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Global Research Trends in Urban Waterfront Redevelopment and Quality of Life: A Bibliometric Analysis (2000–2025)

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ABSTRACT

This paper presents a bibliometric and thematic analysis of global research on urban waterfront redevelopment and its relationship with quality of life (QoL) published between 2000 and 2025. Using publications indexed in Scopus and Web of Science, the study employs VOSviewer to examine publication trends, intellectual structures, thematic clusters, and patterns of international collaboration. The results reveal a clear conceptual shift from real estate-driven redevelopment toward broader socio-ecological priorities, including sustainability, climate resilience, blue-green infrastructure, and public health. Rather than empirically validating impacts, the literature increasingly frames waterfronts as strategic spaces for enhancing urban livability. Four dominant thematic clusters are identified: (1) sustainable planning and climate adaptation; (2) ecosystem services and environmental restoration; (3) quality of life and livability; and (4) governance, participation, and place attachment. Despite the growing body of research, significant gaps remain, particularly in fast-growing coastal cities, where empirical evidence is limited. Regional disparities are also evident: China, the United States, and European countries dominate academic production, while cities in the Gulf and Middle East remain underrepresented despite substantial waterfront investments. The findings highlight the need for broader multilingual data sources, increased use of empirical and mixed-methods research, and stronger regional and international collaboration to advance both theoretical and practical knowledge. Overall, the analysis positions waterfront redevelopment as a key component of contemporary urban livability discourse, while cautioning against assumptions of empirically confirmed effects on QoL.

Keywords: Urban waterfront redevelopment; Quality of Life (QoL); Sustainable urbanism; Livability; Bibliometric analysis; VOSviewer; Climate resilience

INTRODUCTION

Urban waterfronts have shifted from predominantly industrial and port-related functions to vibrant public and mixed-use spaces, becoming key catalysts for urban regeneration worldwide [1]. Cities have, in the past several decades, become more aware that waterfront rehabilitation can be used to positively impact the quality of life in cities by improving the quality of the environment around the place, offering recreational facilities, and strengthening the sense of the city. The example of Baltimore, London, and Barcelona is international, and it is possible to show

how a reconstructed waterfront can trigger regeneration in the city and enhance the quality of life. As a result, the former port and industrial locations are being converted to accessible and sustainable urban waterfronts, as a more general port-to-city transformation.

One of the motivating factors behind the redevelopment of the waterfront is the need to have an enhanced urban quality of life. Reinvented waterfronts are also fully inclusive of parks, promenades, cultural amenities, and recreational amenities that encourage healthier lifestyles and daily well-being. These spaces help in making cities much more livable by reconnecting the cities with water, enhancing social interaction, and improving the quality of the environment by restoring it [2]. Nature and urban space have been demonstrated to contribute to physical and mental well-being [1,3], whereas the transformation of the brownfields into beautiful places can help eliminate urban blight and environmental degeneration [3,4]. Urban quality of life is an inter-dimensional concept that covers both objective and subjective understanding of well-being [5], and the enhancement of it is one of the key goals of urban regeneration planning [6]. Nevertheless, researchers warn that the benefits of redeveloping the waterfront are not necessarily inclusive; in the case of redevelopment that promotes the interests of the elites, quality-of-life advantages might be distributed unequally [1]. Therefore, development of waterfronts and quality of life are related not only to the design and economic performance, but also to social inclusion and equity.

Overall, in the late twentieth century, waterfronts have changed into more cultural, leisure, and sustainable development places [1]. Since the 1970s, North American and European cities led the way in redeveloping deteriorating port areas, which became the main focus of regeneration policies by the 1980s and were later replicated across the world [7,8]. In addition to physical renewal, waterfront revitalization also responds to heightened urban demand,s including, but not limited to, increasing the public space, encouragement of new economic pursuits like tourism and creative economy, and reconnecting residents with water landscapes [4]. The redevelopment of the waterfront can be seen as an improvement in the environment of the location as well as the economic revitalization carried out in high-profile projects like Cheonggyecheon in Seoul, London Docklands, and Bilbao [4]. Therefore, the present-day waterfronts can be regarded as the main platforms in terms of the combination of social, economic, and environmental goals of sustainable city transformation.

In line with their increased practical significance, the subject of urban waterfront has been the focus of rising scholarly interest, especially in the years 2000-2025. The literature on this shows a consistent increase in literature, as the world becomes familiar with waterfront developments, and there has been more interest in sustainable and livable cities as a focus of policy [7,8]. The nature of the field has intensified interdisciplinarity, which is based on urban planning, architecture, environmental studies, economics, and sociology. The latest studies focus more on the quality of life, social justice, urban health, and ecological balance as the main aspects of waterfront regeneration [1,7]. Although this has grown, a lot of the literature is still characterized by single case reports, and little synthesis has been done to relate world trends to tangible quality-of-life implications [9].

On this basis, there remain significant gaps in knowledge. Although numerous studies claim that redevelopment of the waterfront would make living better or more sustainable, they often fail to provide details on how those betterments would take place and how the economic, environmental, and social goals would be balanced. It is also not clear in what circumstances waterfront redevelopment yields real changes in the everyday life of the residents, as well as how the benefits are distributed evenly. The solution to these gaps is integrative research that incorporates both quantitative and qualitative perspectives.

This research paper addresses these problems by examining the trends in urban waterfront redevelopment in the world between 2000 and 2025 and the connection of these trends to the quality of life through bibliometric and thematic analyses. It follows the development of the concept and evaluates its implications as per the conceptualized frameworks, such as livability, Triple Bottom Line, and place attachment. Connecting the conceptual advances to the empirical findings, the study is able to fill one of the gaps in the literature, the paucity of knowledge regarding the interrelationships between waterfront redevelopment processes and quality-of-life outcomes [2,10].

