

Transformation of Green Open Space as a Source of Learning in Sustainable Environmental Development

Eko Adhy Setiawan¹

¹Landscape Architecture Study Program, Trisakti University, Indonesia; Ekoadhys@trisakti.ac.id

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Abstract

Urban development is increasingly creating environmental pressures that threaten the ecological balance and quality of life in cities, particularly due to the decline of green open space (GOS) caused by rapid urbanization and land-use conversion. However, the historical transformation of green open space in the process of urban development has not been sufficiently studied from an integrative historical and analytical perspective. Therefore, this study aims to analyze the historical transformation of green open space in the context of sustainable urban environmental development. This study uses a qualitative approach with a historical-analytical design, utilizing data obtained from policy documents, urban planning archives, academic literature, and in-depth interviews with experts in the fields of urban planning and environmental management. The data are analyzed using an interactive qualitative analysis model involving data reduction, data display, and inference drawing to interpret patterns of transformation in the function, meaning, and governance of green open space across various periods of urban development. The results indicate that green open space has undergone a significant functional shift from traditional public-social space to strategic ecological infrastructure in sustainable urban planning. However, this study also finds a persistent gap between policy discourse promoting green open space and its practical implementation, largely due to land-use conflicts, economic development pressures, and institutional constraints. This study makes a theoretical contribution by emphasizing the importance of integrating historical perspectives into urban sustainability studies and offers insights for policymakers to strengthen environmentally oriented urban planning strategies.

Keywords

Green Open Space, Historical Transformation, Sustainable Urban Development.



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1. INTRODUCTION

Sustainable urban development in the 21st century places a balance between economic growth, social welfare, and environmental sustainability as a fundamental principle in urban governance. Within this framework, green open space (GOS) is a crucial element because it functions as ecological infrastructure that supports environmental quality, public health, and the sustainability of urban ecosystems. GOS not only provides space for recreation and social interaction, but also plays a role in maintaining microclimate

balance, absorbing air pollution, and increasing the carrying capacity of the urban environment. Therefore, various modern urban planning policies place GOS as a strategic component in the development of a sustainable urban environment (Djuarsa et al., 2025).

Normatively, the existence of green open space in urban planning has a widely recognized ideal standard. In Indonesia, spatial planning regulations stipulate that urban areas should have a minimum of 30% green open space of the total city area, consisting of 20% public green open space and 10% private green open space. This standard is intended to ensure ecological balance, provide adequate ecological space, and improve the quality of life for urban communities. In addition to its ecological function, green open space also has important social and cultural dimensions because it can be a public space that strengthens social cohesion, local identity, and urban community activities. Thus, green open space is not only understood as a physical element of the urban landscape, but also as part of the socio-ecological system that shapes the overall sustainability of the city.

However, the reality of urban development in various developing countries shows conditions that differ from this ideal. Rapid urbanization, infrastructure expansion, and economic pressure on urban land have led to a significant reduction in green open space. An evaluation study of the availability of green open space in Jakarta shows that the proportion of green space has decreased from around 33.70% in 2000 to only 19.50% in 2020, despite the gradual implementation of green city development policies. This phenomenon indicates a mismatch between sustainable development policies and the reality of implementation at the urban level. Furthermore, continued urban population growth has accelerated the conversion of green land into built-up areas, reducing the city's ecological capacity to cope with various environmental pressures.

The decline in the quality and quantity of green open spaces also gives rise to increasingly complex ecological and social impacts. The reduction in vegetation in urban areas contributes to the increasing urban heat island phenomenon, declining air quality, and increasing the city's vulnerability to climate change. Research on urban landscapes shows that the conversion of green areas to built-up areas reduces the environment's ability to lower surface temperatures, absorb pollutants, and maintain the stability of urban ecosystems. Furthermore, the limited green space also impacts public health, such as increasing urban stress due to the lack of natural recreation and social interaction spaces. Therefore, the existence of green open spaces is no longer merely an aesthetic issue of urban planning, but has become an urgent ecological and social necessity in modern urban development.

From an academic perspective, research on green open spaces has grown rapidly over the past two decades. Most studies highlight the ecological functions of green open spaces, such as their role in climate change mitigation, carbon storage, and urban temperature control. Other research emphasizes spatial planning, policy governance, and the social benefits of green spaces for urban communities. However, most of these studies still focus on quantitative analysis of the extent and distribution of green open spaces or on evaluation of management policies. This approach tends to position green open spaces as a technocratic object in urban planning, ignoring the historical dynamics and social transformations that influence the existence and function of green open spaces in urban development.

