



Mix Sustentável



Pesquisa científica em paisagismo e design urbano: uma revisão de trabalhos notáveis

Scientific research in landscape and urban design: a review of notable works

La investigación científica en el diseño paisajístico y urbano: una revisión de trabajos notables

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Resumo: Este estudo traça a evolução e o estado atual da pesquisa em arquitetura paisagística e design urbano de 1979 a 2024 por meio de uma revisão bibliográfica. Inicialmente fundamentada na observação e na prática profissional, a área tem incorporado cada vez mais análises estatísticas e ferramentas tecnológicas, abordando preocupações anteriores relacionadas à inconsistência metodológica. A revisão empregou uma abordagem quantitativa, selecionando trabalhos com base no número de citações ajustado pelo ano de publicação e pelo fator de impacto da revista. Os resultados sintetizados revelam um crescente corpo de literatura

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tura estruturado em torno de três categorias temáticas: Urbana, Natural e Outras. Dentro destas, os principais subcampos incluem morfologia urbana, espaço público e imagens urbanas; conforto ambiental, resiliência e design urbano sensível à água; e conceitos emergentes como a cidade circular. A análise destaca relações transversais em diferentes escalas e domínios, com uma ênfase compartilhada em adaptabilidade, flexibilidade, diversidade e sustentabilidade. Ao abranger quase cinco décadas de produção acadêmica, esta pesquisa ilustra a maturação disciplinar do design urbano e paisagístico. Este estudo destaca uma mudança da teorização baseada na prática para a pesquisa orientada por dados e sinaliza a integração de paradigmas sustentáveis, ecológicos e tecnológicos no planejamento espacial. Ele contribui com uma estrutura coesa para a compreensão das tendências contemporâneas, dos desafios e das direções futuras neste campo interdisciplinar.

Palavras-chave: Desenho urbano; paisagem urbana; revisão de literatura.

Abstract: This study traces the evolution and current state of research in landscape architecture and urban design from 1979 to 2024 through a literature review. Initially grounded in observation and professional practice, the field has increasingly incorporated statistical analyses and technological tools, addressing previous concerns related to methodological inconsistency. The review employed a quantitative approach, selecting works based on the number of citations adjusted for the year of publication and the journal's impact factor. The synthesized results reveal a growing body of literature structured around three thematic categories: Urban, Natural, and Other. Within these, the main subfields include urban morphology, public space and urban imagery; environmental comfort, resilience and water-sensitive urban design; and emerging concepts such as the circular city. The analysis highlights cross-cutting relationships at different scales and domains, with a shared emphasis on adaptability, flexibility, diversity, and sustainability. Spanning nearly five decades of academic production, this research illustrates the disciplinary maturation of urban and landscape design. This study highlights a shift from practice-based theorizing to data-driven research and signals the integration of sustainable, ecological, and technological paradigms in spatial planning. It contributes a cohesive framework for understanding contemporary trends, challenges, and future directions in this interdisciplinary field.

Keywords: Urban design; urban landscape; literature review.

Resumen: Este estudio analiza la evolución y el estado actual de la investigación en arquitectura del paisaje y diseño urbano desde 1979 hasta 2024 mediante una

permite o compartilhamento do trabalho com reconhecimento da autoria e publicação inicial nesta revista.

Contribuição dos autores segundo a Taxonomia CRediT

MB: Conceptualization, Resources, Supervision, Investigation, Writing - original draft, Project administration, and Writing - review & editing. EP: Data curation, Software, Formal analysis, Methodology, and Writing - review & editing. TR: Resources, Validation, and Writing - review & editing. HI: Validation, and Writing - review & editing.

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Nothing to declare.

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revisión bibliográfica. Inicialmente fundamentada en la observación y la práctica profesional, la disciplina ha incorporado cada vez más análisis estadísticos y herramientas tecnológicas, abordando así las preocupaciones previas relacionadas con la inconsistencia metodológica. La revisión empleó un enfoque cuantitativo, seleccionando trabajos en función del número de citas ajustado al año de publicación y al factor de impacto de la revista. Los resultados sintetizados revelan un creciente corpus bibliográfico estructurado en torno a tres categorías temáticas: Urbana, Natural y Otras. Dentro de estas, los principales subcampos incluyen la morfología urbana, el espacio público y la imagen urbana; el confort ambiental, la resiliencia y el diseño urbano sensible al agua; y conceptos emergentes como la ciudad circular. El análisis destaca las relaciones transversales en diferentes escalas y ámbitos, con un énfasis común en la adaptabilidad, la flexibilidad, la diversidad y la sostenibilidad. Abarcando casi cinco décadas de producción académica, esta investigación ilustra la maduración disciplinaria del diseño urbano y del paisaje. Este estudio pone de relieve la transición de la teorización basada en la práctica a la investigación soportada en datos, y señala la integración de paradigmas sostenibles, ecológicos y tecnológicos en la planificación espacial. Aporta un marco coherente para comprender las tendencias contemporáneas, los desafíos y las direcciones futuras en este campo interdisciplinario.

Palabras clave: Diseño urbano; paisaje urbano; revisión biblio-hemerográfica.

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1 INTRODUCTION

Landscape evaluation has permeated the field of urban design through the factors associated with how humans interact with their surroundings in terms of needs, health, and wellbeing, all of which are objectively assessed (Lowenthal, 1997; Matsuoka; Kaplan, 2008). This is a human and urban ecological perspective aimed at understanding ecosystem functioning as the result of a process that evolves while adapting over time to a specific locale (Hussein; Stephens; Tiwari, 2020; Morar *et al.*, 2022; Spielhofer *et al.*, 2021), and which is evaluated through perception by inhabitants.

The urban landscape integrates overlapping sensations that give rise to a holistic experience conditioned by the characteristics of the perceiver (Ode *et al.*, 2009; Portal; Kerguillec, 2018; Santibáñez; Cantú; Pérez, 2021). The analysis is approached from an objective perspective, incorporating other cross-disciplinary fields.