The study will map the trends in global research, determine the thematic strengths and gaps, and synthesize empirical evidence on the social, economic, environmental, and cultural effects of redeveloped waterfronts. All these goals have the power to bridge the gap between quantitative mapping and qualitative understandings of the role that waterfront redevelopment has to play in making urban futures more sustainable, resilient, and inclusive. It is believed that the results will contribute to interdisciplinary urban studies and offer feasible recommendations to practitioners and policy makers willing to improve the quality of life using waterfront redevelopment [4,9].

THEORETICAL AND CONCEPTUAL FRAMEWORK

The connection between the redevelopment of the urban waterfront and the quality of life is a phenomenon that requires a potent theoretical assumption. Some of the main concepts and theories that elaborate on this relationship are addressed in this section, chief of them is the role of governance in this relationship, the place

attachment theory, livability and quality of life, and principles of sustainability in the city. When combined, these views create a theoretical basis for the ways in which converting waterfronts to community urban space can enhance the well-being of the community.

Quality of Life and Urban Livability

Quality of life (QoL) in an urban setting is the well-being of individuals based on their environment, which can be objective and subjective in satisfaction [6]. The multifaceted notion of QoL measures how effectively a city serves citizens' requirements in housing, jobs, health, education, environmental quality, and social belonging. [6]. Urban QoL includes social, environmental, and service conditions that support citizens' well-being. Urban planners prioritize quality of life to "promote the general welfare" and public well-being through built and natural environment improvements [11]. In regeneration initiatives, one of the main indicators of success is if the intervention improves inhabitants' quality of life and makes the region more habitable [6]. Livability frameworks divide QoL into domains and use metrics to track development.

By increasing residents' quality of life, waterfront rehabilitation addresses environmental degradation, limited access, and insufficient social connection. However, a renovated waterfront may include clean, beautiful public spaces, connectivity, and amenities that improve daily life. Waterfront parks, promenades and cultural facilities in an industrial environment enhance leisure and socialization and therefore make people happier, and enrich their community [2,4]. QoL has such environmental enhancements as water quality, green landscaping, pollution reduction, which health and comfort. A properly implemented waterfront development can also enhance local identity and pride (people feel good about their city), enhancing morale and well-being. The livability frameworks in city planning contribute towards the environmental quality, social well-being, and equity of services. It is a compromise between hardware (improvement of infrastructure, place, environmental factors) and software (community cohesion, cultural living, security) in order to boost QoL [6]. The waterfront programs can serve to make the place livable by increasing the amount of space in the park, surveying residents, reducing crime and blight, and other social and environmental measures [6]. The long-term inhabitants might treasure the cheap housing and cultural heritage whereas the newcomers might treasure the recreational opportunities. The planners are supposed to possess a wide-range of the idea of livability and consult the community to make sure that the project is beneficial to all the stakeholders.

Place Theory

Aggression and attachment, emotional and psychological, to place is a primary aspect of quality of life. Place attachment theory describes how individuals and communities learn to have emotional and symbolic attachment to certain places and the effect of this attachment on well-being and behavior [12]. This theory is especially applicable in the situation of waterfront redevelopment because in that case, the redevelopment processes can transform meanings and attachments related to the waterfronts. Rebuilding that appreciates the local history, culture, and social needs can contribute to place attachment in residents and, therefore, the overall life quality.

Research in environmental psychology demonstrates that stronger place attachment is associated with improved well-being, social cohesion, and pro-social and pro-environmental behaviors [12–14]. The people, who feel emotionally attached to their city or neighborhood, are more likely to report greater physical and mental health, better social bonds, and more pride. In this regard, an effective redevelopment of the waterfront with references to cultural features, historical motifs, or humanistic design can bring community well-being that is not limited to the physical enhancement alone.

The symbolic significance of urban waterfronts is frequently intensely personal as it is a location of national memory, and a place of shared identity. These meanings can be supported by redevelopment strategies that recognize these meanings via heritage conservation, cultural programming, or context-sensitive design. On the other hand, the redevelopment, which is a result of generic commercial model or prohibitionary behavior, can destroy the social connections that are already established and lead to the sense of displacement. The available empirical and theoretical evidence implies that to optimize quality-of-life benefits of waterfront redevelopment, human-scaled design, authenticity, and inclusive access must be considered, so that waterfronts could be valued and incorporated components of the local community [12].

Sustainable Development and the Triple Bottom Line

Modern redevelopment of waterfronts is often shaped by the principles of sustainability that aim at balancing between environmental, social, and economic goals according to Triple Bottom Line (TBL) framework [15,16]. There are waterside projects in this view that seek to provide economic stimulation of the local economy, ecological systems, and social conditions by amenities, homes, and services. This balance has been strongly believed to be necessary to ensure long-term enhancement of urban quality of life [1].

Waterfront redevelopment is being developed in many cities as an example of sustainable urbanism focusing on environment, cultural conservation, and the creation of accessible open spaces [1]. Such projects are capable of positively impacting the quality of life when implemented successfully, by improving the environmental quality by creating jobs and services, and having a positive impact on social interaction due to the presence of a lively public and cultural environment. In this regard, the sustainable waterfronts are both the contributors to the livability of the urban setting and resilience in the long term.