This is where a research gap emerges that is crucial for further study. Most previous research has not comprehensively analyzed the historical transformation of green open spaces within the context of changing urban development paradigms. Studies on green open spaces are generally sectoral and static, thus failing to explain how green open spaces have changed in function, meaning, and strategic position within the history of urban development. Yet, in many cities around the world, green open spaces have undergone not only spatial changes, but also social, political, and ecological changes along with the dynamics of development. Furthermore, the integration of historical, ecological, and urban planning approaches remains relatively limited in recent research literature, particularly in the context of developing countries facing high urbanization pressures.

Based on these conditions, research into the historical transformation of green open spaces in sustainable urban development is crucial. This study not only seeks to understand the changing function and role of green open spaces over time but also analyzes how the historical dynamics of urban planning

influence the sustainability of today's urban environment. Using a critical-analytical approach, this research is expected to uncover the relationship between changing urban development paradigms, spatial planning policies, and social dynamics in the existence of green open spaces.

Specifically, this study aims to analyze the historical transformation of green open spaces in urban development and its implications for sustainable urban environmental development. The results are expected to provide theoretical contributions to the development of historical-based urban sustainability studies, while also providing practical recommendations for the formulation of urban planning policies that are more oriented towards ecological sustainability and the well-being of urban communities. Therefore, this study is expected to enrich the academic discourse on the integration between the history of urban spatial planning and strategies for sustainable urban environmental development in the future.

2. METHOD

This study uses a qualitative approach with a historical-analytical research design to understand the dynamics of changes in green open space (GOS) within the context of sustainable urban development. This approach was chosen because the research problem relates not only to the current spatial condition of GOS but also to historical transformation processes, changes in function, and the dynamics of spatial planning policies that influence the presence of green space in urban development. In urban research, a historical-analytical approach is considered relevant for tracing changes in spatial structure and urban planning policies over time, thereby explaining the relationship between urbanization, development policies, and environmental sustainability more comprehensively (Yin, 2021). Thus, this method allows researchers to critically analyze the evolution of green open space concepts and practices, while simultaneously identifying the social, political, and ecological factors that influence these transformations within the context of sustainable urban development (Creswell & Creswell, 2023).

The object of this research is the historical transformation of green open space in urban environmental development, analyzed through spatial planning policy documents, urban planning, urban historical archives, and empirical studies on the development of green open space over a certain period. The data sources used consist of primary and secondary data. Primary data were obtained through in-depth interviews with informants who have competence in urban planning, green open space management, and urban environmental policy, such as regional planners, academics, and local government officials involved in green open space management. Meanwhile, secondary data were obtained through documentation studies and literature reviews, including regional spatial planning documents, government policy reports, urban planning archives, and scientific publications relevant to the development of green open space and urban environmental sustainability. This data collection technique was chosen to enable the process of triangulation of sources, thereby increasing the validity and depth of analysis in qualitative research (Miles, Huberman, & Saldaña, 2020).

The primary instrument in this study was the researcher (human instrument), supported by semi-structured interview guidelines, document analysis sheets, and a data categorization matrix to identify patterns of green open space transformation in the city's historical development. Data analysis was conducted using an interactive analysis model, which includes data reduction, data presentation, and iterative conclusion drawing. Initially, historical and policy data were analyzed chronologically to identify changes in the function, role, and management policies of green open space across various periods of urban development. Subsequently, the analysis was conducted thematically by interpreting the relationship between the historical dynamics of urban planning and the concept of sustainable development as it develops in urban policy. This analytical approach was chosen because it integrates historical, policy, and ecological dimensions within a coherent interpretative framework, enabling this study to provide a deeper understanding of how green open space transformation affects the structural and long-term sustainability of the urban environment (Miles et al., 2020; Creswell & Creswell, 2023).

3. FINDINGS AND DISCUSSION

The research results show that green open spaces (GOS) in the context of urban development have undergone significant historical transformation, both in terms of function, spatial structure, and the orientation of their management policies. In the early phase of urban development, the existence of green open spaces was generally not positioned as strategic ecological elements, but rather as public spaces with social, symbolic, and aesthetic functions. In many cities, open spaces such as town squares, city parks, and public squares became centers of community social activities as well as symbols of political power and the city's cultural identity. In this historical context, GOS is better understood as part of the traditional urban planning structure that functions as a space for social interaction and community ceremonial activities, rather than as an instrument for ecological urban environmental management.

