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Evaluating the Role of Urban Green Spaces in Enhancing Neighborhood Livability: A Case Study of Vellayambalam

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Abstract

Urban green spaces (UGS) constitute vital elements of sustainable urban systems, contributing significantly to ecological stability, social well-being, health benefits, and economic resilience. This study aims to evaluate the contribution of UGS to neighborhood livability in Vellayambalam, Trivandrum, by analyzing their environmental, social, and economic functions. The study includes combined geographical analysis, field survey, observation, and perspective study. Using maps helps to analyze the spatial distribution, accessibility, and ecological performance of existing green spaces. Social and economic data were analyzed to understand community perceptions, recreational use, and the influence of UGS on property values and local economic activity. The study emphasizes the need for a more integrated planning strategy that acknowledges UGS as multifunctional assets critical to sustainable urban livability. Urban planners and decision-makers can use the insights this research offers to improve the livability of the neighborhood of Trivandrum and other comparable urban contexts through the strategic integration of green spaces, since it bridges the gap between ecological design principles and practical urban management.

Keywords: Environmental sustainability, neighborhood livability, social cohesion, sustainable urban planning, urban green spaces, urban livability

INTRODUCTION

Urban Green Spaces (UGS) play a crucial role in enhancing and shaping livability and overall quality of life within the urban environments in urban neighborhoods. When cities continue to expand rapidly due to urbanization and increasing population, and also increasing the built-up area in the city, the demand for green and open spaces within neighborhoods become critical element for maintaining environmental balance, social well-being, economic vitality, and urban livability. UGS, like parks, gardens, tree-lined streets, and recreational areas, plays a crucial role in enhancing the livability which offers essential ecological services, improving air quality, moderating urban temperature, and reduces urban heat island. However, beyond environmental significance, they provide recreation, social interaction, and community engagement, thereby contributing directly to neighborhood livability. A neighborhood is a localized area within the city and neighborhood livability is the quality of life in a neighborhood. UGS are essential components of livable neighborhoods, as they directly influence environmental quality, social well-being, and economic value [1].

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In the context of Trivandrum city, Kerala, the presence and accessibility of UGS have been increasingly recognized as indicators of sustainable urban living. However, with the city's rapid urban growth, many green spaces are under pressure due to land-use changes and infrastructure expansions. Presently, the total area of organized green spaces is about 4.25 sq. km (where it holds less than 1%) [2].

According to URDPFI guidelines, 2014 recommends 10 to 12 sq. m of open spaces per person needed for every city but at Trivandrum city does only provide 2.28 sq. mt per person that implies the city does not provide the required UGS per person at a minimum [3].

The purpose of this study is to assess how urban green spaces affect the livability of a community in Vellayambalam. This study contributes to the understanding of how green spaces can improve urban livability, people movement and activity, and sustainability by assessing, analyzing, and investigating the multifunctional role of UGS in Vellayambalam. It also provides insights for urban planning, policymakers, and urban designers to create more resilient and livable neighborhoods in Trivandrum and beyond [4].

AIM

This research aims to evaluate the contribution of urban green spaces in neighborhood livability in Vellayambalam. By evaluating, analyzing, and by examining the multifunctional role of UGS in Vellayambalam, where this study contributes to the understanding of how green spaces can enhance neighborhood livability.

Scope of the Study

The research specifically examines the existing and accessible UGS including parks, streets, pedestrian pathways with lined trees, etc. within a selected neighborhood in Vellayambalam. The scope of the study encompasses an evaluation of environmental, social, and economic function of these selected neighborhoods by utilizing indicators related to urban livability. Present land use, usage patterns, public accessibility, and user perception will be highlighted in this study which will be conducted in accordance with the existing urban conditions [5].

Objectives

- To examine the accessibility, distribution quality of urban green spaces and residents' participation in selected neighborhood of Vellayambalam through spatial and field analysis.
- To investigate the interlinkages between environmental, social, and economic functions of UGS and their cumulative impact on neighborhood livability.