However, not all waterfront projects fully realize TBL principles. These are being expressed by scholars as green gentrification in which environmentally branded redevelopment is disproportionately rewarding to the higher income groups at the expense of vulnerable communities [1]. This explains why proper planning and policy paradigms that promote environmental recovery, economic well-being, and social justice are necessary. Most of the modern waterfront practices thus embrace clear sustainability targets and performance indicators, such as environmental quality, open space access, employment, and affordable housing [4,6]. This integrated approach is important to waterfront redevelopment because sustainability outcomes can be converted into inclusive and enduring benefits of the urban environment.

Governance and Participatory Planning

The government of cities is decisive in redeveloping waterfronts because these projects imply the coordination of a number of institutions and interests. Directly associated with quality-of-life outcomes is governance, which is defined as institutional frameworks and decision-making processes dictating the planning and implementation. Proper governance can guarantee that the redevelopment is inclusive, transparent, and is in tandem with the aim of sustainability, unlike a weak or top-down governance that usually results in social imbalanced developments, which are driven by self-serving interests [1,7].

Effective development of waterfronts is often based on collaborative governance systems involving the combination of public, private and community participants. The development of Toronto waterfront, catalyzed by the tri-government agency Waterfront Toronto, demonstrates how governance frameworks that are based on triple bottom-line frameworks can inform redevelopment towards more holistic social outcomes and not necessarily market-oriented results [17]. Studies indicate that new methods of governance, including international design competitions and organized community participation, can help to improve the quality and social acceptability of redevelopment projects. To illustrate, design competitions within the Toronto redevelopment of the waterfront have been demonstrated to be creative and more socially responsive urban space [1].

Good governance also assists in balancing competing interests and adjusting the redevelopment plans in the long project durations. Participatory and flexible arrangements enable plans to accommodate arising issues, including cost-effective housing, heritage protection, and climate resilience, and hence protect quality-of-life agendas [1,18]. Contrastingly, little community participation usually creates unused or isolating spaces that reduce livability. As a result, governance is becoming viewed as one of the primary aspects of sustainable waterfront redevelopment because responsible and participatory decision-making processes can assist in avoiding socio-spatial marginalization and making quality-of-life advantages more fairly allocated [1].

Conceptual Framework and Integrative Discussion

Summing up, a full theoretical understanding of global waterfront redevelopment and its effects on quality of life must include all these lenses. Urban sustainability and the triple bottom line theory remind us that we can only thrive by balancing environmental, social, and economic goals. The ultimate human success metrics are livability and quality of life. Place attachment theory explains the emotional benefits of inclusive, meaningful waterfront areas. Finally, governance concerns show how to produce fair and durable results. When a waterfront project is planned and executed with sustainable, livable, and community-centered principles and supported by strong governance, it is more likely to improve the city's quality of life. The following sections of this essay will employ theoretical insights to evaluate bibliometric and thematic findings to bridge the gap between theoretical frameworks and actual waterfront development patterns from 2000 to 2025.

METHODOLOGY

Bibliometrics refers to a measurable or statistical description of a set of related documents within the literature [19,20]. Although the term ‘scientometrics’ was coined in the 1960s by Vassily V. Nalimov, it has become increasingly popular and is applied to the study of science: growth, structure, interrelationships, and productivity. Scientometrics is associated with and shares interests with bibliometrics and informatics [21]. The quantitative examination of literary works to identify patterns and trends in research activity is known as bibliometrics. Although the approach's intellectual underpinnings go back to the middle of the 20th century, it has become more widely

accepted in recent years due to the development of sizable bibliographic databases and better analytical tools. In fields related to urban development and sustainability, bibliometric reviews have been used to map scientific knowledge and research evolution. For example, a recent analysis of "quality of urban life" literature combined Scopus and Web of Science data to examine 609 publications on urban livability [22]. These studies highlight the importance of bibliometrics as a tool for synthesizing interdisciplinary areas and creating knowledge gaps.

In this research, the model of scanning, curating, and analyzing of bibliometric reviews was followed as suggested by Khanra et al. In the scanning phase, the identification of relevant literature was done systematically by carrying out extensive searches in Scopus and Web of Science databases [23,24]. To map the patterns of collaboration, track the evolution of themes, and find out knowledge gaps concerning the redevelopment of the urban waterfront and quality of life, bibliometric methods were used.

The first dataset was narrowed down in the curating stage with strict inclusion and exclusion criteria based on the research scope to be repowered. It was then analyzed in the analyzing phase with the help of descriptive bibliometrics and science mapping to show the intellectual form of the field and its thematic development. Co-authorship network, citation and co-citation analysis, bibliographic coupling, and co-word analysis were also used in the analysis to extract influential works, collaborative relationships, clusters of documents, and repeated themes [25]. The VOSviewer open-source software was used to perform network visualization as it is well adapted to processing large bibliometric data [26]. All these processes, in turn, allowed obtaining a collaboration map, citation networks, and co-occurrence patterns of keywords, which are the conventional best practices in bibliometric review studies.

The current research will use the approach described by Alhowaish [2025] [23], which is organized into three steps: scanning, curating, and analyzing. During the scanning stage, the search strings and keywords that were created were applied to identify the relevant studies, such as journal articles, book chapters, and conference proceedings. The curating step was the refinement of this data based on inclusion and exclusion criteria aimed at making sure it matches the purpose of the study. Lastly, during the analysis step, shortlisted records were analyzed by applying a mixture of bibliometric and thematic strategies. Analyzing toolskit had the bibliographic, citation, co-authorship, and co-citation analyses, and country-level publication and collaboration maps were built to evaluate international networks and partnerships in urban waterfront redevelopment and quality-of-life scholarship [24,27].