Transformation began to occur along with the increasing intensity of urbanization and the shifting paradigm of urban development in the modern era. Rapid urban economic development drove the expansion of built-up areas and increased pressure on urban land, resulting in a gradual decline in green open spaces. Analysis of spatial planning and urban spatial development policy documents shows that during the modern development period, urban planning orientation tended to emphasize economic growth and physical infrastructure development. As a result, green open spaces were often positioned as secondary elements whose existence could be compromised for the sake of commercial development, residential areas, or transportation infrastructure. This situation indicates a structural tension between the needs of economic development and environmental sustainability in the urban planning process.

Research findings also reveal that changes in the function of green open spaces occur not only spatially but also conceptually within urban development policies. In recent decades, particularly following the strengthening of sustainable development discourse, green open spaces have begun to be repositioned as ecological infrastructure that plays a strategic role in maintaining urban environmental quality. Analysis of urban planning policies indicates a paradigm shift from a growth-oriented development approach to one that pays greater attention to environmental sustainability. Within this framework, green open spaces are no longer understood merely as aesthetic elements of the city, but as essential components of the urban ecological system that function to control environmental temperatures, improve air quality, and strengthen the city's resilience to the impacts of climate change.

However, the research findings indicate that this conceptual transformation has not been fully accompanied by structural changes in urban development practices. Although policies emphasizing the importance of green open space are increasingly being adopted in spatial planning documents, their implementation often faces various obstacles, particularly related to conflicts of interest in urban land use. Analysis of policy dynamics indicates that market pressures on urban land, limited institutional capacity of local governments, and weak spatial planning oversight mechanisms are factors that hinder the optimization of green open space management. In many cases, green spaces normatively planned in spatial planning policies are not fully realized in development practice, creating a gap between policy and implementation on the ground.

Furthermore, this study also found that the transformation of green open spaces in urban development is influenced by social dynamics and changing patterns of urban community needs. Along with increasing public awareness of the importance of environmental quality, green open spaces are beginning to be viewed as a public need related to health, psychological well-being, and the quality of life of urban residents. Analysis of informants' perceptions shows that the public increasingly views green spaces as ecological recreational spaces that can provide a healthier and more comfortable environment amidst urban density. This change in perception indicates that the social function of green open spaces has expanded from merely traditional public spaces to ecological spaces that have health and sustainability values.

Another important finding of this study is that the historical transformation of green open spaces demonstrates a cyclical pattern in the relationship between urban development and environmental sustainability. In the early stages, green open spaces had a strong social function but were not yet integrated into the ecological framework of urban development. In subsequent stages, economic

development and urbanization led to the marginalization of green open spaces in urban planning. However, in the contemporary phase, efforts have emerged to recontextualize green open spaces as an integral part of sustainable urban development strategies. This pattern demonstrates that the existence of green open spaces in cities is strongly influenced by the dynamics of development paradigms that develop in each historical period.

The findings of this study indicate that the historical transformation of green open space (GOS) in urban development is not merely a spatial change, but rather the result of the dynamic interaction between development policies, economic interests, and shifting environmental paradigms in urban governance. From the perspective of sustainable development theory, GOS is positioned as part of urban ecological infrastructure, serving simultaneous ecological, social, and economic functions. This concept emphasizes that the existence of green space is inseparable from the urban sustainability system because it plays a role in maintaining the balance of the urban ecosystem and improving the quality of life of the community (Kabisch et al., 2021). The results of this study indicate that in the early stages of urban development, the function of GOS was more social and symbolic, while its ecological dimension was not yet a primary consideration in urban planning. This condition can be explained by classical urban development theory, which states that the spatial structure of cities in the early stages was more influenced by political, cultural, and power factors than environmental considerations (Hall & Tewdwr-Jones, 2020). Thus, the findings of this study demonstrate that the understanding of GOS as ecological infrastructure is actually a relatively recent conceptual construct in modern urban planning discourse.

The results of this study also show that the urban modernization phase has resulted in the marginalization of green open spaces due to the dominant paradigm of economic development and the expansion of built-up areas. This phenomenon aligns with previous research findings, which show that rapid urbanization often leads to the conversion of green areas into commercial and residential areas, thereby reducing the city's ecological capacity (Wang et al., 2021). However, this study makes an analytical contribution by demonstrating that this process is influenced not only by economic pressures on land but also by the construction of development policies that place green spaces as a secondary element in urban spatial planning. Within the framework of the political ecology of urban space theory, this condition can be understood as a manifestation of power relations in the production of urban space, where economic interests often dominate over ecological interests (Heynen, 2020). In other words, the shrinking of green open spaces is not simply a consequence of uncontrolled urban growth but also the result of policy choices that structurally prioritize economic development.

