhanced with natural textures (such as sand, terracotta, and grass) to fully support the participation of ritual. Finally, supportive policies should be developed to limit the use inappropriate modern materials that erode the authenticity of sacred sites, and ensure future intervention is sensitive to heritage and culturally appropriate.

Suggestions for Future Research

This study identifies several areas for further research. Long-term monitoring of material transitions will provide valuable insights into how traditional and modern materials influence ritual practices over time. Comparative studies across other sacred cities in Sri Lanka and South Asia could reveal broader patterns in how material authenticity influences spiritual engagement. Furthermore, research should explore sustainable modern materials that mimic the tactile, thermal, and visual properties of traditional materials, providing alternatives where durability and maintenance issues arise. Finally, cognitive-based studies, particularly focusing on barefoot rituals

and user comfort, should be expanded to strengthen empirical evidence on the relationship between material choice, cultural authenticity, and sacred experience.

Conclusion

The research investigated the role of material transitions in the user experience of Buddhist sacred landscapes in Anuradhapura before and after 2015. Using an integrated qualitative and quantitative analysis and a mixed-method approach including photographic survey, thermal comfort testing, interviews, and observation, the research demonstrated that careful material selection affects more than the physical comfort of pilgrims. It is critical in the preservation of the spiritual and cultural integrity of sacred places.

The research showed key points are traditional materials such as stone, brick, and terracotta clay are cooler on the surface, are comfortable in tactile engagement when barefoot, and visually blend with the natural and spiritual environment, thus enhancing the sacred atmosphere through visual continuity, authenticity, and environment balance. In contrast, modern materials such as concrete tiles and polished synthetic finishes were found to introduce thermal discomfort, disrupt the flow of ritual movements, and visually contrast with the calm and symbolic language of Buddhist landscapes. These alterations have resulted in a decline of sensory and spiritual satisfaction for users, as they negatively impacted the embodied rituals that convey the sacred experience.

The study found that landscapes that are sacred are living entities that mediate physical form with spiritual value. The material and spatial characteristics affect a user's ability to perceive what is sacred, how the ritual unfolds, and the sense of belonging to place. The advancements after 2015, even though they provoked a better understanding of accessibility and maintenance, ultimately resulted in a diminishment of visual hierarchy and the sacred balance in sites like Ruwanwelisaya and Sri Maha Bodhi. The introduction of the materials industry, finishes, and ornaments which are inappropriate caused a movement away from the simplistic spiritual meaning of the site and into aesthetics and conscious visual order, diminishing the aesthetics of Buddhist values and the indirect discipline of spatial experience altogether.

In terms of theory, the research supports *genius loci* (Norberg-Schulz, 1980) and sacred spatial order (Eliade, 1959) of what aspects of physical design generates a spiritual experience. The findings also align with the Nara Document on Authenticity (ICOMOS, 1994), that preserves not just the material fabric, but the cultural meaning and continuation of ritual is how heritage is maintained in truth.

In conclusion, the research indicates that decisions on the materials in sacred landscapes encompass more than technical decisions, but reflect an ethical and cultural obligation. As we move forward with conservation and design processes, we must design a heritage sensitive, climate responsive, user-centred intervention that respects the interdependence of both environmental realities and spiritual traditions. Traditional materials can be reappraised in a new sustainable tradition offering comfort, authenticity and continuity principles.

This research provides many insights for landscape architectural practices, heritage conservation, and sacred space design, by addressing the complex interplay between materiality, ritual experience, and spiritual sensibility. It is evident that the renewal of the sacred place of Anuradhapura requires sensitive design interventions in keeping with its cultural identity, spiritual identity and contemporary context.

References: (Journal articles)

- Bandaranayake, S. (1974a). Sinhalese monastic architecture: The vihāras of Anurādhapura. Brill.
- Bandaranayake, S. (1974b). Sinhalese monastic architecture: The vihāras of Anurādhapura. Brill.
- Cohen, 2008). (n.d.). "Cohen, E. (2008). Pilgrimage and Tourism: Convergence and Divergence. In R. Raj & N. D. Morpeth (Eds.), Religious Tourism and Pilgrimage Management: An International Perspective (Pp. 76–88). CABI," n.d.
- Cooper, J. (2011). (n.d.). "Cooper, J. (2011). Ancient Hydraulic Engineering in Sri Lanka: Sustainable Water Management in Sacred Landscapes. Journal of South Asian Studies, 34(2), 211–229.," n.d.
- De Silva, K. M. (2013). (n.d.). De Silva, K. M. (2013). The Environmental and Spiritual Dimensions of the Anuradhapura Sacred Landscape. Colombo: Centre for Heritage Studies., n.d.
- De Silva, W. (2023). Comprehending genius loci, towards spiritual sustainability: Lessons from Buddhist heritage city Anuradhapura. International Journal of Heritage Studies
- Eliade, M., & Eliade, M. (1987a). The sacred and the profane: The nature of religion ; [the groundbreaking work by one of the greatest authorities on myth, symbol, and ritual] (W. R. Trask, Trans.). Harcourt, Brace.
- Fernando, S. (2004). Buddhist symbolism in Sri Lankan architecture: Materiality and meaning. Asian Cultural Studies, 12(1), 45–62. (n.d.).
- ICOMOS. (1994). (n.d.). "ICOMOS. (1994). The Nara Document on Authenticity. International Council on Monuments and Sites.," n.d.
- Jokilehto, J. (2006). Considerations on authenticity and integrity in world heritage context. City and Time, 2.
- NARA. (1994). (n.d.). "NARA. (1994). Guidelines for Authentic Conservation of Heritage Sites. National Archives of Research in Asia.," n.d.
- Norberg-Schulz, C. (1980). Genius loci: Towards a phenomenology of architecture. Rizzoli.
- Perera, R. (2018). (n.d.). "Perera, R. (2018). Modern Interventions and Challenges in Heritage Conservation: Case Studies from Sri Lanka. Conservation Journal, 21(4), 122–135.*," n.d.
- Ranaweera, M. (2017). Some Engineering Aspects of Ancient Stupas in Sri Lanka. Proceedings of the Institution of Civil Engineers - Engineering History and Heritage, 171, 1–34.
- Sangapala, P., & Perera, N. (2023). Spatializing Nationalism and Religion: The Production of Sinhala-Buddhist Imagination and the Centrality of Anuradhapura. Space and Culture.
- (Sen, 2012). (n.d.). "Sen, A. (2012). Contesting Sacred Space: The Case of Bodh Gaya. International Journal of Heritage Studies, 18(3), 262–278.," n.d.Cooper, J. (2011). (n.d.). "Cooper, J. (2011). Ancient Hydraulic Engineering in Sri Lanka: Sustainable Water Management in Sacred Landscapes. Journal of South Asian Studies, 34(2), 211–229.," n.d.
- Sheehan, W. (1996). The planet Mars: A history of observation & discovery. University of Arizona Press.