Research Questions

- How does UGS contribute to improving environmental quality and ecological balance within the neighborhood livability in Vellayambalam?
- What are the ways UGS influence social interaction, recreational activity and community well-being among the residents?

Limitations

- The study is confined to a single neighborhood, which may limit the generalizability of findings to other urban contexts.
- Accessibility issues in some areas of the neighborhood, such as apartments, hostels, etc.
- Resident perceptions gathered through surveys are subject to response bias and may not fully represent the diversity of users.

METHODOLOGY

Study Area

The research study area is in a selected neighborhood in Vellayambalam, Trivandrum City, Kerala (Figure 1). The area is characterized by landmarks, commercial buildings, residential clusters, and a

network of roads with open spaces and tree covers. The site was selected to analyze the contribution of UGS to neighborhood livability and also to evaluate the environmental, social, and economic function across the selected neighborhood due to UGS. The area is across 0.48 sq. km [6].

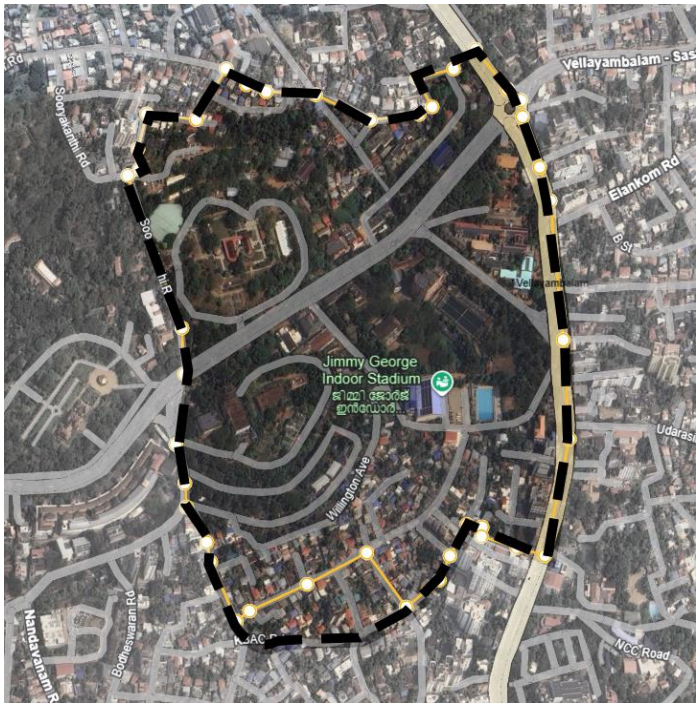

Figure 1. The study area is at Vellayambalam.

Field Surveys and Observations

Direct site visits were conducted to identify and map existing green spaces, evaluate their physical condition, accessibility, and spatial connectivity. The site was also evaluated based on its spatial characteristics, vegetation cover, maintenance level and usage patterns. This method provided empirical insights into how these spaces function in the local context and how design, scale, and maintenance affect their usability and ecological performance [7].

Perception Study

A perception-based study was undertaken to understand how residents and users perceive the role of green spaces in enhancing neighborhood livability. Observations and informal interactions with residents, daily visitors, different user groups, etc. allow us to understand the user satisfaction, livability improvements, well-being benefits, frequency, and purpose of use, environmental benefits, social value, and accessibility. The collected responses were analyzed thematically to identify patterns in public attitudes and experiences [8].

Ethical Considerations

All participants in the survey and interviews were informed about the purpose of the study, and their consent was obtained prior to data collection. Data should be used only for academic and analytical purposes.

LITERATURE REVIEW

Urban green spaces (UGS) are the essential elements that are integrated into the urban fabric, infrastructure, and the neighborhoods and the places in a cityscape which are critical for sustainability and livability in urban neighborhoods and urban futures. In this paper it is mainly focusing on demonstrating the significant contributions of UGS to neighborhood livability through environmental, social, and psychological benefits. The literature also highlights the role of urban green spaces not only

as providers of ecological services but also as vital community assets that foster well-being, social cohesion, and also economic vitality [9].

