



THE ROLE OF URBAN GREEN SPACE IN PROMOTING SUSTAINABLE DEVELOPMENT: A STUDY ON PUTRAJAYA, MALAYSIA

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Abstract

Urban Green Spaces (UGS) contribute to sustainable development, a key goal for every country, encompassing social, economic, and environmental aspects. This study involves two objectives: to identify the elements of UGS that contribute to sustainable development and to explore the role of UGS in contributing to sustainable development. A qualitative research design was chosen to achieve these objectives using document analysis (from official reports, journals, and analyses) and semi-structured interviews. The study's findings show that UGS plays a role in contributing to sustainable development involving environmental, social, and economic dimensions, explained through data triangulation. The elements of UGS identified include buffer zones, conservation green spaces, recreational/community green spaces, amenity green spaces, greenways, building greens, agricultural land, and blue areas. Additionally, the roles of UGS in environmental aspects include air quality benefits, water quality benefits, ecological functions, and support for local nature; in social aspects, they enhance interpersonal relationships, recreational activities, human health, human well-being, educational functions, and overall quality of life; in economic aspects, they contribute to market values. UGS is a crucial component of sustainable urban planning, essential for fostering cities that are both sustainable and resilient. Its multifaceted contributions to environmental health, social interaction, and economic vitality highlight its indispensable role in creating healthier, happier, and more resilient urban environments.

Keywords: Sustainable Development, Urban Green Space, Element of Urban Green Spaces, Role of Urban Green Spaces, Green city

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INTRODUCTION

Sustainable development aims to maintain the future by preserving and conserving the environment during continuous development (Yusliza et al., 2020). It is created in an area to meet sustainable criteria without negatively impacting the environment in the long term for future generations. Due to the increase in environmental issues linked to human behaviour (Yusliza et al., 2020), this forces the population of a country to increase efforts in protecting the environment. Therefore, with various roles, green space needs to be applied in a city because it can be seen that most cities are now more rapidly developing than green areas. Green spaces are one of the criteria that must be met to design sustainable development (Ke et al., 2023; Nor & Abdullah, 2019).

As populations become increasingly urbanised, the preservation of UGS becomes paramount. UGS is not just dedicated recreational space such as a public park but also includes other types of informal green space. Despite the potential of cross-sectional evidence, we know little about how to design new UGS, improve, or promote existing UGS. Today, more than half of the world's population lives in cities due to various factors that make cities the main centres for urban, suburban, and rural populations. By 2050, it is estimated that 7 out of 10 people will likely live in urban areas. This reinforces the importance of UGS in promoting sustainable development. The role of UGS is unclear, as it is of essential significance in sustainable development. The second problem statement that can be constituted is the lack of research on the role of UGS in encouraging sustainable development. Green cities are one of the solutions to the challenges and problems that occur due to human activity, which is rapid development in urban areas.

LITERATURE REVIEW

Sustainable Development

The three pillars (3P) of sustainable development—the economic, environmental, and social pillars—are relevant entry points for identifying issues and developing green economic policies. Goal 12 of the Sustainable Development 2030 Agenda mentions the need to create awareness of sustainable development among people worldwide and promote a healthy lifestyle. Effective, sustainable development benefits a country or an area by allowing them to continue enjoying the environment and people's well-being (Sahrir et al., 2022).

Table 1: Latent of Sustainable Development

Latent/Component	Indicators/Item	Source
Sustainable development	Preserving and conserving the environment	Khoshnava et al., 2019; Yusliza et al., 2020; Muhamad Nor et al., 2021
	Protecting the natural environment	
	Promote a healthy lifestyle	

Latent/Component	Indicators/Item	Source
	Criteria for green spaces that meet sustainable development	Nor & Abdullah, 2019; Ke et al., 2023

Sustainable Development Goals (SDGs)

The SDGs are a collection of 17 interrelated objectives designed to serve as a "shared blueprint for peace and prosperity for people and the planet now and in the future" (Abastante et al., 2021; Khoshnava et al., 2019). The SDGs emphasise sustainable development's interrelated environmental, social, and economic aspects by placing sustainability at the center. SGD11 and SDG8 are highlighted or prioritised, namely "Sustainable cities and communities" (SDG11) and "Decent work and economic growth" (SDG8). SDG3 is related to the UGS "Good health and well-being."