According to Nassauer, landscape science requires a common conceptual foundation—a “mentality different from interdisciplinarity, distinguishing between a “common landscape” and a “unique landscape” (Nassauer, 2023). This characterization contributes to meeting natural and social interaction needs and proposes measures for protection, conservation, intervention, or improvement. The central idea is to safeguard natural areas with balanced interventions that harmonize with, and even benefit, human activities (Hussein; Stephens; Tiwari, 2020; Matsuoka; Kaplan, 2008). Historical and heritage landscapes also require attention because they are part of the collective memory (Baylan, 2019; Nassauer *et al.*, 2021).

The ecological perspective implies two directions: the natural habitat, influenced by urban dynamics; and the built habitat, shaped by the human actions that create, transform, evolve, or adapt to the environment. The urban landscape is understood as a socio ecological and cultural system that brings together different professions to address complex problems (Figure 1).

Figure 1 – Nature–Living Being–City



Source: Prepared by the authors.

A bibliographic review on urban design establishes theoretical connections and networks, offering clear lines of research and strengthening theoretical development (Jorge-huertas; Jorge-moreno, 2022). They con-

cluded with three broad perspectives: ecological (landscape, health, and ecosystem urbanism), technological (emerging technologies, simulations), and participatory (perception of public space, security, identity, sense of belonging). This is precisely the approach to sustainability.

Critiques point to a lack of systematization and limited integration of indicator, which constrains multidimensional understanding of urban performance (Beck; Ferasso, 2024; Ordeig, 2004). The methodology is linked to a scientific paradigm, so outlining unifying perspectives is essential for urban design. Landscape and urban design studies exhibit a temporal amplitude that allows for the observation of the epistemological evolution of the field, moving from approaches based on observation and professional practice toward quantitative and technologically advanced methodologies. This historical trajectory not only documents the growth of the area but also evidences its theoretical and methodological maturation.

Our work is exploratory and seeks to answer: Are research fields interrelated and pertinent today? Which journals and documents have had the greatest impact? What topics, scales, tools, and techniques have been applied? The primary objective is to explain the current state and recent historical evolution of research in landscape and urban design, based on a review of the literature from 1979 to 2024. Specific aims: determine historical development and relevance; describe the documents high-impact documents by approach, location, and scale; classify high-impact research using weighted citation counts to identify subthemes within the major categories (Urban, Natural, and Others).

The study introduces an innovative approach that identifies common research themes to better situate theory and practice in urban landscape and urban design. Its bibliometric method goes beyond raw citation counts by weighting articles according to publication year and whether they appear in journals specialized in urban design—addressing a Scopus-detected bias toward ecology and health journals. The analysis produces a representative sample of influential urban-design scholarship and compiles evaluation tools, scales, and variables that help systematize methods and strengthen theory, especially in public space, morphology, urban image, water-sensitive design, ecocities, implying sustainability. The paper then presents Methodology, Results, Discussion, Conclusions, and References.

2 MATERIALS AND METHODS

The analysis follows the PRISMA criteria for literature reviews (Yepes-núñez *et al.*, 2021), which involves verifying the search process, exclusion of duplicate publications, document selection, data listing, and synthesis of selected results. The procedure is organized as follows:

1. Documents were retrieved from Scopus and deduplicated; key metadata for each publication were extracted for subsequent analysis. Scopus was chosen for its extensive, quality-controlled coverage and long temporal span, making it suitable for longitudinal bibliometric research (Thelwall; Sud, 2022). Its breadth across disciplines pertinent to urban studies—planning, management, and design—further supports its appropriateness for assembling a comprehensive, peer-reviewed corpus (Beck; Ferasso, 2024).

2. Trend Analysis: The temporal evolution was studied by analyzing the number of publications per year.
3. Journals were ranked using both output and impact rather than publication count alone. For each journal a weighting metric was calculated by dividing its number of publications by the total publications across all sources (the publication proportion, “pond”) and multiplying that proportion by the journal’s aggregated citations.
4. This composite indicator integrates productivity and citation impact to offer a more balanced measure than raw citation counts. It preserves the visibility of journals with few papers but high citation influence, while reducing the bias that would favor outlets solely because they publish more articles.
5. Classification by Thematic Focus: publications were manually assigned to three thematic categories — Urban, Natural, and Others — based on titles, abstracts, and keywords.
 - Natural: Studies centered on ecology, water, and green infrastructure, emphasizing the health of living systems and environmental life-support functions.
 - Urban: Research focused on the development and design of the built environment aimed at residents’ wellbeing.
 - Others: Works from sociology, social sciences, economics, medicine, philosophy, and the humanities that relate to but fall outside core urban or natural emphases.

A brief analysis was conducted to assess whether the themes could be considered distinct based on citation counts, using a Poisson regression model (Dobson; Barnett, 2018), Kruskal–Wallis rank test (Hollander; Wolfe, 1973), and Dunn’s test or Kruskal–Wallis multiple comparison (Dunn, 1964). To strengthen the thematic distinction among urban, natural, and other categories, a word cloud diagram was constructed based on the keywords selected by the authors of each article. The 50 most frequently used terms were identified and included in the visualization.

6. Selection of Articles for Inclusion: Articles were selected based on the following criteria:
 - a) Given the authors’ interest in representing the three themes, the primary selection criterion was the number of citations, applied in descending order within each thematic group rather than overall.
 - b) Rather than selecting works solely based on citation counts, these counts were weighted by the publication year in relation to the final study year (2024). Each work received an indicator (I) calculated as Equation 1.