General Condition

According SLIP (Service Level Improvement Plan) to analysis the existing status of organized green spaces or parks and proportion of area, as per URDPFI guidelines categorization of parks are Housing Area Park (HAP), Neighborhood Park (NP), Community Park (CP), District Park (DP) and Sub-City Park (SCP). As per URDPFI Guidelines a minimum of 18–20% of land area must be set apart as Parks and Open spaces in every city. But as per draft Trivandrum Master Plan 2012 which was later frozen by the government the area of organized recreational open spaces available is 0.54 sq. km which accounts only less than 1% of total area of the city. But presently, the total area of green spaces available is about 4.25 sq. km, which is still less than 1% of the total area. According to URDPFI guidelines, 2014 recommends 10 to 12 sq. mt of open space per person in our cities but in Trivandrum city only provides 2.28 sq. mt per person that implies the city does provide the required UGS per person at a minimum [10].

Environmental Benefits

From the studies it helps to identify UGS as a crucial role in improving air quality, regulating urban microclimates and also supporting ecological systems. UGS also helps to mitigate the Urban heat island effect, reduction of air and noise pollution, carbon sequestration, biodiversity conservation and management of stormwater runoff. These services improve environmental quality, contribute to climate resilience, establish urban areas as healthier and improve livability [11].

Social Cohesion, Community Well-Being and Psychological Benefits

UGS encourages social cohesion and also helps to increase trust levels amongst the members of the community or neighborhood. This social cohesion also helps to determine the behavior and lifestyle choices which helps the individuals to feel connected to their community or their neighborhood that fosters social interaction and cohesion, acting as communal meeting grounds that strengthen neighborhood ties and perceptions of safety. In addition to fostering health and happiness, there should be well-designed open spaces, safe, clean which also supports the community attachment and social cohesion within the neighborhood. The study also shows the sense of place, sociability, and perceived safety in a neighborhood are closely linked to the quality and presence of public green spaces [12].

Contact with UGS also improves mental well-being, reduces stress and greater overall well-being. The studies also indicate that living in a greener environment can buffer the negative psychological effects of urban living and also helps to promote psychological restoration and even helps decrease health issues like obesity and cardiovascular diseases [13].

Livability and Urban Quality of Life

Livability can be defined as the suitability to live in place or the quality of life in a neighborhood which will be often associated with the city's environmental quality, health, social cohesion and quality of life. In terms of UGS livability is also closely tied to the availability, accessibility, and quality of green spaces. Some of key indicators of livability are the satisfaction with neighborhood amenities, socializing, perceived safety, and environmental comfort-are often positively influenced by green infrastructure. The integration of parks, UGS, and community gardens correlates with higher levels of resident satisfaction, higher property values and an enhanced sense of urban well-being [14].

In conclusion UGS are fundamental to enhancing a city's livability which delivers ecological, social, and health benefits that make urban neighborhoods more sustainable and livable.

FINDINGS

The study area is in a selected neighborhood in Vellayambalam, Trivandrum City, Kerala. The area is characterized by landmarks, commercial buildings, residential clusters, and a network of roads with open spaces and tree covers.

- *Neighborhood Area:* 121 acres (0.488 sq. km).
- *Location:* Vellayambalam.
- *Major Landmarks Across Selected Neighborhood:* Kanakakunnu palace, Water Captain Lakshmi Park, Manaveeyam veedhi, Jimmy George Indoor Stadium, Police headquarters, Keltron, Water authority.
- *Number of Households:* 180 (approximately only in selected neighborhood).
- *Number of Residential High-Rise Building:* 4.

The timeline helps to understand the infrastructure development across the Vellayambalam area and helps to analyze urban green spaces across the neighborhood (Figures 2–6).

