

Comparative Analysis of Open Green Spaces Policies in Enhancing Urban Resilience to Climate Change through Small Urban Parks in Malaysia and Singapore

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This comparative analysis investigates the effectiveness of open green spaces policies in promoting urban resilience to climate change in the context of dense cities in Malaysia and Singapore. With rapid urbanisation and increasing population density, managing the impacts of climate change is crucial for sustainable urban development. Small urban parks (SUPs) have emerged as valuable assets in enhancing urban resilience and mitigating climate-related risks. This study draws on a comprehensive review of secondary sources, including government reports and academic literature, to compare the strategies employed in both countries' open green spaces policies. The analysis examines the similarities and differences in policy frameworks, regulations, and management approaches. The study reveals that while both Malaysia and Singapore recognise the importance of open green spaces in addressing climate change impacts, there are variations in the specific policies and approaches adopted. The findings contribute to the existing body of knowledge on open green space policies in dense cities and offer valuable recommendations for policymakers and urban planners in Malaysia, Singapore, and beyond. Overall, this study highlights the significance of effective open green spaces policies in fostering urban resilience to climate change and calls for further research and collaboration in this important area.

1. Introduction

Urbanization in Southeast Asia is rapidly increasing, and the urban population is projected to rise from 280 M to 373 M as highlighted in the ASEAN Sustainable Urbanisation Report (ASEAN, 2022). Rapid urban growth in densely populated areas contributes to heightened energy consumption, traffic congestion, and greenhouse gas emissions, exacerbating the Urban Heat Island effect and impacting human health and energy usage (Aghamolaei et al., 2022). The intertwined challenges of climate change and urbanization are pressing issues confronting humanity in the 21st century (Yusoff, 2011). Recognizing the importance of urban climate change resilience (UCCR) is growing, addressing challenges arising from rapid urbanization and uncertainties in climate change (Orsetti et al., 2022). Urban green spaces, particularly in developing nations, face challenges due to urban expansion and growing populations, often prioritizing other development initiatives (Chan and Vu, 2017). Small Urban Park (SUP) represent a valuable initiative for carbon sequestration and building low-carbon cities, offering compact green spaces suitable for densely populated urban areas and promoting sustainability through the creation of urban forests (Hamdy and Plaku, 2021). Singapore's urbanization showcases effective carbon emission mitigation and its positive impact on environmental quality (Ali et al., 2017). Malaysia can draw inspiration from Singapore's strategies, leading to this paper's analysis of both countries' policies and approaches, emphasizing the importance of small urban parks for carbon management.

The research will focus on policy and governance related to open space and carbon management in urban areas of Peninsular Malaysia and Singapore. By analyzing government and local authorities' initiatives in densely populated regions, the study explore how they contribute to mitigating carbon emissions and fostering sustainable urban development. The comparative analysis will identify key similarities and differences in policies

and approaches, seeking valuable insights to enhance low-carbon city efforts and urban resilience to climate change in both countries. The study's concentration on urban areas within Peninsular Malaysia and Singapore will provide a comprehensive understanding of the policies and strategies implemented in highly populated regions and their impact on carbon reduction and sustainable urban development.

2. Literature Review

Urbanization, rapid population growth, and increasing industrial activities have resulted in several environmental challenges, including global warming and climate change. As cities face these challenges, the concept of creating small urban parks (SUPs) or pocket parks emerges as a promising solution (Li et al., 2022). SUPs contribute to the realization of a "green city" envisioned by Sir Ebenezer Howard, offering green spaces closer to residents' homes (Fatiah et al., 2021). This concept not only addresses urban emptiness and abandonment but also contributes to vibrant cityscapes by enhancing urban aesthetics and functionality (Armato, 2017). The significance of SUPs extends beyond aesthetics. These parks play a crucial role in enhancing recreational activities within urban areas, improving carbon sequestration (Fatiah and Pornahono, 2022), providing outdoor thermal comfort (Lin et al., 2017), and creating habitats for wildlife (Jasmani et al., 2020). Despite their potential benefits, the implementation of SUPs presents various challenges that must be addressed.