Scanning Phase

At the initial level, a general literature review was carried out in the Scopus and Web of Science Core Collection databases to identify all pertinent studies on the topic of urban waterfront redevelopment and quality of life in the last quarter-century [8,22]. The search date range included January 2000 to October 2025, as this time frame was selected to include long term developments and recent post 2015 research surges in line with global sustainability agendas (e.g., the Sustainable Development Goals). We searched article titles, abstracts, and keywords using a Boolean query designed to encompass the di-verse terminology in this domain: [("URBAN WATERFRONT*" OR "COASTAL CITY" OR "HARBOR REDEVELOPMENT" OR "URBAN SEAFRONT" OR "WATERFRONT REGENERATION") AND ("QUALITY OF LIFE" OR "LIVABILITY" OR "WELL-BEING" OR "URBAN SUSTAINABILITY")].

Peer-reviewed articles and reviews published in the English language were considered only to have high-quality and similar sources [28]. The two databases were searched to reduce coverage bias, as Scopus and Web of Science include the same journals, with some overlap and some exclusions. The search was combined and re-turned 363 records (229 in Scopus and 134 in Web of Science). To find papers in planning, architecture, environmental studies, and other relevant fields that directly link waterfront development to well-being or quality of life, our initial search was deliberately broad. Because each source may index variations of international research out-puts, the inclusive search technique and database selection maximize recall of pertinent literature.

Curating Phase

In the second stage, the collected records were refined by applying the inclusion/exclusion criteria below to ensure alignment with the study's objectives:

1. Duplicates across retrieved records.
2. Studies that were clearly out of scope or lacking in scholarly merit.
3. Publications that used waterfront terms in a purely metaphorical sense or did not substantively address the nexus of waterfront redevelopment and quality of life (for example, papers focusing solely on technical harbor engineering with no social or livability dimension were deemed irrelevant).
4. Any records without an abstract or with incomplete bibliographic information.
5. Non-English or non-peer-reviewed entries (though the latter were largely ab-sent due to the initial search filters).

After applying these criteria, 121 records were removed as irrelevant or ineligible. This left 242 documents for full-text review. Each of these remaining studies was then examined in detail (by reading the full text or extended abstract) to confirm that it in-deed investigates urban waterfront redevelopment (or closely related concepts such as coastal urban regeneration) in the context of quality of life, livability, well-being, or urban sustainability outcomes. This selection process is summarized in a PRISMA flow diagram (Figure 1) and aligns with the Preferred Reporting Items for Systematic Re-views and Meta-Analyses guidelines [29,30]. The clear screening and filtering steps illustrated in Figure 1 ensure that the analysis relies on a relevant, high-quality set of publications [31].

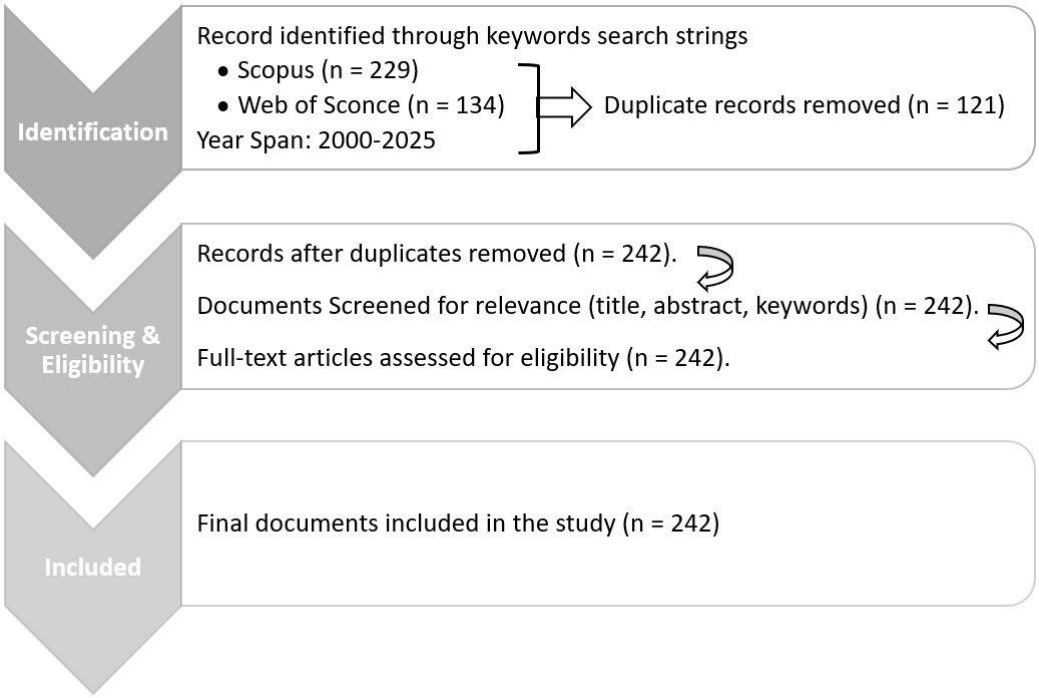

Figure 1. PRISMA flowchart for recording the relevant papers from the searches. Adapted from [31].

Predicted Trends

Before conducting the bibliometric analysis, the study formulated several expected research patterns based on an initial review of the literature. It was anticipated that global scholarship on urban waterfront redevelopment would be dominated by themes related to economic revitalization, iconic design, and tourism-led development, reflecting prevailing development priorities. In contrast, issues of community inclusion, social equity, and direct quality-of-life outcomes were expected to receive more limited attention due to the emphasis on physical transformation and economic growth. It was also anticipated that international collaboration and authorship networks would be concentrated within a small number of prominent academic centers, particularly in the United States, the United Kingdom, and China. These expectations served as an interpretive framework for assessing the bibliometric results and determining the extent to which the empirical findings aligned with or challenged the initial assumptions.

