**Research Article** 

# Ecological urbanism and sustainable cities, reflections on the design and planning of cities in order to improve the quality of urban life

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# ARTICLE INFO ABSTRACT

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Green urbanism and sustainable cities are concepts that focus on the design and planning of urban environments that promote the quality of life of inhabitants and minimize environmental impact. This bibliometric review explored research and academic publications related to city design and planning from an ecological and sustainable perspective. Through a comprehensive analysis, architectural and urban planning approaches that integrate ecological elements into the design of buildings and public spaces, the implementation of green infrastructure, and the promotion of sustainable mobility were identified. The social, economic and environmental impacts of green urban interventions were also assessed, as well as the policies and strategies used to promote urban sustainability. The main purpose of this research focused on identifying current trends, emerging research areas and best practices in the field of green urbanism and sustainable cities. The results of this research provide valuable information for practitioners, researchers and decision-makers in the field of urban planning and urban planning.

**Keywords:** ecological urbanism, sustainable cities, quality of life, sustainability, design and planning of sustainable cities.

JEL Rating: Q51; R58; O18

## **INTRODUCTION**

In recent decades, uncontrolled urban growth and lack of planning have led to the degradation of the natural environment and a decrease in the quality of life in cities (Sanabria, 2022; González et al. 2023). Accelerated urbanization has generated a series of environmental, social and economic problems, which negatively affect the quality of life of urban dwellers. Among the environmental problems generated by uncontrolled urbanization are air and water pollution, loss of biodiversity, soil degradation, and the production of solid and liquid waste (Herraiz-Faixó & Arroyo-Cañada, 2020; McDonald et al., 2019; Song et al., 2020; Valencia-Celis et al., 2023).

Air pollution, in particular, is a serious problem in many cities, as it is responsible for the premature deaths of thousands of people each year. Biodiversity loss, on the other hand, entails the decrease in the capacity of natural ecosystems to provide essential services such as water purification, climate regulation, and food production (Marco et al., 2019; Rodríguez-Torres et al., 2024; Yao et al., 2019).

In addition to environmental problems, uncontrolled urbanization has also generated social and economic problems (González, 2023; Moreira & Reis, 2024). Congestion and insecurity in cities are common problems, which has led to a decline in the quality of life of urban dwellers. Lack of access to basic services such as housing, education, and health care is another serious problem in many cities. Economic and social inequality

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has also been exacerbated in cities, leading to the creation of ghettos and areas of poverty (Lapointe et al., 2020; Shao et al., 2020; Ventriglio et al., 2020; Yao et al., 2021).

In this sense, ecological urbanism and sustainable city planning have become topics of great interest and concern for researchers, practitioners, and policymakers (Martínez et al. 2024). Green urbanism focuses on creating cities that are capable of maintaining and restoring natural processes, protecting biodiversity, and reducing the ecological footprint (Dudek-Klimiuk & Warzecha, 2021; Chen, 2021; Pietta & Tononi, 2021).

This involves integrating the principles of sustainability into the planning and design of cities, considering aspects such as energy efficiency, natural resource management, waste reduction and the promotion of sustainable mobility (Pérez & Arufe, 2023). Sustainable city planning also involves the active participation of the community in decision-making and consideration of the social, economic, and cultural needs of urban dwellers (Cortese et al., 2022; López & Castro, 2020; Pérez-Gamboa et al., 2022; Zhuang et al., 2020).

The academic literature has highlighted the importance of sustainable urban planning in creating more efficient, healthier, and more attractive cities. However, there are still significant gaps in the understanding of how to address urban challenges and how to integrate the principles of green urbanism into city planning and design (Amaral et al., 2020; Tsangas et al., 2023; Zavratnik et al., 2020).

This study, following the guidelines of Ledesma and Malave (2022), seeks to analyze scientific production in the field of ecological urbanism and sustainable city planning, with the aim of identifying trends, patterns, and emerging research areas. Through this analysis, according to Ramírez et al (2023) and Raudales et al. (2024), it is expected to contribute to the advancement of knowledge in the field of ecological urbanism and sustainable city planning, and provide recommendations for the formulation of more effective policies and strategies to improve the quality of life in cities.