Aziz (2015) underscores the importance of community-supported transformation of unused urban spaces into small parks. However, this approach faces challenges such as converting privately owned land and securing sustainable funding. Local authorities in Malaysia also confront considerable obstacles, such as a lack of suitable land, inadequate money, and issues with policy adherence (Ibrahim et al., 2017). In a comparative context, Singapore's approach to conserving urban green spaces, as highlighted by Tan et al. (2013) in relation to increasing population density and urban expansion, stands out. Despite facing spatial constraints, Singapore's strategic planning and effective distribution of green areas actively contribute to its renowned status as a "city in garden," as also acknowledged by Haaland and Bosch (2015). The urbanization process in Singapore demonstrates the country's impressive capacity to mitigate carbon emissions, highlighting the successful integration of urban growth and environmental progress. This achievement is particularly noteworthy considering the challenges posed by population growth and limited land resources, as emphasized by Ali et al., (2017)

While existing studies have delved into the limitation of preserve green spaces, a gap remains in exploring the policy frameworks and governance models approaches that contribute to the success of Singapore's urban green space conservation crucial for climate change mitigation. Therefore, the objective of this study is to conduct a comparative analysis of open green space policies in enhancing urban resilience to climate change in Malaysia and Singapore. By examining the successes and shortcomings of these policies, the study aims to provide insights into what Malaysia can learn from Singapore's achievements in urban green planning.

3. Methodology

Figure 1 illustrates a flowchart figure designed to visually represent the step-by-step process undertaken in this study.

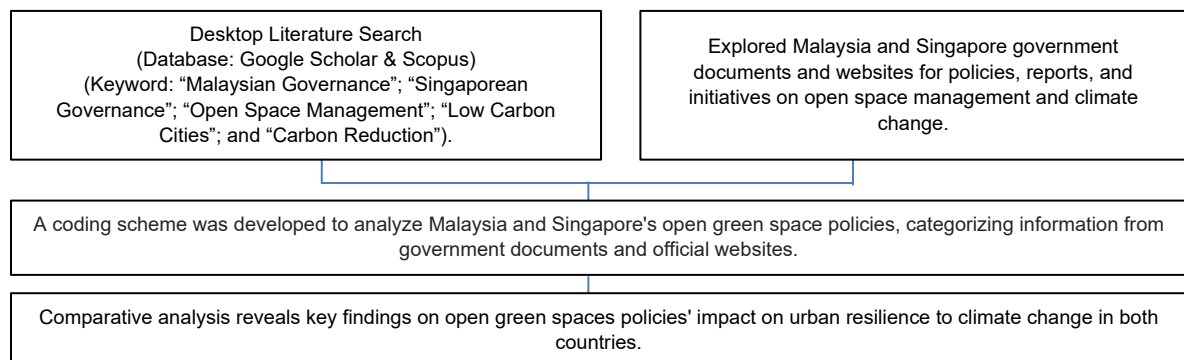


Figure 1: Flowchart illustrating the step-by-step process of gathering and analyzing government documents and official websites to compare open green space policies in Malaysia and Singapore for sustainable and low-carbon urban development.

A comprehensive literature review was conducted to gather relevant academic research and government documents related to Malaysian and Singaporean governance, open space management, low-carbon cities, and carbon reduction. The keyword search focused on these key topics to identify relevant studies and sources.

Official policies and reports on open space management and climate change initiatives in both countries were obtained by searching government documents and websites. The gathered data was organized and analyzed to compare the open green spaces policies of Malaysia and Singapore. The results of the comparative analysis were presented in a clear and concise manner, highlighting the key findings related to open green spaces policies and their impact on urban resilience to climate change in both countries. Additionally, a coding scheme was developed to analyze Malaysia and Singapore's open green space policies, categorizing information from government documents and official websites. The systematic approach and flowchart help ensure a rigorous and thorough examination of the data, contributing to the overall reliability and credibility of the study's findings. The comparative analysis revealed key findings on the impact of open green spaces policies on urban resilience to climate change in both countries, providing valuable insights for sustainable urban development.

4. Result and Discussion

3.1 Governance Approaches in Urban Greenspace Planning: Malaysia and Singapore

Green space management is an important aspect of sustainable urban development, which has received significant emphasis in Malaysia and Singapore. Table 1 provides a comparison between the urban green-space governance of Malaysia and Singapore.

Table 1: A comparison of the urban greenspace governance of Malaysia and Singapore

Urban Greenspace Strategies	Malaysia	Singapore
Vision	Most Beautiful Park Country.	City in a Garden.
Governance and Management	Primarily managed by local councils with federal involvement.	Centralised management by National Parks Board (NParks).
Policy Framework	Town and Country Planning Act 172 1976; Tree Preservation Order; National Physical Plan; National Landscape Policy; and the National Urbanization Policy.	National Parks Board Act 1996; Green Plan 2030; and the Sustainable Singapore Blueprint,
Provision of Public Open Spaces	Malaysia has a standard of a 2-hectare public open space per 1000 urban residents.	Singapore targets 0.8-hectare green space per 1,000 people.
Beautification Programs and Park Establishment	Implemented programmes to promote greenery, such as tree-planting campaigns, and community gardening initiatives.	Implemented comprehensive programmes to promote greenery, including parks and gardens, green roofs, and vertical gardens.
Funding for Greenspace Management	Limited funding available	Substantial funding available
Maintenance	Managed by local authorities.	Managed by a dedicated team in NParks.
Monitoring and Evaluation	Decentralised, carried out by local authorities.	Centralised, conducted by NParks.