RESULTS

The bibliometric dataset spans 25 years, from 2000 to October 2025, capturing the gradual emergence and acceleration of research on Urban Waterfront Redevelopment and Quality of Life worldwide. A total of 242 documents were retained in the final dataset after a rigorous curation process, comprising 174 journal articles, 28 book chapters, 28 conference papers, 9 review papers, 2 books, and 1 conference review. The majority of the records are peer-reviewed journal articles, as shown in Table 1, which highlights the dominance of formal scholarly outputs in shaping the intellectual foundation of the field, and a minor proportion are review and conference articles (Table 1). The dataset indicates a strong differentiation of the output of the research across environmental, social, and spatial levels of urban planning. The increasing publications in chapters and conference papers, however, signify that there is an ongoing ex-change and interdisciplinary expansion in the academic scene of urban studies, landscape design, and environmental management.

Table 1. Overview of Study.

Indicator	Value
Total documents included	242
Document types	174 journal articles, 28 book chapters, 28 conference papers, 9 reviews, 2 books, 1 conference review
Timespan of publications	2000 – October 2025 (25 years)
Author-supplied keywords	1,091 terms (849 unique)
Keywords Plus (from cited references)	2,825 terms (1,578 unique)
Total contributing authors	949
Author appearances	2,116
Average authors per document	8.74
Average co-authors per document	7.74
Collaboration index	3.92
Average citations per document	14.06

With 2,116 author appearances and 949 contributing authors, the authorship pro-file shows an average of 8.74 authors per document and a collaboration index of 3.92. That's indicating a high level of multi-authored publications within the dataset [31]. The mean citation rate (14.06 per publication) indicates the increased academic and policy significance of world and regional planning discourses.

Figure 2 shows that the temporal trends support the increasing scholarly interest in this subject. As illustrated in Figure 2, publication output remained low between 2000 and approximately 2014, the amount of output was extremely small (in most cases, less than five papers per year), which is a sign of a nascent phase in research. In the mid-2010s, the discipline, in line with the global sustainability agendas, began to experience rapid development. Figure 2 shows a marked increase in publication output after 2015, with a clear rise continuing into 2025. This upward trend reflects the growing volume of research activity in the field. Together, these indicators show an expanding and increasingly collaborative body of literature on urban waterfront redevelopment and QoL.

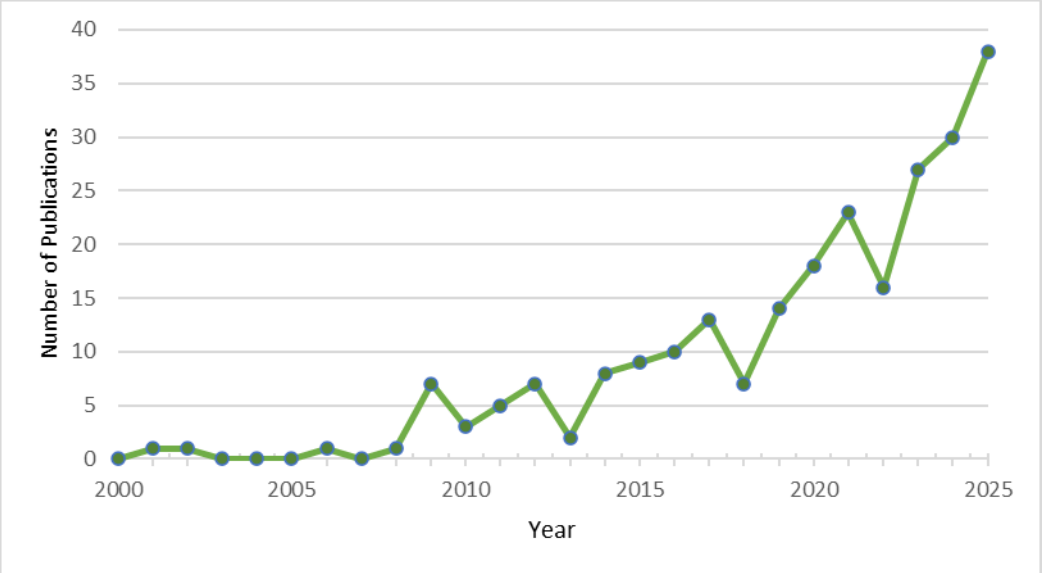

Figure 2. Publication Trends on Urban Waterfront Redevelopment and Quality of Life Worldwide (2000–2025).

Thematically, the dataset includes contributions spanning environmental sustainability, spatial access, and socio-cultural topics. The increase in multi-authored publications reflects a broad disciplinary range within the field. This interdisciplinary pattern is reflected in the distribution of document types in Table 1 and the rising publication activity depicted in Figure 2.

Bibliometric Analysis

Citation Analysis

The citation analysis is a popular bibliometric method of evaluating the intellectual and visibility of a publication based on its reference rate by other publications [32]. Citation analysis, in the context of urban waterfront redevelopment and quality of life, offers information about powerful journals, articles, and authors, as a complement to bibliographic coupling, showing the trends in intellectual influence.

This study examined citation tendencies of a dataset of 242 articles on the Excel Data Analysis Tool in order to reveal the most influential journals in the field [33,34]. Table 2 displays the top ten most cited journals, with the Science of the Total Environment getting the most citations, followed by Ocean and Coastal Management, Urban Forestry, Urban Greening, and their related outlets. The journals formulate important areas of research on environmental, spatial, and socio-economic aspects of urban waterfront development. The extent of the integration of sustainability science, urban design, and environmental management of the field is further indicated by the prevalence of interdisciplinary journals, including Landscape and Urban Planning, Journal of Cleaner Production, and Sustainable Cities and Society.