#### METHODOLOGY

## **Research Paradigm**

The research paradigm is quantitative, with a descriptive-retrospective approach, based on a bibliometric study in the Scopus database (Creswell, 2019; Newman & Gough, 2019). The study was conducted by two independent researchers, with the goal of verifying the total amount of research and contrasting data, and then reviewing the documents.

The value of this approach lies in the fact that it offers access to a large and reliable database such as Scopus, allows data to be analyzed objectively and reduces subjectivity and bias, to identify trends and patterns in the literature, to evaluate scientific production in terms of quantity and quality, and to detect research gaps and opportunities. In this way, this approach provides an overview of the literature in a specific field, which can help researchers better understand the current state of research and identify areas for future research (Casasempere-Satorres & Vercher-Ferrándiz, 2020; Gómez-Cano et al., 2023; Monzón-Pinglo et al., 2023).

#### **Information Search Strategy**

The search formula was: TITLE-ABS-KEY ("green urbanism" OR "sustainable city") AND "quality of urban life"). The search was conducted on April 3, 2024, and a total of 20 investigations (N=20) were retrieved.

#### **Data Analysis and Bibliometric Indicators**

The analysis of the information, as indicated by the protocols of Gómez et al. (2023), Eslava et al. (2023) and Gómez et al. (2024), was carried out by downloading the file in ". RIS", which was processed by one of the researchers using the EndNote X20 bibliographic manager. The indicators of trend and scientific production were obtained from the Scopus database, where the . XLSX in Excel format and processed in Microsoft Excel. For the description of the publications, the following bibliometric indicators were analyzed:

• Scientific production per year: Study the behavior of research and its frequency over time. The adjusted trend line was used based on the higher value of  $.R^2$ 

- Number of investigations by type of document: The number of documents is analyzed according to their type.
- Number of investigations by area of knowledge: The number of documents by areas of knowledge is analyzed.
- Number of publications by country: The number of documents per country is analyzed.

• Number of publications by institutional affiliation: The number of documents by institutional affiliation is analyzed.

#### **Impact Indicators**

The impact indicators were obtained from the SCImago Journal & Country Rank (https://www.scimagojr.com/) website. The indicators analysed were:

• Journal Ranking: CC (Citation Count): evaluates the number of citations received by the journal during the period analyzed.

• IF (Impact Factor): analyzes the ratio between the number of citations received by a journal's articles during the previous two years and the number of articles published in those years.

• Q (Quartile): analyzes the relevance of a journal within all journals in the area of knowledge, divided into four quartiles Q1, Q2, Q3 and Q4.

• H-index: measures the productivity of a journal in correlation with the impact of citations of publications.

In addition, an analysis of keyword co-occurrence from the clusters and the evolution of terms over time was carried out. In addition, an authorial collaboration analysis was carried out with the aim of identifying research trends. The analysis was carried out with the support of the bibliometric software Vosviewer.

# RESULTS

The results of this bibliometric study on ecological urbanism and sustainable cities reveal interesting trends and patterns in scientific production in this field. First, the distribution of publications by year shows a significant increase in scientific production in recent years, suggesting a growing interest in research on ecological urbanism and sustainable cities (Bibri, 2020; Wu, 2022; Zhou et al., 2019; Cresmani et al. 2023).

In the analysis of scientific production on ecological urbanism and sustainable cities, a heterogeneous pattern was observed in the amount of research published per year (Figure 1). In the period from 1991 to 2017, a constant rate of one publication per year (n = 1) was recorded, while between 2018 and 2023 there was a significant increase, with a peak of six publications in 2023 (n = 6), which fits a polynomial function with a confidence level of 54.49%.

Regarding the distribution of publications by type of document, it was found that research articles were the most frequent, with 13 documents representing 65% of the total, followed by book chapters with four documents (Table 1).

The predominance of research articles and book chapters as types of documents suggests that research in this field focuses on the presentation of original results and on the review and synthesis of existing knowledge. The presence of research in 10 areas of knowledge and 18 countries reflects the interdisciplinary and global nature of research in ecological urbanism and sustainable cities (Matlock & Lipsman, 2020; Yigitcanlar et al., 2019).