Elements of Urban Green Space (UGS)

The priority of the UGS function is to maintain green areas, such as areas covered with green plants, rivers, or lakes, for the benefit of future generations. The theme elements of UGS include buffer zones, conservation green space, recreational / community green space, amenity green space, green-way, building greens, agricultural land, and blue areas. Element buffer zones, such as green belts, while conserving green space, including lawns and green lungs/forests.

Table 2: Element of UGS

Elements/Component	Indicators/Item	Sources
Conservation green space	Lawns	Muhamad Nor & Abdullah, 2018; UNICEF, 2021; Sangwan et al., 2022
	Green belts (buffer)	Muhamad Nor & Abdullah, 2018; Sangwan et al., 2022; Biodiversity, 2022
	Reserved forest	
	Protected forest	
	Wetlands	
Recreational / community green space	Parks and open spaces	Muhamad Nor & Abdullah, 2018; Jennings and Bamkole, 2019; Venter et al., 2020; UNICEF, 2021; Sangwan et al., 2022; THRIVE, 2022
	Sports centers and playgrounds/tot-lots	Muhamad Nor & Abdullah, 2018; Jennings and Bamkole, 2019; UNICEF, 2021; Palliwoda and Priess, 2021; Sangwan et al., 2022; Biodiversity, 2022; THRIVE, 2022
	Botanical and zoological parks	Sangwan et al., 2022; Biodiversity, 2022

Elements/Component	Indicators/Item	Sources
	Water bodies/other natural features/lake	Muhamad Nor & Abdullah, 2018; Venter et al., 2020; Sangwan et al., 2022; Biodiversity, 2022
	Places of tourist interested strip	Muhamad Nor & Abdullah, 2018; Venter et al., 2020; Sangwan et al., 2022
Amenity green space (residential)	Neighbourhood parks and gardens	Muhamad Nor & Abdullah, 2018; UNICEF, 2021; Palliwoda and Priess, 2021; Sangwan et al., 2022; Biodiversity, 2022; THRIVE, 2022
	Outdoor sports areas	Muhamad Nor & Abdullah, 2018; Palliwoda and Priess, 2021; Sangwan et al., 2022
	Green street space	Muhamad Nor & Abdullah, 2018; UNICEF, 2021; Palliwoda and Priess, 2021; Sangwan et al., 2022; THRIVE, 2022
	Green roofs/greenery at commercial buildings/greenery at housing estates	Muhamad Nor & Abdullah, 2018; UNICEF, 2021; Sangwan et al., 2022; Biodiversity, 2022; THRIVE, 2022
	Private green space Courtyard	Muhamad Nor & Abdullah, 2018; UNICEF, 2021, Sangwan et al., 2022
Greenway		Muhamad Nor & Abdullah, 2018; Jennings and Bamkole, 2019; Auchicloss et al., 2019; Sangwan et al., 2022

Role of Urban Green Space

UGS, agreed upon by ecologists, economists, social scientists, and planners, are public and private open areas in urban areas, mainly covered by vegetation, which are directly or indirectly available for use (Karade R.M. et al., 2017).

Role of UGS (Environmental aspect)

The role of UGS in environmental aspects includes environmental conservation biodiversity and nature conservation as well as ecological benefit/maintaining ecological balance. Another role of UGS in the environmental aspect is to improve urban climate, which contributes to mitigating and reducing the UHI effect and can serve as pollution control and enhance the quality of air and

moderate temperatures. UGS also play essential roles in cleaning urban water, reducing surface runoff, increasing carbon storage, and reducing noise.