Table 3 presents the top 10 authors, according to the number of publications in the data set under analysis (242 studies). The results presented in Table 3 indicate that the most prolific authors are Wang, Liu, and Zhang, as all of them are interested in the subject of the research on the urban waterfronts and the quality of life (QoL) during a long period. The fact that Li, Chen, and Yang are among the authors underlines the focus of East Asian literature on ensuring that waterfronts are developed sustainably and international environmental planning. These authors are also displayed repeatedly in the dataset and are associated with waterfronts and QoL through several publications, as in Table 3.

Table 2. Top 10 journals based on the number of citations within 242 studies.

Rank	Journal Title	Citations	Publisher
1	Science of the Total Environment	202	Elsevier
2	Urban Forestry and Urban Greening	187	Elsevier
3	Ocean and Coastal Management	173	Elsevier
4	Landscape and Urban Planning	166	Elsevier
5	Journal of Cleaner Production	154	Elsevier
6	Sustainable Cities and Society	149	Elsevier
7	Marine Pollution Bulletin	85	Elsevier
8	Professional Geographer	79	Taylor & Francis
9	Theoretical and Applied Climatology	74	Springer
10	Sustainable Development	68	Wiley

Table 3. Top 10 authors based on the dataset analyzed (242 studies).

Author	Number of Publications
Wang, Guangjie [35]	24
Liu, Honghua [36]	21
Zhang, Hui [36]	18
Guerri, Giulia [37]	17
Chen, Guanghao [38]	12
Yang, Cunjian [35]	12
Huang, Xinjie [39]	11

Wu, Di [40]	10
Zhou, Xingcan [41]	8
Zhao, Jingfeng [42]	7

Keyword Co-Occurrence Analysis

One of the fundamental bibliometric methods for revealing the thematic patterns and research trends in a field of science is keyword co-occurrence analysis. This would help researchers identify conceptual connections, knowledge clusters, and research frontiers by analyzing how often specific keywords co-occur across publications [26,43]. It is particularly effective for mapping the intellectual structure of interdisciplinary fields, as it highlights the relative prominence and interrelation of key themes over time [44].

In this paper, the VOSviewer software was applied to demonstrate the relation-ships between the keywords and perform co-word analysis [26]. The ensuing network diagram depicts the conceptual and thematic concentration of recurrent research topics, the intellectual organization of the literature, and the proactive progression of re-search topics over time [28]. The method of analyzing the semantic frames of the literature on urban waterfronts and quality of life (QoL) can be successfully applied to establish the correlation between, for example, the image of environmental perception and life in the context of contemporary urban studies.

The Co-occurrence analysis of all Keywords was carried out under the following criteria: at least 5 occurrences of a keyword and at least 5 cluster sizes, to ensure consistent results and similar findings with the prevailing bibliometric research parameters. As shows in Figure 3, it is analyzed that the keywords "sustainable development" (frequency = 40), "quality of life" (39), "coastal cities" (37), "urban planning" (32), "cli-mate change" (29), "sustainable" (23), and "urban area" (20) have the most significant part in the field, which indicates the central conceptual anchors around which the literature is organized. That shows their prominence across the dataset.

In support of this, 2111 keywords were entered into VOSviewer to generate a co-occurrence network (Figure 3). 89 keywords that passed the minimum co-occurrence threshold of five were entered into VOSviewer. The five clusters visualized in Figure 3 map the core thematic areas of the field, distinguishing environmental resilience, spatial planning, governance, urban growth, and well-being as separate but interconnected domains:

- Cluster 1 (red, 19 items) is based on the coastal cities, ecosystem services, and sea-level change and includes the environmental and ecological aspects of climate risks and coastal resilience.
- Cluster 2 (green, 18 items) emphasizes urban planning, waterfront development, and sustainability, and takes a spatial and design approach that encourages habitable, resource-saving waterfronts.
- Cluster 3 (blue, 16 items) is concerned with sustainable development and urban growth and focuses on the connection between policy and environmental management in driving sustainable urban growth.
- Cluster 4 (yellow, 16 items) comprises of decision-making and economic development, which depicts the governance and socio-economic emphasis on urban transition management of sustainability.
- Cluster 5 (purple, 11 items) includes quality of life and well-being, which characterizes the human and social aspect of relating the environmental quality to livability and population health.

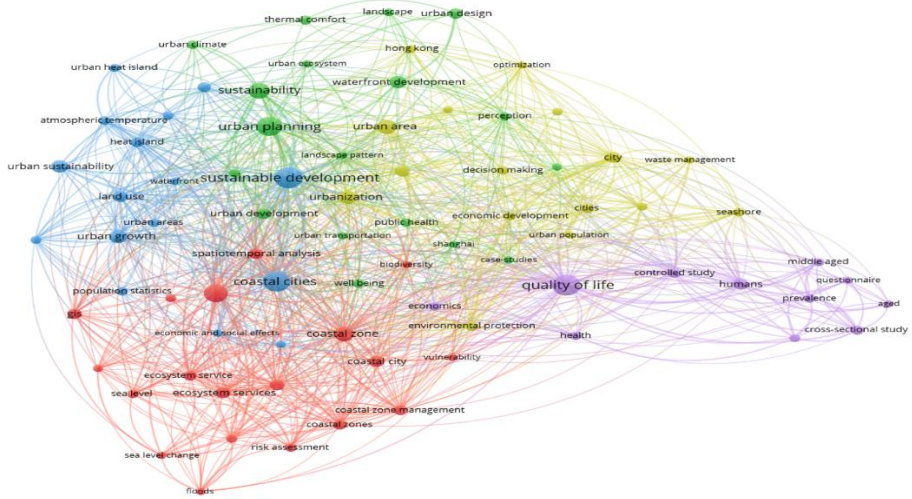

Figure 3. Network visualization of the co-occurrence of all keywords. This network shows how keywords co-occur across publications [29]. The bigger nodes are the most common keywords, and color-coded groups disclose the overall theme areas, including waterfront, coastal cities, and quality of life.