Figure 1. Scientific production per year Source: Authors.

Table 1. Analysis of the number of documents by type.					
Document Type	Frequency	Percentage			
Research article	13	65 %			
Book Chapter	4	20 %			
Event	1	5 %			
Event Review	1	5 %			
Review article	1	5 %			
Total	20	100 %			
Source: Authors.					

The analysis of the areas of knowledge revealed that the social sciences were the most representative area, with 13 investigations, closely followed by the environmental sciences with nine documents (Figure 2). Publications

were identified in 18 countries, and analysis of the five most productive countries showed that Turkey was the country with the most research (n = 5), followed by the Netherlands, South Korea, and the United States, all with two investigations (n = 2) (Figure 3).



Figure 2. Scientific production by area of knowledge Source: Authors.



As for the institutions, 30 institutional affiliations were found, with the Vrije Universiteit Amsterdam being the most productive, with two studies, located in the Netherlands. The other institutions only had one publication each. Figure 4 shows the network of collaborations between institutions.

The analysis of institutional collaboration and the identification of institutional affiliations reveals a network of institutions working in this field, which can be beneficial for collaboration and knowledge sharing. The presence of institutions from different countries suggests that research in ecological urbanism and sustainable cities is a global priority (Home & Bauer, 2021; Jagt et al., 2019; Mills et al., 2021; Ramos et al. 2024).



## Figure 4. Analysis of collaboration between institutions Source: Authors.

The impact analysis of the main publications and journals (Table 2) revealed that the journal Environmental Challenges was the most cited, with 52 citations, and that the journal Transportation Research Interdisciplinary Perspectives achieved the greatest impact, with a value of 1.48. Journals were found in quartiles 1, 2, and 4. The ISPRS International Journal of Geo-Information was the one with the highest h-index, with a value of 73.

Impact analysis of leading publications and journals shows that the most cited and highest-impact journals focus on topics such as urban resilience, sustainable urban planning, and environmental performance assessment. This suggests that research in green urbanism and sustainable cities focuses on finding practical and effective solutions to improve the quality of urban life (Fell & Mattsson, 2021; Zeng et al., 2022).

Table 2. Impact analysis							
Article	Magazine	СС	IF	Q	h- index		
Land use and land cover change detection and prediction in Bhutan's high-altitude city of Thimphu, using cellular automata and Markov chain	Environmental Challenges	52	0,99	Q1	32		
Sustainable and Green City Brand. An Exploratory Review	Management Notebooks	4	0,31	Q2	15		
Less can be more: Pruning Street networks for sustainable city-making	Transportation Research Interdisciplinary Perspectives	1	1,48	Q1	45		
Compact city concept from the viewpoint of place-making	WIT Transactions on Ecology and the Environment	1	0,18	Q4	29		
What Drives the Spatial Heterogeneity of Urban Leisure Activity Participation? A Multisource Big Data-Based Metrics in Nanjing, China	ISPRS International Journal of Geo-Information	0	0,71	Q1	73		
Transnational urban circularity, green transition and innovative city development projects, funded through the jpi urban europe and the dut partnership instruments	Argument (Romania)	0	-	-	-		
Source: Autnors.							

A keyword analysis identified two main clusters and nine items (Figure 5). The evolution over time of the terms showed that the keywords in cluster 1 were interrelated and appeared in the most recent research (2023) (Figure 6).

The analysis of keywords and the identification of two main clusters suggests that research in ecological urbanism and sustainable cities focuses on two main lines. These lines are the application of seismic resilience materials and strategies for urban resilience, and the evaluation and optimization of environmental performance in sustainable urban planning through the integration of green areas (Akbar et al., 2020; Heymans et al., 2019).



# Figure 6. Keyword co-occurrence analysis (density map) Source: Authors.

Table 3 shows an analysis of the two main lines of research identified from the analysis of keywords by cluster. Cluster 1 focused on the development and application of seismic resilience materials and strategies for urban resilience, while cluster 2 focused on the evaluation and optimization of environmental performance in sustainable urban planning through the integration of green areas.