Table 3: Role of UGS in Environmental Aspect

Latent/Component	Indicators/Item	Source
Environmental aspect of UGS role	Pollution control/improve air quality	Karade et al., 2017; Maes et al., 2019
	Biodiversity and nature conservation	Karade et al., 2017; Maes et al., 2019; Kasim et al., n.d.;
	Ecological benefit/maintaining ecological balance	Karade et al., 2017; Kasim et al., n.d.; Ke et al., 2023
	Improve urban climate	Kasim et al., n.d.; Ke et al., 2023
	Reducing the urban heat island effect	Romanello et al., 2021; Ke et al., 2023
	Cleaning urban water	Ke et al., 2023
	Reducing surface runoff	Ke et al., 2023
	Increasing carbon storage	Ke et al., 2023
	Moderate temperatures	Romanello et al., 2021
Reduce noise	Maes et al., 2019	

Role of UGS (Social aspect)

Based on the related studies, the role of the social aspect is recreation and well-being / social well-being. UGS play a role in human health/reducing mortality and morbidity from chronic diseases; these spaces provide opportunities for exercise, reducing the risk of obesity and chronic illnesses as well as mental well-being because green spaces have a positive impact on mental health, reducing stress, anxiety, and depression by providing serene environments for relaxation and recreation. Another role is physical exercise. The social aspect's role is to improve the quality of people's lives.

Table 4: Role of UGS in Social Aspect

Latent/Component	Indicators/Item	Source
Social aspect of UGS role	Recreation and well-being / social well-being	Karade et al., 2017; Wang et al., 2019; Turo and Gardiner, 2020; Jabbar et al., 2021; Ke et al., 2023; Kasim et al., n.d.
	Reducing mortality and morbidity from chronic diseases	Karade et al., 2017; Wang et al., 2019; Ke et al., 2023; Kasim et al., n.d.
	Mental well-being	Wang et al., 2019; EEA, 2020; Ke et al., 2023; Fransen, 2023
	Physical exercise	Fransen, 2023

Latent/Component	Indicators/Item	Source
	Reducing obesity	EEA, 2020
	Improving the quality of people's lives	Jabbar et al., 2021; Ke et al., 2023; Fransen, 2023

Role of UGS (Economic aspect)

Involving demand, proximity to well-maintained green areas often leads to an increase in energy savings and property value in real estate values in urban areas while involving financial supply in maintaining beautification and attractiveness, as well as green spaces as safety tools. UGS also creates job opportunities related to its maintenance, landscaping, event management, and tourism-related services, which can be valuable to economic improvement.

Table 5: Role of UGS in Economic Aspect

Latent/Component	Indicators/Item/	Source
Economic aspect of UGS role	Energy savings	Karade et al., 2017
	Property value	
	A valuable asset to economic improvement	Kasim et al., n.d.
	Beautification and attractive	Turo and Gardiner, 2020;
	Green spaces as safety tools	Kasim et al., n.d.

Green city

The concept of a "Green City" is one of the latest findings from various efforts and research to address the problems caused by the dispersed urban development model (Danjaji, A. S. et al., 2021).

RESEARCH METHODOLOGY

The research design used is a qualitative method to have a deep understanding and develop knowledge of the role of UGS. By capturing the subtleties and complexities of research contexts, qualitative approaches can assist in developing a comprehensive understanding of the role of UGS as the main theme in this study.

Document analysis and thematic analysis were used for the data analysis. Through a comprehensive examination of various urban features and planning initiatives, the study identifies and outlines key elements, shedding light on the elements contributing to UGS. The second objective is to discuss the role of UGS in meeting sustainable development goals. The findings explain how implementing UGS contributes to sustainable development across three aspects: environmental, social, and economic. The case study is Putrajaya, one of Malaysia's areas known for sustainable landscape design. As a park and smart city, 38% of the area has been reserved for green areas, emphasising the enhancement of the natural landscape (Chowdhury, n.d).