Malaysia's ambitious goal is to achieve net-zero greenhouse gas emissions by 2050, guided by the National Low Carbon City Masterplan, which places a strong emphasis on carbon management strategies, particularly focusing on urban green spaces. Integrating open spaces into Structure and Local Plans and development layouts, mandated by Town and Country Planning 1976 (Act 172), is essential to realize low-carbon cities and improve the quality of life with recreational opportunities. The National Urbanisation Policy (NUP) aims to provide adequate public open spaces, targeting 2 hectares per 1000 urban population. Overseeing the planning, development, and promotion of green spaces is the responsibility of the Ministry of Housing and Local Government, in collaboration with the National Landscape Department. Local councils and local authorities play vital roles in managing green spaces, with a strong emphasis on preserving existing areas and creating new ones (Suratman et al., 2020). However, limited resource allocation and funding have presented challenges in achieving a harmonious balance between development and preservation (Ibrahim et al., 2017).

Singapore, adopts a centralised approach to green space management, with the government taking the lead in planning and implementing initiatives (Han, 2017). The National Parks Board (NParks) is responsible for regulating and managing urban green spaces, collaborating closely with other governmental authorities. Singapore's substantial investments in green spaces are widely acknowledged for their positive impact on residents' quality of life. The country has set a target of 0.8 hectares of green space per 1,000 people, and it has achieved 0.78 hectares of public green space per 1,000 people. The Singapore Green Plan 2030 outlines

specific goals for park development, tree planting, and accessibility. Notably, Singapore has placed significant emphasis on urban greening since the 1960s, resulting in a remarkable increase in tree cover from 10 % to 47 % and the establishment of over 1,000 parks and gardens. The preservation of the natural tropical rainforest pocket within the Botanic Gardens of Singapore stands as a remarkable example of nature conservation amid urban development (Jim, 2004).

In conclusion, both Malaysia and Singapore recognize the importance of green space management, with varying approaches. Singapore is a leading authority, while Malaysia aims to become the "Most Beautiful Park Country." Cities in Malaysia, like Petaling District and Kuala Lumpur, can learn from Singapore's sustainable urban planning approach, especially in investing in green spaces, particularly SUPs. Effective urban planning requires tailored solutions to address each city's unique needs and circumstances. Singapore's success in reducing carbon emissions and providing SUPs despite dense population and limited land area highlights the importance of this principle.

3.2 Greenspace strategies through achieving low-carbon cities in Malaysia and Singapore

In response, both Singapore and Malaysia are embracing innovative strategies to seamlessly integrate green spaces into their urban landscapes. Table 2 presents a comparative analysis showcasing the effectiveness of green space strategies in both countries towards achieving low-carbon cities.

Table 2: Greenspace strategies through the achievement of low-carbon cities in Malaysia and Singapore

Aspect	Singapore's Approach	Malaysia's Approach
Green Space Creation	The Building and Construction Authority (BCA) of Singapore's Green Mark scheme is a significant initiative promoting eco-friendly and sustainable buildings, with a key focus on encouraging outdoor greenery spaces.	Malaysia advocates for sustainable urban planning through its Low Carbon City Framework (LCCF), which promotes the creation of green townships characterized by effective urban green spaces.
Network of Parks	The Park Connector Network (PCN) is a 400 km green corridor connecting parks, nature reserves, and open spaces in Singapore, enhancing residents' quality of life and fostering economic growth.	Local authorities mandate developers to allocate 10 % of open space in development projects for planting trees and beautification to create a network of parks within an urban or regional area.
Economic Contribution	Green spaces like the Botanic Gardens and Gardens by the Bay stimulate the economy through ecotourism while reducing carbon emissions.	Malaysia's green projects like Forest City are designed to attract tourists and residents, thus providing economic benefits alongside environmental benefits.
Strategic Plan	Singapore's Green Plan 2030 outlines ambitious goals, including new therapeutic gardens and a million tree-planting targets. Through programs like LUSH, Singapore excels in implementing vertical greenery, including innovative roof gardens, which mandate the incorporation of natural elements within high-rise constructions.	Malaysia's National Urbanization Policy and National Physical Plan promote the incorporation of green spaces in urban areas. The Green Building Index (GBI) offers guidelines for integrating vertical greenery into building designs, such as rooftop gardens, to achieve natural cooling effects and energy savings.