$$I = \frac{c}{2024 - y + 1} \quad (1)$$

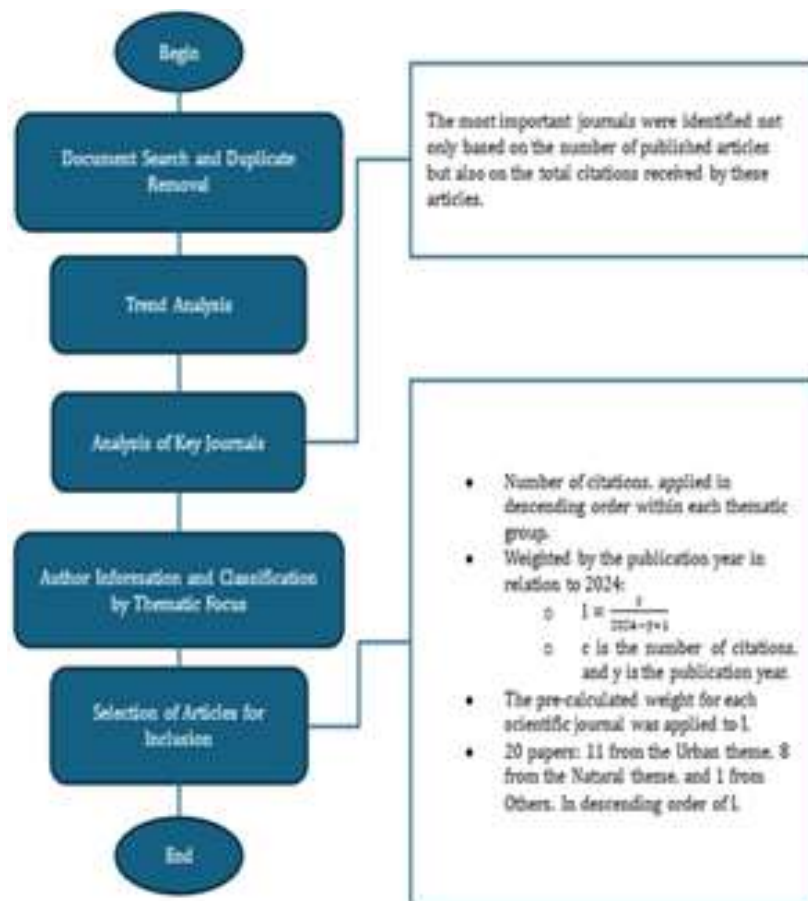
where c is the number of citations and y is the publication year. This approach ensures equity between older publications—which have had more time to gather citations—and more recent works,

without unduly penalizing highly cited recent studies. For example, a 2020 paper with 50 citations would receive $I = 10$, and a 2022 paper with 30 citations would also yield $I = 10$. The works were then ordered in descending order according to this indicator rather than raw citation count.

c) Additionally, the pre-calculated weight for each scientific journal was applied to the I indicator according to the source of each work, thereby giving preference to those journals that have contributed more significantly to the subject area.

7. Final Selection: A proportional sample of 20 works was chosen for in-depth review due to space constraints: 11 Urban, 8 Natural, and 1 Other. Each selected article was read fully to extract key concepts and findings, which were synthesized and reported in the Results section. The synthesis informs the subsequent Discussion and Conclusions, and the methodological workflow is presented in Figure 2.

Figure 2 – Methodological flowchart



Source: Prepared by the authors.

3 RESULTS

3.1 Selection of the main works

This section identifies studies that explicitly link “urban landscape” and “urban design” within a shared natural–built framework. The Scopus search was executed on 10 February 2025, restricted to the phrases “urban landscape” and “urban design” in scientific journal articles published in English before 2025. The specific Scopus search command was as follows:

TITLE-ABS-KEY (“urban landscape” AND “urban design”) AND PUBYEAR < 2025 AND LIMIT-TO (LANGUAGE , “English”) AND LIMIT-TO (DOCTYPE , “ar”) AND LIMIT-TO (SRCTYPE , “j”)

The initial query returned 634 documents; after applying filters for journal source, article type, English language, and publication year (1979–31 Dec 2024), 448 records remained. Excluding three conference papers produced a final corpus of 445 documents. Figure 3 summarizes these results.

Figure 3 – Overall results from the Scopus search



Source: Prepared by the authors.

The final dataset includes 445 articles and 23 retained metadata variables (e.g., authors, title, year, source, citation count, DOI, keywords, abstract, references, open access, eid). A portion of these variables were used for quantitative analysis while the rest provided contextual detail. Table 1 presents yearly counts of articles (n_papers) and distinct sources (n_sources).

On average, 12.2 articles and 10.0 sources were published per year. Figure 4 illustrates the publication trends over the years.

Table 1 – Number of articles and sources per year

year	n_sources	n_papers	year	n_sources	n_papers	year	n_sources	n_papers
1979	1	1	2001	2	2	2013	20	23
1987	1	1	2002	6	6	2014	8	9
1988	1	1	2003	2	2	2015	14	14
1990	2	2	2004	1	1	2016	21	22
1991	1	1	2005	5	5	2017	23	30
1992	1	1	2006	2	2	2018	14	22
1995	1	1	2007	10	12	2019	29	32
1996	3	3	2008	5	5	2020	18	22
1997	4	4	2009	7	7	2021	33	42
1998	1	1	2010	10	10	2022	30	36
1999	5	5	2011	9	11	2023	19	32
2000	2	2	2012	11	14	2024	39	55

Source: Prepared by the authors.

From 2006 onward the field shows sustained exponential growth, reaching 55 articles and 39 sources in 2024; the linear correlation between article count and available sources is 0.98, indicating a near-perfect proportional relationship. This trend confirms the first objective by evidencing the increasing historical relevance of research on the topic, consistent with the broader rise in Scopus-indexed publications (Thelwall; Sud, 2022).

For the second objective, raw citation counts alone can be misleading because some sources publish few articles that nonetheless receive many citations. To address this, a composite indicator was computed by multiplying each source's share of total publications ("pond") by its aggregated citations, producing a more robust metric that balances productivity and impact while retaining visibility for journals with few high-impact papers. Table 2 reports the journals ranked by this indicator.

As indicated, the top journals in terms of average weighted citations are Landscape and Urban Planning, Urban Forestry and Urban Greening, Sustainability (Switzerland), Cities, Urban Design International, Journal of Urban Design, Landscape Research, and Science of the Total Environment.