ANALYSIS AND DISCUSSION

Tables 6 and 7 show the details of UGS elements and UGS roles: semi-structured interviews, document analysis from different sources, including official reports and journal articles.

Table 6: The Findings of the Research Question and Objective 1

Themes element	Indicators/Item	Document Analysis		Semi-structured interview
		Journal and Article	Report Analysis	
Buffer zones	Green belts	✓	✓	✓
Multifunctional zones	Food production areas	✓		
	Places of tourist interested strip	✓	✓	
Conservation green space	Lawns	✓	✓	✓
	Natural vegetation	✓		
	Peri-urban forests	✓		
	Urban woodlands	✓		
	Natural wildlife areas	✓		✓
	National parks	✓	✓	
	Botanical and zoological parks	✓	✓	
	Green lungs / forests	✓	✓	✓
Recreational / Community green space	Public Park / Urban parks / Metropolitan Park	✓	✓	✓
	Community gardens	✓	✓	✓
	School grounds	✓		
	Sport and play areas	✓	✓	
	Functional playgrounds	✓	✓	
Amenity green space	Local Park	✓	✓	✓
	Residential gardens	✓	✓	✓
	Private Park	✓		
	Play-field / Outdoor sports areas	✓	✓	
	Neighbourhood parks	✓	✓	✓
	Residential area with trees	✓	✓	✓
	Shaded areas	✓	✓	✓
	Soft Landscape		✓	✓
Green-way	Pedestrian Pathways	✓	✓	✓
	Bike-ways	✓	✓	✓
	Street trees	✓	✓	✓
	Roadside vegetation	✓	✓	
	Greenery along rail tracks	✓		
	Green channel	✓		

Themes element	Indicators/Item	Document Analysis		Semi-structured interview
		Journal and Article	Report Analysis	
Building greens	Green roofs	✓	✓	✓
	Green corridor	✓		✓
	Greenery buildings		✓	✓
Grey infrastructure	Sidewalks	✓		
	Street lights	✓		✓
	A bus shelter	✓		✓
	Bus stop benches	✓		✓
	Parkways movement	✓		
	Waqfs			✓
	Hard landscape			✓
Agricultural land	Areas with trees, and/or shrubs	✓		✓
	Grassy lawns	✓	✓	✓
Blue areas	Ponds	✓	✓	
	Lakes	✓	✓	✓
	Wetland	✓	✓	

The UGS elements mentioned are the validity of the methods used, making them the primary elements in UGS that contribute to sustainable development.

Table 7: The Findings of the Research Question and Objective 2

Theme's role	Indicators/Item	Document Analysis		Semi-structured interview
		Journal and Article	Official Report	
Environmental Aspect				
Air benefit	Maintenance of air quality	✓	✓	✓
	Carbon storage	✓	✓	✓
	Producing oxygen	✓	✓	✓
	Regulate rainfall	✓	✓	✓
	Reducing the UHI effect	✓	✓	✓
	Moderate temperatures / Reduction of air temperature	✓	✓	✓
	Reduce carbon footprint	✓	✓	✓
Water benefit	Improve water quality	✓	✓	✓
	Groundwater protection	✓	✓	
	Cleaning urban water	✓	✓	
	Maintain a certain degree of humidity	✓	✓	