Table 1. Historical Transformation of Green Open Space in Urban Development

No	City Development Period	Characteristics of Green Open Space	Main Function of Green Open Space	Driving Factors of Change
1	Traditional (pre-modern) cities	Squares, public squares, royal gardens	Social space, cultural activities, symbols of power	Traditional social structures and local governance systems
2	Early Modern City	City parks and green boulevards are being planned	Urban aesthetics and public recreation	Urban modernization and the influence of Western urban planning
3	The Era of Industrialization and Urbanization	Shrinkage of green space due to expansion of built-up areas	The function of green open space is declining, often becoming a leftover urban space	Economic growth, urbanization, and the need for development land
4	Sustainable Contemporary City	Integration of green open space in the city planning system	Ecological infrastructure, public health, climate change mitigation	Sustainable development paradigm and environmental policy

The table above shows that green open spaces (GOS) have undergone a transformation in function and meaning along with the development of urban history. In the traditional urban period, open spaces such

as town squares or public squares served more as social and symbolic spaces related to cultural and government activities. During this phase, GOS was not yet understood as part of the city's ecological system, but rather as centers of social interaction. Entering the early modern period, the concept of urban planning began to develop with the emergence of city parks and green boulevards designed to enhance the aesthetics and comfort of the urban environment. However, in the era of industrialization and urbanization, the pressures of economic development and the need for urban land caused many green spaces to shrink or change function.

Conceptual Diagram of Green Open Space Transformation in Sustainable Cities

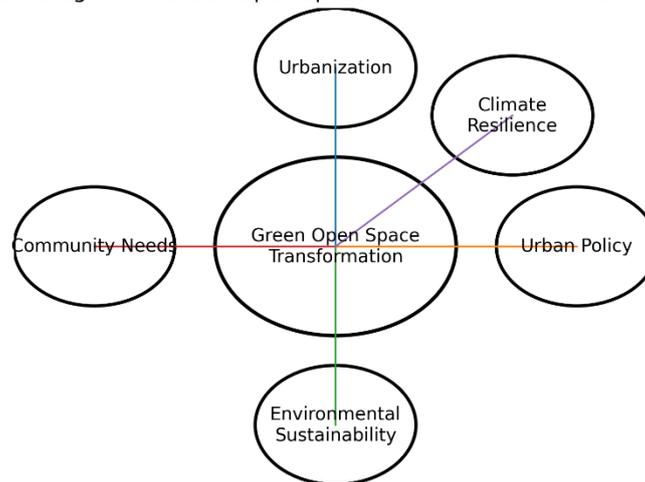


Figure 1. the conceptual relationship influencing the transformation of green open spaces. The circular diagram illustrates the conceptual relationship influencing the transformation of green open spaces in sustainable urban development. The central concept is connected with several key factors such as urbanization, urban policy, environmental sustainability, community needs, and climate resilience. These interconnected elements collectively shape how green open spaces evolve and function within modern urban environments.

Factors Influencing the Transformation of Green Open Spaces in Sustainable Urban Development

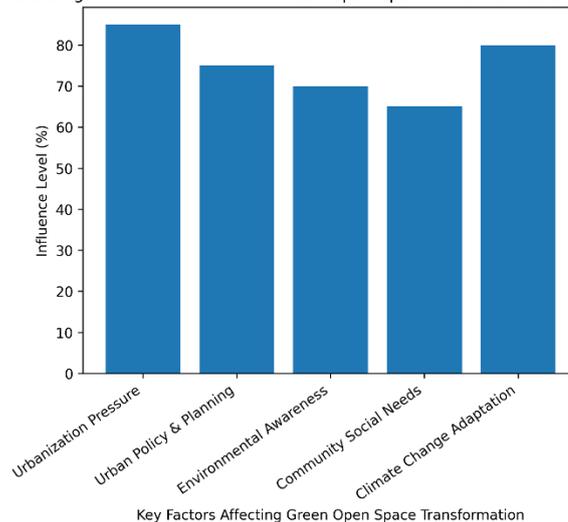


Figure 2. key factors influencing the transformation of green open spaces. The bar chart illustrates several key factors influencing the transformation of green open spaces in sustainable urban development. Urbanization pressure and climate change adaptation appear as the most influential drivers shaping the planning and management of urban green spaces. These factors interact with policy frameworks, environmental awareness, and community needs in determining how green spaces evolve within modern cities.