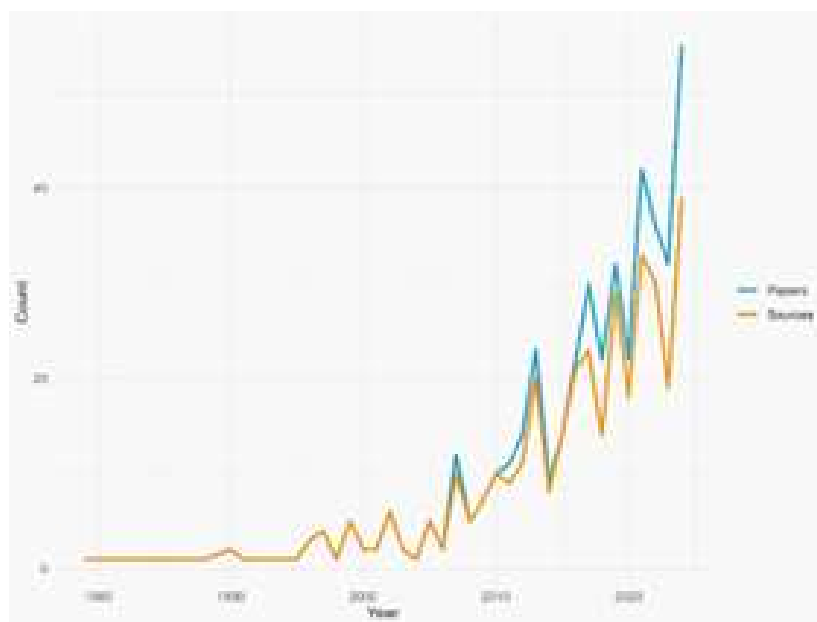
3.2 Differentiation by themes

This subsection develops the third objective of the study. Each article was manually classified into three topics of particular interest, previously explained in terms of the content of each topic: Urban, Natural and, Others.

Table 3 and Figure 5 summarize the distribution of articles across these three themes within the full sample of 445 works. In Table 3, sf represents simple frequency, rf represents relative frequency, csf represents cumulative simple frequency, and crf represents cumulative relative frequency.

In combination, the Urban and Natural themes accounted for 95

Figure 4 – Trends in the number of articles and sources published per year



Source: Prepared by the authors from Scopus.

3.2.1 Citation distribution by theme

To examine whether citation patterns differ by theme, we plotted the distribution of total citation counts for each group (Figure 6). Although most articles received between 0 and 50 citations, several works—particularly in the Natural and Others categories—were high-citation outliers.

Quantitatively, articles in the Natural and Others groups exhibit both higher median citations and greater dispersion than those in the Urban group.

3.2.2 Statistical test for theme differences

We applied a generalized linear model with a Poisson link (quasi-Poisson to account for overdispersion) to test whether mean citation rates differ significantly by theme. The model estimates are presented in Table 4, with Natural as the reference level.

This is a Poisson regression model with a canonical link function, since the number of citations is clearly a count variable. The overall meaning of the number of citations is 20.58, and the variance is 1587.24, indicating significant overdispersion; therefore, a quasi-Poisson model that controls dispersion was selected, as Equation 2.

$$\log(\lambda) = \beta_0 + \beta[\text{Themes}] \quad (2)$$

Table 2 – Average weighted citations per journal

source_title	n	n_cit	pond	pond_cit
Landscape and Urban Planning	20	1472	0.04494	66.15
Urban Forestry and Urban Greening	15	694	0.03371	23.39
Sustainability (Switzerland)	22	329	0.04944	16.27
Cities	12	390	0.02697	10.52
Urban Design International	15	240	0.03371	8.09
Journal of Urban Design	13	251	0.02921	7.33
Landscape Research	13	246	0.02921	7.19
Science of the Total Environment	7	417	0.01573	6.56
Landscape Ecology	6	227	0.01348	3.06
Building and Environment	4	262	0.00899	2.36
Planning Perspectives	6	113	0.01348	1.52
Land	16	32	0.03596	1.15
Sustainable Cities and Society	6	73	0.01348	0.98
Urban Studies	2	196	0.00449	0.88
Progress in Physical Geography	1	354	0.00225	0.80

Source: Prepared by the authors.

Table 3 – Frequencies and proportions of themes within the sample

Themes	sf	rf	csf	crf
C1. Urban	238	0.53483	238	0.53483
C2. Natural	185	0.41573	423	0.95056
C3. Others	22	0.04944	445	1.00000

Source: Prepared by the authors.

where λ is the citation rate per published work, and Natural is the reference level of the only factor [Themes] that has two explicit levels: Other and Urban, each with a coefficient to estimate.

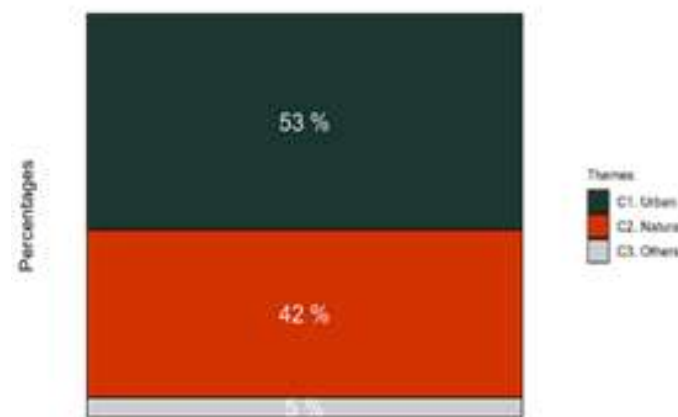
From Table 4, we conclude that the differences in the number of citations per topic are significant, as at least one of the subject categories is significant. To interpret their coefficients, exponentiation is necessary:

- An article in the Others category is expected to receive ≈ 1.27 times the citations of a Natural-theme article (not statistically significant at $p = 0.403$).
- An Urban-theme article is expected to receive only ≈ 0.38 times the citations of a Natural-theme article (highly significant at $p < 0.001$).

Thus, citation rates differ significantly between Urban and Natural themes, justifying separate thematic analysis.