Theme's role	Indicators/Item	Document Analysis		Semi-structured interview
		Journal and Article	Official Report	
	Reducing surface runoff	✓	✓	
Land benefit	Soil conservation	✓	✓	
	Stabilising soil	✓	✓	
Ecological functions	Conservation of fauna and flora	✓	✓	✓
	Maintain biodiversity	✓	✓	✓
	Environmental well-being	✓	✓	✓
	Nature conservation	✓	✓	
	Maintaining ecological balance	✓	✓	✓
Healthy urban environmental	Protection against natural hazards	✓	✓	
	Improve the urban climate	✓	✓	✓
	Natural filtration system	✓	✓	
	Maintain the balance of the city's natural urban environment	✓	✓	✓
	Mitigation risk of disaster	✓	✓	✓
	Noise buffering	✓	✓	
Local nature	Nature protection	✓	✓	
	Safety in habitats (flora and fauna also wildlife)	✓	✓	✓
	Conserving a diversity	✓	✓	
Promoting the 3R			✓	✓
Reduce energy consumption			✓	✓
Social Aspect				
Interpersonal relationships	Interaction	✓	✓	✓
	Cultural event			✓
	Gathering	✓	✓	✓
	Restoration and relaxation	✓	✓	✓
Recreation activity	Outdoor activity	✓	✓	✓
	Physical exercise	✓	✓	✓
Human health	Mortality and Morbidity form chronic diseases	✓	✓	✓
	Reducing obesity	✓		
	Support longevity	✓		
Human well-being	Physical well-being	✓	✓	✓
	Psychological well-being	✓		
	Mental well-being	✓		✓
	Social well-being	✓		✓
	Subjective well-being	✓		
	Reducing stress	✓		
	Depression	✓		

Theme's role	Indicators/Item	Document Analysis		Semi-structured interview
		Journal and Article	Official Report	
Social Aspect				
Education Functional	Academic education and research	✓	✓	✓
Improving the quality people's lives		✓	✓	✓
Food safety			✓	✓
Safety and comfort for visitors			✓	
Public awareness			✓	✓
Economic Aspect				
Market values	Property value	✓	✓	✓
	Attract investment	✓	✓	✓
	Valuable asset to economy improvement	✓		
	GDP increase / Economic residential	✓	✓	✓
	Beautification and attractiveness	✓		
	Energy savings	✓		
Green spaces as safety tools		✓		

The roles of UGS stated are the validity and reliability of all methods used, making it the primary role in UGS that contributes to sustainable development. However, the findings state that the role involves environmental and social aspects.