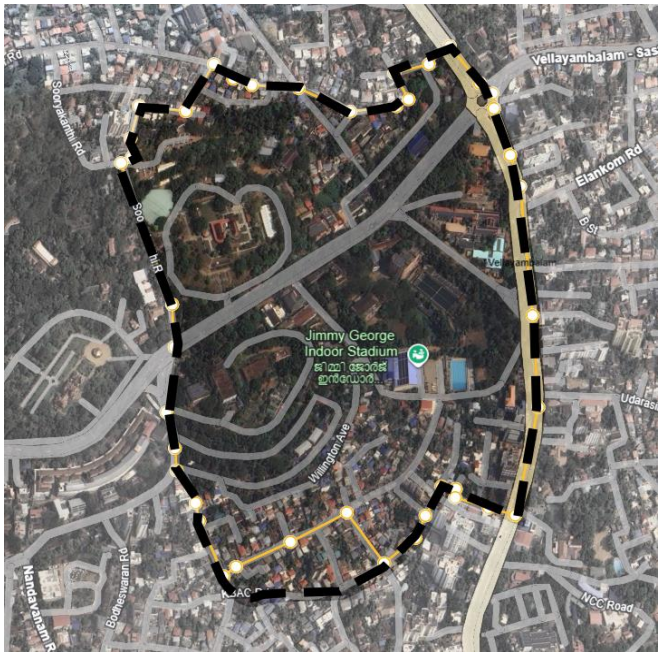

Figure 2. The study area is at Vellayambalam.

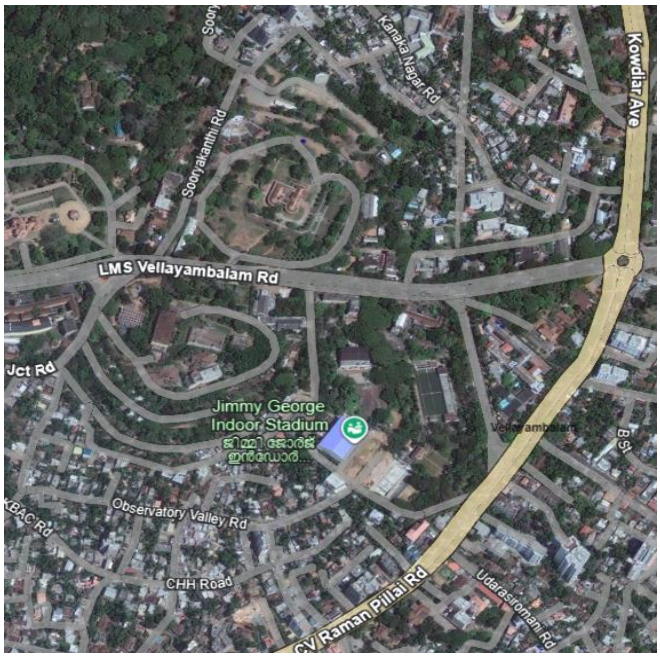

Figure 3. Built fabric in 2011.