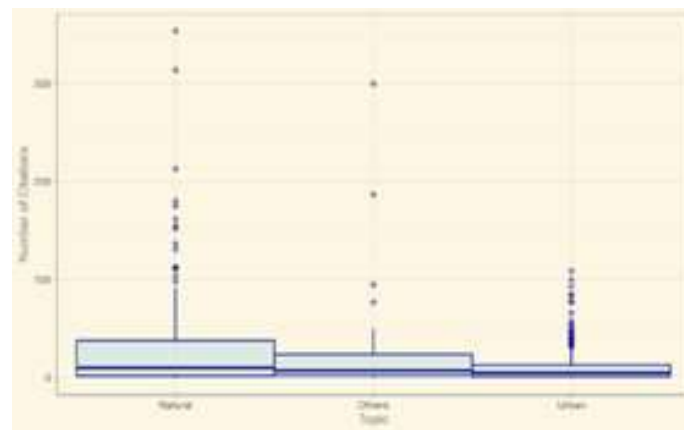
To assess whether there were significant differences in the number of citations among the three topics, a general nonparametric Kruskal–Wallis rank test was conducted. The test yielded a highly significant p-value (approximately 10^{-5}), leading to the rejection of the null hypothesis of equal citation counts across topics. The associated chi-squared statistic was 18.528 with 2 degrees of freedom.

Figure 5 – Proportions of themes in the sample



Source: Prepared by the authors from Scopus.

Figure 6 – Boxplot of citation counts



Source: Prepared by the authors from Scopus.

A Dunn's test (Kruskal–Wallis multiple comparison test) was also performed for each pair, yielding the results in Table 5.

The null hypothesis of equal citations between the Natural and Urban topics was rejected with a high level of confidence. This result reaffirms the need to consider the topics separately.

3.2.3 Word cloud analysis

Figure 7 shows the word cloud diagram created from the first 50 keywords from the 445 documents. In the urban theme, the focus is on the built environment, using terms such as public space, morphology, culture, social, architecture, image, history, perception, and health, among others. In the natural theme, terms such as water-sensitive design, green spaces, uses, sensitive surfaces, heat, comfort, resilience, biodiversity, and human

Table 4 – Quasi-Poisson regression of citation counts by theme

Coefficient	Coef	Std. Err	t-val	Pr(> t)	Conclusion	Exp
(Intercept)	3.4048	0.1017	33.4846	0.0000	Significant	30.1081
themeOthers	0.2352	0.2812	0.8364	0.4034	Non-significant	1.2651
themeUrban	-0.9581	0.1769	-5.4163	0.0000	Significant	0.3836

Source: Prepared by the authors.

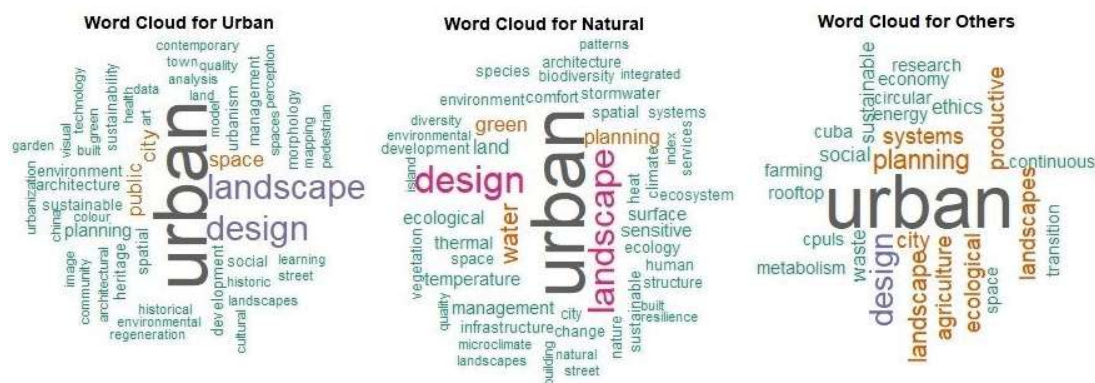
Table 5 – Kruskal–Wallis rank test

Comparison	Z	p-Value (adj)	Conclusion
Natural–Others	0.2668866	0.7895565	Not reject
Natural–Urban	4.2309167	0.0000698	Reject
Others–Urban	1.5908855	0.1674530	Not reject

Source: Prepared by the authors.

ecology are observed. For the "other" category, terms such as urban design, landscapes, city, agriculture, ecology, waste, metabolism, sustainability, economy, systems, productivity, and planning are observed, among others.

Figure 7 – Word cloud diagram



Source: Prepared by the authors.

The idea of "systems" present in the natural world and other themes suggests a more ecologically focused. The words "ecological" and "economy" do not appear in the urban theme. The social and political aspects are missing from the natural theme; there are no mentions of "community," "public," or "architecture," which could indicate a more technical or biophysical view of the natural environment. Terms such as data, patterns, and systems seem to indicate the need for a dynamic and multidimensional approach, in tune with technological advances.

3.3 Final article selection and review

Because articles with Natural and Other themes tend to be more highly cited, reflecting larger research communities in ecology and related fields, we selected our final sample by ranking articles within each theme rather than across the entire corpus. This ensured adequate representation of Urban-theme studies, despite their relatively lower citation counts; accordingly, we included 11 Urban articles, 8 Natural articles, and 1 Other article for in-depth review.

Another noteworthy aspect concerning citation counts is that, of the 445 publications identified, 43% are published in open-access sources; in contrast, among the subset of 20 selected publications, 60% are open-access—an increase of 17 percentage points. Given that the selection criteria include publication year, source, and—most importantly—citation count, this pattern strongly suggests that, as anticipated, works published in open-access sources tend to receive greater visibility and scholarly attention.

3.3.1 *Urban Theme*

Vanderhaegen e Canters (2017) in "Mapping urban form and function at city block level using spatial metrics" [Indicator (I): 0.5618 - Citations (C): 100] propose that urban morphology be treated as a “multidimensional continuum” rather than discrete land-cover patches. By analyzing 60 blocks in Brussels, Belgium, they defined eight key spatial metrics—grouped into built versus open areas, contour profiles, and construction characteristics—using GIS, machine learning, and statistical frequency analyses. They found that configurational metrics best capture distinct morphological signatures, offering robust tools for both intra- and intercity comparisons and temporal monitoring of form.