Singapore, with its high population density, effectively strikes a balance between urban growth and environmental well-being, enveloping 47% of its island in greenery to markedly reduce carbon emissions and underscore the efficacy of urban green spaces in mitigating a city's carbon footprint (Velasco et al., 2016). Introducing the pioneering Green Mark scheme, Singapore's Building and Construction Authority (BCA) underscores the commitment to sustainable building practices, emphasizing the integration of outdoor green spaces. This initiative has catalyzed the creation of environmentally friendly and lush structures, yielding benefits for residents and the ecosystem alike. Green spaces emerge as pivotal assets, bearing substantial environmental and economic significance (Buijs et al., 2016). Singapore boasts iconic landmarks like the Botanic Gardens and Gardens by the Bay, driving the economy through ecotourism while concurrently mitigating carbon emissions (Lindsay and Middleton, 2018). The city's extensive network of meticulously maintained parks and gardens not only entices eco-tourists but also nurtures sustainable urban living, all without significantly amplifying carbon footprints (Han, 2017). Singapore's impressive Park Connector Network (PCN), a sprawling 400 km green corridor connecting parks, nature reserves, and open spaces, enhances residents' well-being, stimulates economic progress, and promotes healthier lifestyles through recreational opportunities (Wang et al., 2019). Singapore's forward-looking Green Plan 2030 articulates goals of establishing innovative therapeutic

gardens and planting a million trees, exemplifying the nation's steadfast commitment to nurturing a resilient and sustainable urban environment. Singapore's mastery in vertical greenery shines through initiatives like LUSH, mandating nature's integration in high-rise constructions. Diverse strategies, encompassing pocket parks and green roofs, astutely harness limited urban space, aligning seamlessly with Singapore's aspirations for a low-carbon trajectory (McDonald et al., 2023).

Malaysia has elevated its mitigation ambitions by committing to an unconditional target of reducing carbon intensity against GDP by 45% by 2030, in comparison to 2005 levels. The Low Carbon Cities Framework (LCCF) introduction in Malaysia strategically targets carbon emission reduction and sustainability enhancement by envisioning green townships with seamless integration of green spaces (Md Dali et al., 2022). Amidst these pioneering efforts, local authorities rigorously promote the integration of open spaces in development projects, and within this landscape of innovation, Forest City stands out as a remarkable showcase of low-carbon urban development in Malaysia, offering both environmental and economic advantages (Ho et al., 2013). While policies such as the National Urbanization Policy and National Physical Plan lend support to the incorporation of green spaces, further policy development and regulatory refinement are required to achieve comprehensive and effective low-carbon development (Rahman, 2020). Providing guidance for the incorporation of vertical greenery like rooftop gardens into building designs, the Green Building Index (GBI) aims to attain benefits such as natural cooling and energy efficiency. Nonetheless, based on PLAN Malaysia, the existing green spaces currently do not contribute to fulfilling the 10% open space mandate due to their restricted accessibility (Raid et al., 2017). SUPs, or "pocket parks", could play a pivotal role in achieving this open space requirement.

Through their collaborative initiatives, Singapore and Malaysia exemplify the significance of sustainable urban green spaces in addressing climate change and achieving carbon reduction. These efforts highlight the shared commitment of both nations to a greener, more sustainable future.

4. Conclusion

In conclusion, Singapore's effective green urban planning provides a compelling model for Malaysia to enhance its sustainable urban development approach. Adopting key strategies such as centralized green space management, comprehensive environmental policies, diversified financing, stakeholder engagement, and consistent monitoring can contribute to creating a more resilient and sustainable urban landscape in Malaysia. However, Malaysia lags behind in certain aspects related to green space management and environmental sustainability. Specifically, challenges such as decentralized green space management, inadequate funding, and limited public awareness pose significant obstacles to achieving a more sustainable urban environment in Malaysia. To bridge this gap, Malaysia must address these challenges proactively and take inspiration from Singapore's successful practices. By adopting similar strategies and implementing robust policies, Malaysia can work towards creating a more resilient and sustainable urban landscape in the future. The significance of this study lies in its potential implications for shaping Malaysia's urban landscape and fostering environmental sustainability. By learning from Singapore's successes and identifying areas for improvement, Malaysia can make substantial progress toward creating more sustainable and liveable cities. Implementing best practices from Singapore can not only reduce carbon emissions but also enhance the overall well-being and quality of life for citizens. Ultimately, this study offers a roadmap for Malaysia to embrace green urban planning principles and harmoniously integrate green spaces into its evolving urban landscape. By prioritizing the conservation and enhancement of urban green spaces, Malaysia can pave the way towards a more sustainable future, aligning with global efforts to combat climate change and achieve the United Nations' Sustainable Development Goals.

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