Cluster	Items	Keywords	Line of research		
C1	5	Earthquake resilience, Earthquake	Development and application of seismic		
		resilience material, Earthquake	resilience materials and strategies for urban		
		resilience strategy, Istanbul, urban	resilience.		
		resilience			
C2	4	Environmental performance, green	Evaluation and optimization of		
		areas, sustainability, urban planning	environmental performance in sustainable		

Table 3. Analysis of the main lines of research

		urban planning through the integration of
		green areas.
Total	9	

Source: Authors.

Finally, the analysis of collaboration between authors (Figure 7) did not show a relationship between them. However, the knowledge map overlay showed that authors with more recent publications are in yellow.



Figure 7. Author collaboration analysis Source: Authors.

The results of this bibliometric study suggest that research in ecological urbanism and sustainable cities is a field in constant evolution, with a growing interest in the search for practical and effective solutions to improve the quality of urban life. Identifying trends and patterns in scientific production can be useful for researchers, urban planners, and policymakers seeking to develop effective strategies and policies to create more sustainable and resilient cities (Bottero et al., 2019; Du & Zhang, 2020).

# **Integrative Analysis**

Green urbanism and sustainable city planning are critical issues today, given the growing urban and environmental challenges facing the world's cities. The integration of the results of this bibliometric analysis suggests that research in ecological urbanism and sustainable cities focuses on the search for practical and effective solutions to improve the quality of urban life (Huang & Wey, 2019; Lu et al., 2021).

The growing scientific production in this field, especially in recent years, suggests a growing interest in the application of principles and strategies of sustainable urban design and planning. In addition, comparison with existing literature indicates that research in this field focuses on finding sustainable and resilient solutions for cities, and that interdisciplinarity and institutional collaboration are critical to addressing complex urban challenges (Puchol-Salort et al., 2020; Quijano et al., 2022; Sodiq et al., 2019; Kapelista et al. 2024).

In terms of practical implications, the results of this analysis suggest that urban designers and planners should consider the integration of green areas and the application of seismic resilience materials and strategies in sustainable urban planning. In addition, the evaluation of environmental performance and the consideration of urban resilience should be fundamental in decision-making and urban planning (Pamukcu-Albers et al., 2021; Pokhrel, 2019; Valente et al., 2022).

In addition, the results of this analysis suggest that institutional collaboration and interdisciplinarity are critical to addressing complex urban challenges. Research in ecological urbanism and sustainable cities must be interdisciplinary and collaborative. Ultimately, creating sustainable and resilient cities requires a

comprehensive and holistic view of urban planning, which considers the interconnectedness of urban systems and the complexity of urban challenges (Butt & Dimitrijević, 2022; Youm & Feiock, 2019; Tavora, 2023). CONCLUSIONS

The integration of green areas into sustainable urban planning is critical to improving the quality of urban life, as these spaces can provide environmental, social, and economic benefits for the city and its inhabitants. The application of seismic resilience materials and strategies is crucial to ensure the safety and resilience of urban structures in the face of natural disasters.

On the other hand, the evaluation of environmental performance in sustainable urban planning is essential to ensure that urban decisions are sustainable and resilient in the long term. Consideration of urban resilience is critical to addressing complex urban challenges and ensuring that cities are able to meet the challenges of the future. The results of this research suggest that research in ecological urbanism and sustainable cities focuses on the search for practical and effective solutions to improve the quality of urban life. The integration of green areas, the application of seismic resilience materials and strategies, and the evaluation of environmental performance are some of the key themes that emerge from this analysis, and that can inform decision-making and urban planning in the future.

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# FINANCING

No.

# CONFLICT OF INTEREST STATEMENT

None.

# **AUTHORSHIP CONTRIBUTION:**

Conceptualization: Verenice Sánchez Castillo and Carlos Alberto Gómez Cano Research: Verenice Sánchez Castillo and Carlos Alberto Gómez Cano Methodology: Verenice Sánchez Castillo and Carlos Alberto Gómez Cano Validation: Verenice Sánchez Castillo and Carlos Alberto Gómez Cano Writing – original draft: Carlos Alberto Gómez Cano Writing – proofreading and editing: Verenice Sánchez Castillo