Sepe (2021) in “Covid-19 pandemic and public spaces: improving quality and flexibility for healthier places” [I: 0.5562 - C: 66] conducted a descriptive study based on nine case studies in Italy, initially framed by Quito’s 2016 Urban Agenda. The author analyzed documents on how public spaces (coastal fronts, plazas, gardens, transit hubs, trails) were adapted during COVID-19 lockdowns. Using a database of design plans, management records, images, and social media indicators of success, the author derives 50 design principles emphasizing flexibility, adaptability, and health-promoting features.

Zhao, Weng e Hersperger (2020) in “Characterizing the 3-D urban morphology transformation to understand urban-form dynamics: A case study of Austin, Texas, USA” [I: 0.4854 - C: 54] apply LiDAR-based 3D analysis to track Austin’s shift to-ward greater density since the mid-2000s. They define three growth modes—intensification, efficient expansion, and dispersed expansion—across a 30 × 30 m grid with nine height–density classes. Logistic regression shows that proximity to planned centers is the dominant predictor of urban expansion patterns, supporting the compact-city ideal promoted by smart-growth policies.

Meng e Xing (2019) in “Exploring the relationship between landscape characteristics and urban vibrancy: A case study using morphology and review data” [I: 0.4180 - C: 93] quantify urban vibrancy via

geolocated social media reviews (AutoNavi) and correlate them with morphological features (land-use, POIs, green spaces, water bodies). A multilevel regression reveals that areas with higher concentrations of amenities and distinct landscape metrics are associated with increased social media activity. The authors recommend incorporating socioeconomic and temporal variables in future models.

Filomena, Verstegen e Manley (2019) in “A computational approach to ‘The Image of the City’” [I: 0.3467 - C: 54] adapt Kevin Lynch’s five image elements via network-science algorithms and 3D visibility analysis in Boston’s central district. They normalize each element (paths, edges, districts, nodes, landmarks) on a 0–1 scale, then map changes over time. Their findings show significant shifts in landmark prominence and building heights, while street networks remain stable. They recommend integrating demographic and social media data to refine district boundaries.

Lai e Kontokosta (2018) in “Quantifying place: Analyzing the drivers of pedestrian activity in dense urban environments” [I: 0.3467 - C: 54] hypothesize that both static contextual factors (street geometry, land-use) and dynamic situational factors (crime rates, weather) influence pedestrian volumes. They use log-linear regression on georeferenced counts in a high-density district. Their results indicate that situational variables, especially real-time environmental conditions, play a bigger role than built-environment constants in driving foot traffic.

Egidi *et al.* (2020) in “Towards Local Forms of Sprawl: A Brief Reflection on Mediterranean Urbanization” [I: 0.3164 - C: 32] develop a comparative framework for Mediterranean sprawl, contrasting Northeast and Southern European cities. They argue for context-sensitive planning strategies that recognize historical compact-city development anchored in agricultural hinterlands and propose integrating socioeconomic, political, and environmental indicators to distinguish local sprawl typologies.

Dempsey e Burton (2012) in “Defining place-keeping: The long-term management of public spaces” [I: 0.2826 - C: 109] introduce “place-keeping” to complement “place-making,” emphasizing the ongoing management of public spaces (at all scales, from plazas to regions). Their critique focuses on design over-maintenance, and they advocate for strategic, locally centered funding indicators and performance metrics that ensure sustainable, longterm stewardship.

Carta, Gisotti e Lucchesi (2022) in “Settlements and Urban Morphological Quality in Landscape Planning. Analytical Models and Regulating Tools in the Landscape Plan of Regione Toscana” [I: 0.2142 - C: 13] examine Italian landscape planning through “morfotipi,” regulatory instruments that govern urban form and perimeter transitions. They analyze regional statutes and maps to propose a dual frame-work—one tool for form regulation, another for guiding transformations—and stress the need for dynamic rural–urban edge definitions and multifunctional strategic zoning.

Lak *et al.* (2020) in “A Framework for Elder-Friendly Public Open Spaces from the Iranian Older Adults’ perspectives: A Mixed-Method Study” [I: 0.1753 - C: 26] combine interviews and surveys in urban Iranian neighborhoods to elicit older adults’ place and process dimensions. They apply partial least squares–structural equation modeling (PLS-SEM) to test hypotheses on the impact of physical environment and sociocultural processes. Both dimensions significantly predict preference, underscoring the importance of participatory design for age-friendly public spaces.

Mosler (2019) in “Everyday heritage concept as an approach to place-making process in the urban landscape” [I: 0.1509 - C: 31] proposes “everyday heritage”—the passive, lived presence of fortified historical landscapes—as a key driver of place-making. Using phenomenological and topophilia frameworks, the author analyzes walled cities in Europe to show how mundane–sacred interplays yield potent threads of collective memory, and advocates for harnessing these dynamics in con-temporary urban design.

3.3.2 *Natural Theme*

Li, Ratti e Seiferling (2018) in “Quantifying the shade provision of street trees in urban landscape: A case study in Boston, USA, using Google Street View” [I: 1.3675 - C: 213] extract “sky view factor” (SVF) from Google Street View images trans-formed via fisheye-to-geometric correction. They segment tree canopies using Python’s mean-shift algorithm, then simulate solar trajectories in a building-height model. They demonstrate that large street trees reduce SVF by 18.5%, highlighting their role in summer thermal comfort.

Colding (2007) in “‘Ecological land-use complementation’ for building resilience in urban ecosystems” [I: 0.7840 - C: 314] synthesizes urban ecology literature to propose ELC: the strategic pairing of public and private green lands to enhance habitat connectivity and biodiversity. The author recommends adaptive co-management, small-scale experimental reserves, and species-specific conservation structures rather than large protected areas.

Hodson e Sander (2017) in “Green urban landscapes and school-level academic performance” [I: 0.6292 - C: 112] assess 222 Minnesota schools’ test scores (reading, math) against on-campus tree and water-body metrics, and generate bivariate scatterplots and Pearson correlations, revealing positive associations—especially in reading—supporting the idea that natural exposure can bolster academic outcomes in underserved communities.