Together, these clusters represent the primary groups of recurring themes identified in the keyword network, each corresponding to a set of related topics present across the analyzed publications.

The criteria were used to conduct Co-Occurrence Analysis using Author Key-words to provide a consistent result and similar findings with the accepted standards of bibliometric research. In addition to this, 849 gathered keywords were employed to build a network of co-occurrence in VOSviewer (Figure 4). 13 of these keywords had satisfied the minimum co-occurrence requirement of five. Figure 4 further clarifies the intellectual structure of the field, with four author-keyword clusters highlighting recurring combinations of concepts that frequently co-appear across studies:

- Cluster 1 (red, 5 items): coastal cities, coastal city, ecosystem services, nature-based solutions, and waterfront.
- Cluster 2 (green, 3 items): quality of life, sustainable development, and urban waterfront.
- Cluster 3 (blue, 2 items): climate change and sustainability.
- Cluster 4 (yellow, 2 items): urban planning and urban sustainability.

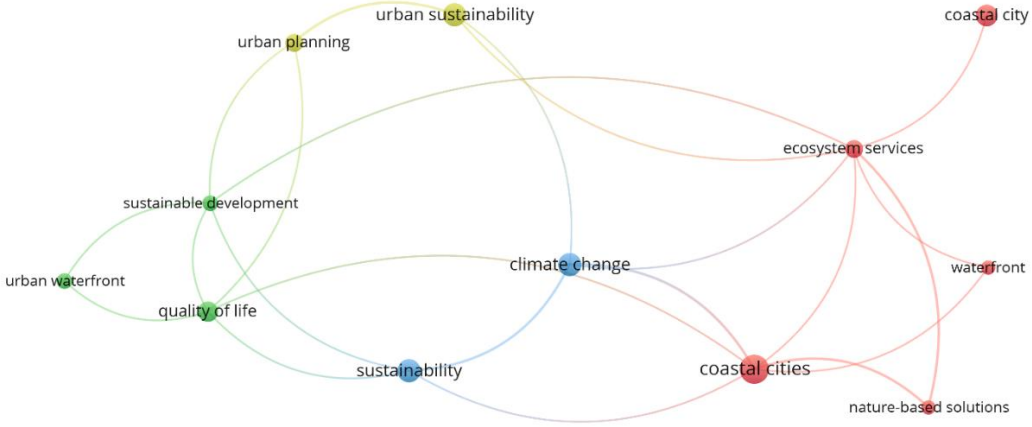

Figure 4. Network visualization of the co-occurrence of author keywords. This network shows how keywords co-occur across publications [29].

Together, these clusters reveal an interconnected research landscape that bridges environmental resilience, spatial planning, and human well-being, which reflects the interdisciplinary evolution of urban waterfront and QoL research.

The search term co-occurrence analysis denotes that research on urban water-fronts and quality of life (QoL) revolves around four themes regarded as interconnected and are identified as environmental sustainability, urban planning, climate resilience, and human well-being. New topics like nature-oriented solutions and urban waterfronts also represent a growing attention to adaptive design and livability, which are interdisciplinary and policy-oriented, and on sustainable coastal urban studies.

Co-Citation and Intellectual Structure

Co-citation analysis determines the frequency of joint citation of two documents within other publications and indicates the intellectual and thematic connections that establish a research field [45,46]. It highlights the primary theoretical schools, methodological traditions, and emerging subfields that collectively shape scholarly discourse [47,48].

To illustrate the intellectual structure of the research on urban waterfront and quality of life (QoL), in this research, VOSviewer was employed to create a co-citation network based on the analyzed set of data, visualizing the intellectual structure of these two concepts. The network showed two primary clusters of co-cited references (Figure 5), one of which is indicative of divergent thematic trends in the literature, including reclaiming the city and sustainability, as well as urban waterfronts:

- Cluster 1 (red): Urban Waterfront Redevelopment, including pieces by Avni, Chang, and Bunce that highlight the socioeconomic transformation of coastal areas, cultural renewal, and the revitalization of post-industrial waterfronts.
- Cluster 2 (green): Sustainable Urban Design Frameworks, including studies by Fusco Girard and New Waterfront, emphasizing sustainability principles, urban form, and integrated planning for resilient and livable waterfronts.

Together, these clusters represent two main groups of frequently co-cited references within the dataset.

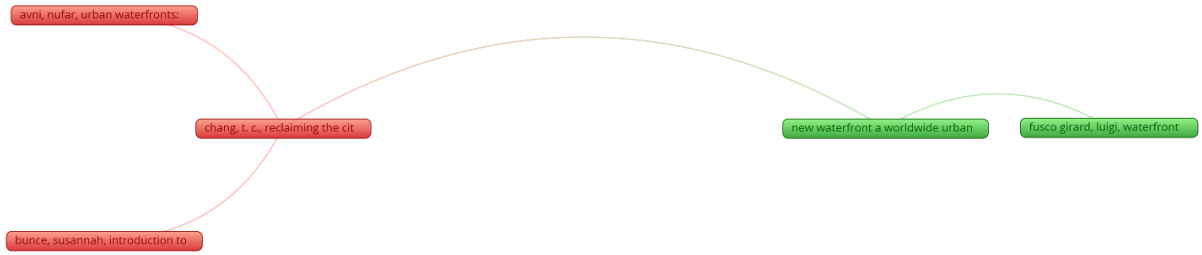

Figure 5. Co-cited references network of documents. This figure depicts how often documents are cited together within the dataset.