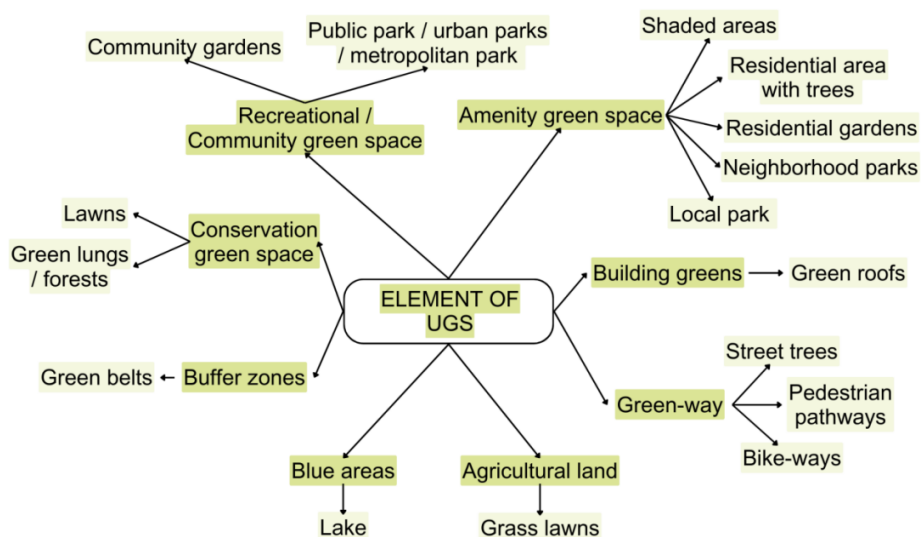


Figure 1: Element of UGS

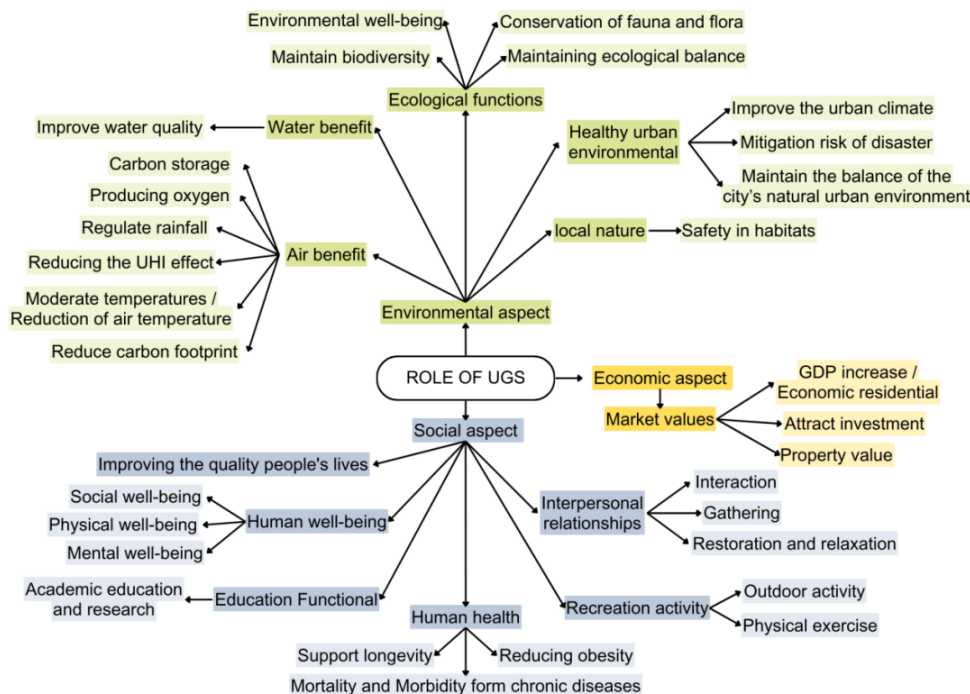


Figure 2: Role of UGS

The issue that prompted this study is the unclear understanding of the role of Urban Green Spaces (UGS) in contributing to sustainable development. It can be concluded that there is a lack of research on how UGS promotes sustainable development. Based on the findings obtained from semi-structured interviews and document analysis from various sources, including official reports, journals, and articles, it is evident that environmental and social aspects are emphasised in achieving sustainable development. Each element involving softscape contributes similarly to sustainable development, while elements involving hardscape have distinct roles that also significantly contribute to social aspects. In planning UGS, it is crucial to consider both softscape and hardscape to foster the relationship between humans and the environment.

CONCLUSION

This study has explored the roles of Urban Green Spaces (UGS) in promoting sustainable development and contributing to environmental, social, and economic aspects. The findings confirm that UGS significantly improves air quality, conserves biodiversity, and fosters social interaction among residents. The study applies three aspects to research the role of UGS, focusing on their elements and contributions toward sustainable urban development, a highly relevant topic.

UGS, known for incorporating green and blue spaces, enhances landscapes, making them more attractive while emphasising the relationship between humans and the environment. The findings of this study aim to expand knowledge about UGS, highlighting their importance and benefits to humans, the environment, ecosystems, and ecology, which are increasingly at risk. The research underscores the need for concerted efforts to improve accessibility, engage communities, and ensure sustainable management practices in UGS initiatives. This comprehensive study of UGS roles spans various environmental, social, and economic dimensions.

In conclusion, UGS is essential to sustainable urban planning, fostering sustainable and resilient cities. Their multifaceted contributions to environmental health, social interaction, and economic vitality highlight its indispensable role in creating healthier, happier, and more resilient urban environments. To maximise their benefits, continued investment, community involvement, sustainable management practices, and equitable access to these spaces are crucial aspects to emphasise in urban planning and development. By implementing recommended strategies and actively involving stakeholders, urban areas can enhance the benefits of green spaces, improving the overall livability and well-being of urban communities. Efforts to protect, develop, and promote UGS are essential for fostering sustainable and inclusive cities for both present and future generations.

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