Morakinyo *et al.* (2020) in “Right tree, right place (urban canyon): Tree species selection approach for optimum urban heat mitigation - development and evaluation” [I: 0.4876 - C: 155] study Hong Kong’s sub-tropical urban canyons ($600 \times 600 \text{ m}^2$) and classify 54 tree species by canopy morphology and SVF reduction potential. They use ENVI-met microclimate simulations under four planting scenarios (none to extensive) and demonstrate that evidence-based species selection maximizes cooling, especially under humid-hot conditions.

Montazeri *et al.* (2017) in “Simulating the cooling effects of water spray systems in urban landscapes: A computational fluid dynamics study in Rotterdam, The Netherlands” [I: 0.4663 - C: 83] detail wind-tunnel and nozzle parameters for water-spray cooling. They validate a 3D computational fluid dynamics (CFD) model at micro-scale to assess air and droplet flow. They confirm cooling efficacy but caution about water-quality maintenance for long-term health safety.

Livesley, Baudinette e Glover (2014) in “Rainfall interception and stem flow by eucalypt street trees - The impacts of canopy density and bark type” [I: 0.4658 - C: 152] compare smooth-barked and rough-barked Eucalyptus species for canopy interception and stem-flow contributions. They identify bark type and canopy density as key factors that can reduce stormwater runoff by up to 20%, providing a cost-efficient nature-based

stormwater management tool.

Sikorska *et al.* (2023) in “Rethinking urban green spaces for urban resilience. Do green spaces need adaptation to meet public post-covid expectations?” [I: 0.4382 - C: 26] survey Warsaw residents via social media on landscape images varying in greenness density and human presence. Using ANOVA and categorical regression, they show that COVID-concerned respondents favor diversifying green-space typologies (large parks for nature escape vs. small pocket parks), rejecting restrictive measures in favor of design adaptations.

Vanos *et al.* (2016) in “Hot playgrounds and children’s health: A multiscale analysis of surface temperatures in Arizona, USA” [I: 0.4144 - C: 83] evaluate surface temperatures at neighborhood (1 km), micro (6.8 m), and tactile (1 cm) scales in two Gilbert, Arizona, playgrounds using SVF (RayMan 2.1) and fisheye sky photos. They highlight material-dependent heat disparities that coarse meteorological data often mask, calling for human-scale thermal assessments in urban health studies.

3.3.3 Other Theme

Marin e Meulder (2018) in “Interpreting Circularity. Circular City Representations Concealing Transition Drivers” [I: 0.6710 - C: 95] compare four recent circular city initiatives (Reburg, r-Urban, Masdar City, Living Breakwaters) using objectivist and constructivist lenses. They argue that landscape urbanism can orchestrate holistic, scale-sensitive circularity, highlighting Living Breakwaters as exemplary for integrating ecological, social, infrastructural, sustainable cycles.

4 DISCUSSION

4.1 Urban-focused findings

The eleven urban-themed publications converge on a micro-scale inquiry, primarily investigating urban morphology and public space while explicitly linking these topics to health, socio-economic, cultural, and environmental variables (Elrahman; Asaad, 2021; Nassauer, 2023; Nassauer *et al.*, 2021; Ordeig, 2004). Urban morphology studies explore socio-spatial and temporal dynamics using composite metrics that capture built and open surfaces at the block scale (Beck; Ferasso, 2024; Elrahman; Asaad, 2021; Meng; Xing, 2019; Portal; Kerguillec, 2018; Vanderhaegen; Canters, 2017; Zhao; Weng; Hersperger, 2020). These metrics clarify the contributions of block perimeter, building outline, and volume.

Within a landscape frame, morphology is assessed across gray and green realms (Meng; Xing, 2019). “Morphotypes” emerge as regulatory planning tools to govern form and edges and to guide retrofitting of existing fabric (Carta; Gisotti; Lucchesi, 2022). Although solids, voids, and 3D form are considered, a coherent conceptual taxonomy is still lacking. Classic voices—Lynch, Cullen, Sitte, McHarg, Calthorpe—are being

revisited through ecological and data-driven lenses, offering opportunities for theoretical consolidation (Filomena; Verstegen; Manley, 2019; Jorge-huertas; Jorge-moreno, 2022; Thravalou; Philokyprou, 2021; Whitehand, 2009).

Public space research emphasizes flexibility and quotidian use, and historic urban landscapes highlight interactions between ephemeral and enduring elements via the “everyday heritage” lens (Mosler, 2019), enriching debates on aesthetics, attachment, and sense of place (Baylan, 2019; Hussein; Stephens; Tiwari, 2020; Lowenthal, 1997; Santibáñez; Cantú; Pérez, 2021). Socio-spatial and economic dynamics—such as pedestrian flows and maintenance funding—are treated as design attractors, and methods that geolocate POIs and deploy statistical clustering enhance transferability across contexts (Dempsey; Burton, 2012; Egidi *et al.*, 2020; Lai; Kontokosta, 2018; Lak *et al.*, 2020).

In the city, analyses in compact sectors and peripheries stand out, the former with a defined morphology, the latter in areas of dispersed growth, areas of expansion with more diffuse morphology and edges, and places of research for the urban theme (Carta; Gisotti; Lucchesi, 2022; Dempsey; Burton, 2012; Zhao; Weng; Hersperger, 2020). It is observed that the landscape contributes to urban design, tools, and methods in a spatiotemporal, multidimensional, and multiscale framework (Elrahman; Asaad, 2021; Ode *et al.*, 2009; Portal; Kerguillec, 2018).

4.2 Natural-focused findings

Natural-theme publications concentrate on thermal comfort, water-sensitive design, and resilience, adopting ecological frameworks combined with advanced quantitative tools—image segmentation, CFD, ENVI-met, quasi-experimental statistics, and structural equation modeling (Li; Ratti; Seiferling, 2018; Montazeri *et al.*, 2017; Morakinyo *et al.*, 2020; Vanos *et al.*, 2016).