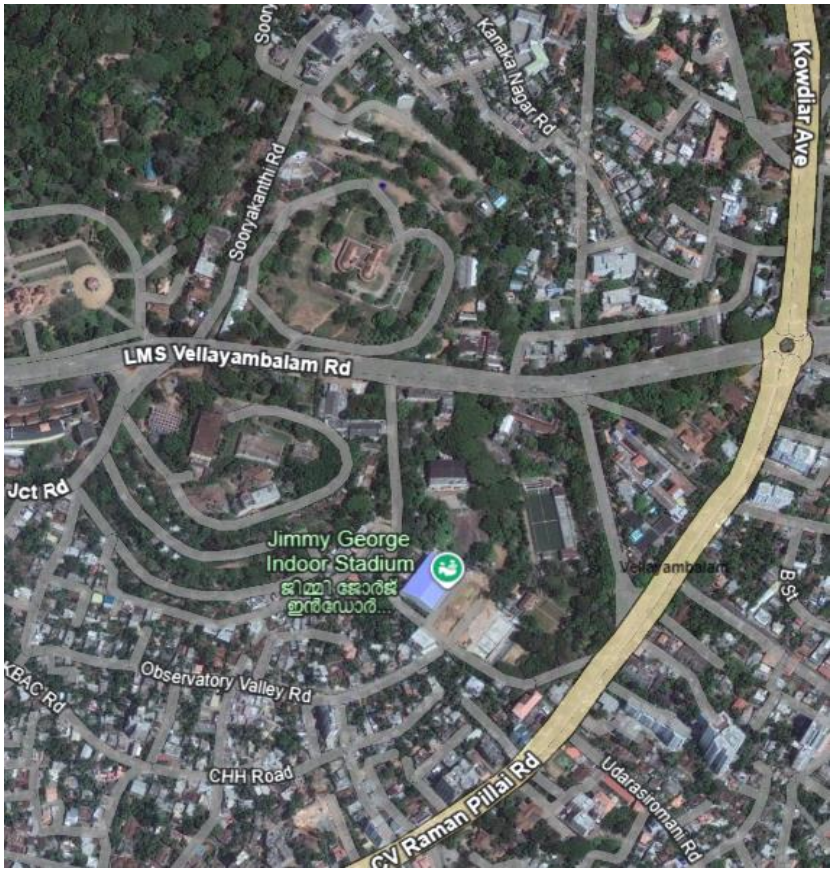

Figure 4. Built fabric in 2014.

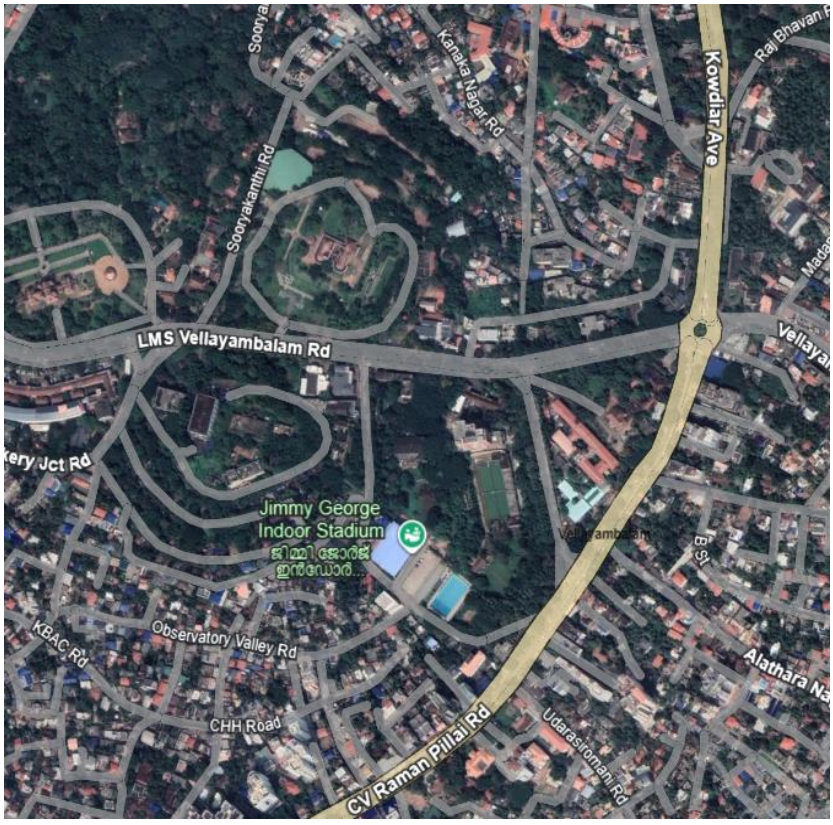

Figure 5. Built fabric in 2019.