The findings of this study also demonstrate a paradigm shift in contemporary urban policy, which is beginning to position green open space as a strategic component of sustainable urban development. This shift aligns with the development of green urbanism theory, which emphasizes the importance of integrating green space into urban planning systems to improve environmental resilience and the quality of life for urban communities (Beatley, 2020). Recent research also shows that cities with well-developed green open space networks tend to have better air quality, more stable urban temperatures, and higher levels of psychological well-being (Li et al., 2022). In this context, the results of this study strengthen the argument that green open space has a multidimensional role that extends beyond its ecological function to contribute to social and public health dimensions.

However, this study found a gap between conceptual transformation in policy and actual implementation in urban development. This finding is consistent with previous research showing that many urban green space policies face implementation obstacles due to conflicting land interests, limited institutional capacity, and weak spatial oversight (Zhou et al., 2023). However, this study adds a new perspective by showing that this gap is also influenced by historical factors in urban spatial structures. Cities that lack a strong tradition of green space planning from the beginning of their development tend to struggle to effectively integrate green space into modern development systems. Thus, the transformation of green space cannot be understood solely as a matter of contemporary policy but also as a result of the accumulated history of urban planning that shapes the current urban spatial structure.

Furthermore, this study found that changes in public perceptions of green open spaces are a crucial factor driving the recontextualization of the role of green open spaces in urban development. In recent decades, increasing public awareness of environmental health and climate change issues has driven public demand for greater and higher-quality green spaces. This finding aligns with research showing that access to urban green spaces is positively associated with mental health, social well-being, and the quality of life of urban residents (Jennings & Bamkole, 2022). However, this study demonstrates that changes in public perception are not always accompanied by structural changes in urban development policies. This indicates a gap between public aspirations and the government's institutional capacity to adequately provide green open spaces.

Theoretically, the results of this study strengthen arguments in urban sustainability studies that emphasize the importance of integrating ecological, social, and historical dimensions in city planning. Most previous studies tend to position green open space as a technical variable in spatial planning, such as the area of green land or the distribution of urban vegetation. Conversely, this study shows that the existence of green open space is also strongly influenced by the historical dynamics of urban development, power relations in spatial planning policies, and changes in public perceptions of the environment. Therefore, the scientific implication of this research finding is the need for an interdisciplinary approach that integrates historical, urban ecological, and public policy perspectives in understanding the transformation of green open space in sustainable urban development.

Furthermore, the findings of this study indicate that the future sustainability of green open spaces depends not only on quantitative green land provision policies but also on the city's ability to reconstruct a development paradigm that is more oriented towards ecological balance. In this context, the resilient city theory emphasizes that a sustainable city is one that is able to integrate ecological systems into its development structure and urban governance (Meerow et al., 2021). Therefore, the results of this study imply that efforts to strengthen green open spaces must be accompanied by spatial planning policy reform, strengthening environmental management institutions, and increasing public participation in urban planning.

4. CONCLUSION

This study concludes that the historical transformation of green open space (GOS) in urban environmental development is a dynamic process influenced by changes in development paradigms, urbanization pressures, and the dynamics of urban spatial planning policies. In the early phase of urban development, GOS served more as a social and symbolic space associated with public activities and the

city's cultural identity. However, with increasing urbanization and the dominance of economic development orientation, the position of GOS has been marginalized in urban spatial structures. In contemporary developments, a paradigm shift has occurred that has begun to position GOS as a strategic ecological infrastructure in sustainable urban development. However, this study found a gap between conceptual transformations in policy and actual implementation in the field, influenced by conflicts of interest in land use, limited institutional capacity, and historical structures of urban spatial planning that do not fully support the integration of green space. Scientifically, this study contributes by demonstrating that the analysis of GOS cannot be understood solely through a technical-spatial approach, but needs to be viewed through historical, social, and policy perspectives that interact in shaping urban environmental sustainability.

However, this study has several limitations that require attention. First, the analysis of the historical transformation of green open space is still based on the review of policy documents and historical interpretations, so it is not fully supported by quantitative spatial analysis that can show changes in the distribution of green space more measurably. Second, this study places more emphasis on the conceptual and policy dimensions, so it does not explore in depth the perspectives of urban communities as direct users of green open space. Therefore, further research is recommended to integrate multidisciplinary approaches, such as geospatial analysis, land-use change mapping, and community participatory studies to obtain a more comprehensive picture of the dynamics of green open space in urban areas. Furthermore, future research can also examine models of green open space governance based on collaboration between the government, communities, and the private sector as an innovative strategy to strengthen urban environmental sustainability amidst the pressures of increasingly complex urbanization.

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