Comfort studies demonstrate that targeted interventions (street-tree selection, shade quantification, spray-mist systems) measurably affect SVF and near-surface temperatures, supporting species -and device-specific recommendations (Hodson; Sander, 2017; Li; Ratti; Seiferling, 2018; Morakinyo *et al.*, 2020). The street canyon is consistently modeled as a three-dimensional microclimatic laboratory; SVF emerges as a unifying metric for solar radiation exposure.

Resilience research advocates adaptive, networked green and blue systems and practical management strategies that enhance connectivity and multifunctionality (Colding, 2007; Livesley; Baudinette; Glover, 2014), asking planners to link public and private greens, experimental plots, and habitat corridors. Sikorska and Hodson bridge ecology with public health and post-COVID behavioral insights, demonstrating that greener schoolyards or diversified park typologies correlate with better academic outcomes or higher perceived well-being (Hodson; Sander, 2017; Sikorska *et al.*, 2023).

Common threads across the Natural theme are multiscale framing—from territorial greening strategies to bark micro-textures—and scenario testing via simulations. Authors identify gaps in long-term performance, maintenance, and socio-economic integration—areas for future inquiry.

4.3 Other theme—circular city discourse

The single “Other” publication analyzed interrogates four “circular-city” initiatives through metabolic and governance lenses, contrasting techno-scripted eco-cities with bottom-up socio-ecological prototypes. Their comparative matrix (metabolic scope, macro-scale articulation, explicit use of the circularity label, and project recency) shows stark contrasts between technologically scripted eco-cities (Masdar) and bottom-up, socio-ecological prototypes (Living Breakwaters). The authors argue that landscape urbanism offers an inclusive, place-based bridge between the objectivist (material flows, infrastructure) and constructivist (narratives, governance) readings of circularity. Crucially, they warn that glossy “circular” representations may conceal the real political-economic drivers of urban transition.

Although it is a single publication, it signals a wider shift: coupling metabolic thinking with spatial design while demanding critical scrutiny of the rhetoric that surrounds urban sustainability labels.

4.4 Cross-cutting, dimensional, and multiscale insights

Research across the Urban, Natural, and Other themes reveals a shared conceptual architecture that integrates sociocultural, environmental, economic, and spatiotemporal dimensions; this integrative core underpins the manuscript’s original contribution by articulating how landscape reasoning can operationalize multiscale design interventions. Methodologically, the study demonstrates that microscale metrics (block-level morphology, SVF, localized thermal indices, POI distributions) are not isolated outputs but transferable primitives that, when aggregated and coupled with network-based and territorial indicators, generate scalable diagnostics for planning and design. This re-scaling logic—explicitly mapped in the review—constitutes a primary novelty: it provides a practical pathway to move from detailed, evidence-based interventions (e.g., species selection, shade optimization, micro-placemaking) to strategic, landscape-level policies that preserve ecological function while shaping urban form.

Conceptually, the work advances the field by framing adaptability, diversity, temporality, and participation as operational design heuristics rather than abstract values. By synthesizing empirical tools and variables across studies, the article proposes an actionable template for evaluating interventions according to ecological service delivery, social performance, and morphological coherence. This template foregrounds cross-theme synergies (for example, pairing thermal-comfort metrics with public-space usability indicators) and highlights measurable trade-offs and complementarities that practitioners and researchers can test in new contexts.

Finally, the review’s emphasis on methodological systematization and its composite bibliometric framing produce a distinctive epistemic contribution: a discipline-centred map that not only catalogs influential works and tools but also prescribes a coherent research agenda—prioritizing multiscale testing, longitudinal performance assessment, and integrative indicators—that can guide subsequent empirical studies and policy experiments in urban landscape and design.

By linking the three dominant research perspectives—ecological (biodiversity, water-sensitive design, resilience), technological (models, simulations, multiscale data), and participatory (perception, identity, public space)—with the three thematic categories identified in this review (Natural, Urban, Others), the study provides an integrated heuristic for both analysis and intervention. This synthesis clarifies how ecological service metrics and micro-scale diagnostics can be operationalized through technological tools and validated via participatory criteria, producing coherent interventions that span block to landscape scales. Consequently, the review not only maps existing knowledge but prioritizes a research agenda: multiscale testing of interventions, longitudinal performance assessment, and development of integrative indicators that reconcile ecological function, social value, and morphological coherence in such a way as to contribute to sustainable development.

5 CONCLUSIONS

The objective of this study was to provide an overview of the current state of research in landscape and urban design through a literature review spanning from the first use of these terms (1979) to 2024. For the Urban category, the subtopics of urban morphology and public space stood out; for the Natural category, urban comfort and resilience; and for the Other category, the circular city. These studies employed a wide range of techniques, including statistical analysis, computational methods, and geographic information systems (GIS).

The cross-cutting approach in current research is clear, as is the growing interest in citizen participation, which is essential for sustainability.

Among the most frequently used techniques were linear regression, analysis of variance, logistic and log-linear models, multivariate analysis, and structural equation modeling. Furthermore, machine learning methods and specialized software (e.g., Python, ENVI met) have become established as common tools. The research is primarily based on data sources from the internet, social media, and databases.

The scales of analysis range from territorial to microscale, with many documents addressing subtopics of climatic or landscape comfort. The study areas themselves are predominantly urban, encompassing both compact zones and expansion or peripheral areas.

The theoretical–conceptual focus on landscape and ecology has significantly influenced urban design and broadened the focus towards sustainability, with research in these interrelated areas experiencing exponential growth. It is observed that some morphological studies with a landscape focus tend to emphasize specific characteristics, instead of describing the urban form in the configuration of solids and voids, as is the approach of urban design.

Methodologically, this article encompassed the most prominent and impactful journals and documents in literature. The authors took care to include not only the most cited works—where older publications may be favored due to having had more time to accumulate citations—but also those which, in more recent times, have had the opportunity to garner substantial citations. A representative number of documents covering general aspects of urbanism and natural themes—and involving perhaps the most influential authors—were selected.

One condition that influences citation frequency is open access, which we believe should be considered

in reviews.

The main limitation of this study is its exclusive reliance on the Scopus index. A broader study could extend these findings by incorporating data from additional indices, books, and languages.

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