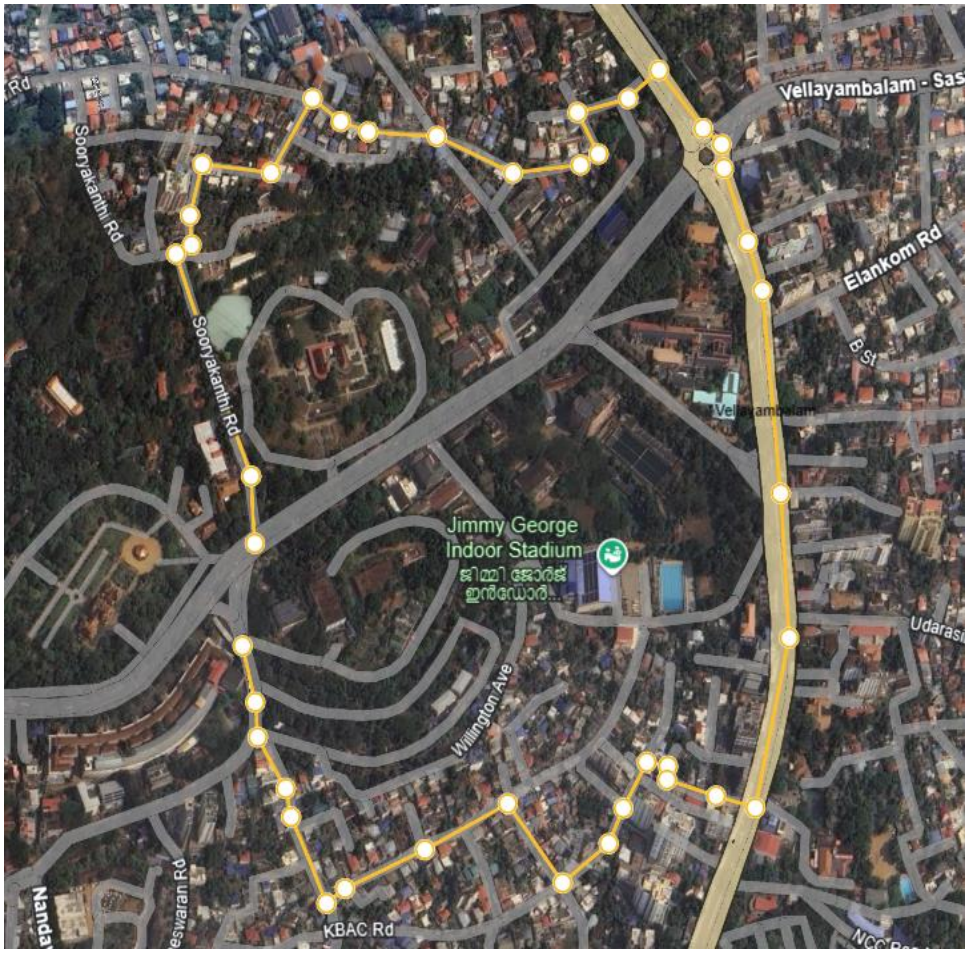

Figure 6. Built fabric in 2025.
Note: Satellite image of the selected neighborhood over the years.

Currently across the selected neighborhood by the development of Smart city Project, Trivandrum currently Vellayambalam-Vazhuthcad Road has developed to smart city road where the electrical wire goes underground and proper pedestrian path with trees as coverage to path, also has tactile paving for people with visual impairments or a subcortical visual pathway in the brain and also proper cycle paths helps the community to engage social activities (Figure 7) [15].

Figure 7. Image of UGS across the pedestrian pathways in Vellayambalam-Vazhuthcad Road.

At same time, across the selected neighborhood LMS Vellaymbalam Rd has proper pedestrian pathways with tree lined corridors which also engages the individuals in social activities (Figure 8).

Figure 8. Image of UGS across the pedestrian pathways in LMS Vellayambalam Road.

Kanakakunnu Palace

In the selected neighborhood two notable landmarks, such as Kanakakunnu Palace and Captain Lakshmi Park, are the UGS which plays a crucial role in enhancing neighborhood livability.

In Kanakakunnu Palace is a significant heritage monument of Kerala which was constructed during the reign of His Highness Sree Moolam Thirunal Maharaja of Travancore (Figure 9). It was used as a royal guest house and now it is used as a UGS. Now it is a vibrant center where many cultural events are hosted. When talking about Kanakakunnu Palace gardens serve as a major UGS across the neighborhood where many people across the neighborhood visit the spaces for recreation, cultural engagement and social interactive space [16].

Figure 9. Kanakakunnu Palace Park.

Users report high satisfaction with the aesthetic beauty, cleanliness, and shaded areas, which promote relaxation and social interaction. The site also attracts groups or communities to foster community cohesion or social interaction across the Palace. And also, the cultural events held across the Palace also encourage the neighborhood socially. Its large, well-maintained green spaces also contribute to mitigating urban heat and improving air quality locally (Figure 10).

Figure 10. Activity happening in Kanakakunnu palace.

Captain Lakshmi Park

The other UGS within the neighborhood is Captain Lakshmi Park which is open space where the space supports daily physical activities, such as walking and jogging, and it supports other sports activities such cycling, skating, etc. The space also acts as a social hub where families, elderly, and youth converge while reinforcing social bonds and promoting mental well-being [17]. The park's green cover helps reduce noise pollution and provides ecological benefits like small-scale biodiversity support. From the observations, the park is well maintained with all playground facilities for children and an open gym for adults which helps to engage in physical activity and socially active and also helps individuals use the UGS more frequently. Within the park it also has an open-air theater to conduct cultural events for the community or for the neighborhood (Figure 11).

Figure 11. Images of Captain Lakshmi Park.

Manaveeyam Veedhi

Manaveeyam Veedhi is a recreational zone which is completely a pedestrian-friendly zone. Different social activities, such as community meetings, reunions, cultural festivals, singing, stage programs, etc., are performed here. The history of Manaveeyam Veedhi can be traced back to as early as 1995 when street plays were regularly held at this location. In 2001 it inaugurated this road as a center for cultural programs. Manaveeyan Veedhi was a narrow street road until in 2011 Government of Kerala began organizing cultural events on the road as part of its "Manaveeyam" project and in 2023 a major renovation, part of the Smart City project, was completed to create a more modern and pedestrian-friendly space. The upgrades added features like an open library, coffee shops, and better seating. This pedestrian-friendly space helps majorly benefit improving social cohesion, improving social engagement among the people. Not only people from the neighborhood but also people who work at the office now use this space as a recreational zone where different seating arrangements allow social interaction within the space (Figure 12).

Figure 12. Image of the different seating arrangement in Manaveeyam Veedhi.

Manaveeyam Veedhi also plays an important role in the nighttime of Trivandrum where different activities, such as recreational singing, community engagement, and cultural programs, are encouraged (Figure 13). For environmental sustainability smart bins are provided and also trees near the streets are preserved and seating spaces are provided around the tree to utilize the tree canopy for shelter and also landscaping as done across the street's environmental sustainability.

Figure 13. Manaveeyam Veedhi Walkway.

CONCLUSION & RECOMMENDATIONS

The study highlights the practical importance of urban green spaces (UGS) as vital components of sustainable neighborhoods that enhance environmental quality, social interaction, and local economic vitality. The findings demonstrate that well-designed and accessible UGS can improve urban livability by fostering healthier, more cohesive, and resilient communities which are the key components of livable neighborhoods. Access to well-maintained green spaces supports physical and mental health, reducing stress and encouraging active lifestyles in the community. The presence of vibrant green spaces is a strong indicator of livability, influencing people's satisfaction with their urban environment and attachment to their community.

However, the benefits of UGS in the selected neighborhood also helps to understand the importance of UGS in every neighborhood which helps to increase the livability across the neighborhood. Overall, investing in UGS is a critical strategy to help the neighborhood create healthier, more resilient and livable cities now and for future generations.

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