Figure 6 expands this structure by showing four broader disciplinary clusters, indicating how ecological science, climate research, planning theory, and environmental design collectively inform the literature. When taken as a whole, these clusters demonstrate the interdisciplinary basis of research on urban waterfronts and quality of life (QoL):

- Cluster 1 (red): Landscape and Urban Planning: Journals like Landscape and Ur-ban Planning and Habitat International focus on urban sustainability and environmental management.
- Cluster 2 (green): Urban Studies and Climate Research: Includes Urban Studies and Climate Change, emphasizing urban transformation and climate adaptation.
- Cluster 3 (blue): Environmental Science: Features Science of the Total Environ-ment, addressing ecological resilience.
- Cluster 4 (yellow): Energy and Atmospheric Studies: Encompasses Energy and Buildings and Atmospheric Environment, focusing on energy efficiency and urban climate.

Figure 6. Co-cited sources network of documents. This figure depicts how often documents are cited together within the dataset.

Country Publications, Affiliations, and Collaboration Map

In this section, the bibliometric analysis of the research on urban waterfront and quality of life (QoL) at the national level is conducted with the focus on the presentation of publishing outputs, institutional affiliation, and global collaboration networks. The task of the analysis is to demonstrate the geographical distribution of scientific contributions as well as the pattern of cross-national collaboration in the production of knowledge in this multidisciplinary topic [24].

To discover the relationship between countries through collaboration, co-authorship data were analyzed using VOSviewer to identify regional and global re-search interactions. As shown in Tables 4 and 5, the analysis of co-authorship data shows that publication outputs and collaboration networks are concentrated in several countries, with China and the United States having the highest number of publications and citations [28,49].

Tables 4 and 5 summarize the Top 10 contributing countries ranked by number of publications and total citations.

Table 4. Top 10 countries based on the number of articles.

Country	Number of Articles
China	72
United States	30
India	20
Italy	13
Australia	11

Hong Kong	10
Spain	9
Canada	8
Turkey	6
Japan	6
Brazil	6

Table 5. Top 10 countries based on the number of citations.

Country	**Total Citations**
China	906
United States	497
Netherland	339
Italy	302
Hong Kong	190
Portugal	184
Canada	182
United Kingdom	178
Indonesia	171
Australia	150
Turkey	91

Moreover, five large clusters of nations actively contributing to research on urban waterfronts and quality of life (QoL) are identified through bibliographic coupling analysis in VOSviewer. These clusters represent separate but related regional research networks (Figure 7).

- Cluster 1 (red) includes Argentina, Chile, India, Portugal, and Spain, and represents emerging economies focused on urban transformation and coastal resilience within local and regional development contexts.
- Cluster 2 (green) comprising Australia, Indonesia, Italy, the Netherlands, and the United Kingdom, which reflects strong collaboration in urban sustainability, planning innovation, and climate adaptation, particularly within European and Asia-Pacific networks.
- Cluster 3 (blue) groups Brazil, Canada, Germany, and Hong Kong, emphasizing environmental management and socio-ecological approaches to coastal urban systems.
- Cluster 4 (yellow) includes Egypt, South Korea, Turkey, and the United States, highlighting policy-oriented and applied research linking sustainable development with urban governance and livability.
- Cluster 5 (purple), which links China and Japan and is distinguished by high publication output, significant citation effect, and widespread international collabo-ration, especially in sustainability and urban resilience studies.

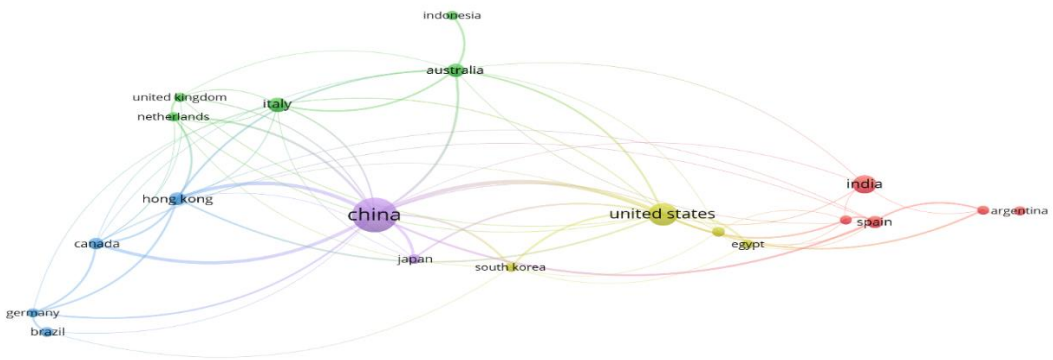

Figure 7. Collaboration network of countries. This figure shows patterns of international collabo-ration in urban waterfront and QoL research.

Overall, the network shows a highly interconnected yet globally dispersed research landscape, with China and the US acting as key hubs that connect regional clusters and enable cross-continental scientific interchange in the developing field of urban waterfront and QoL research.

Finally, the bibliometric analysis of document references with the help of VOSviewer is used to define the most influential papers that have contributed to the development of the sphere of urban waterfronts and quality of life (QoL). The visuali-zation shows clusters of the most frequently cited works, with node size indicating citation frequency and color indicating the average publication year (Figure 8).

Figure 8 displays the most frequently co-cited works, including Frantzeskaki (2014), Alcoforado (2009), and Bunce (2009), which form core references in the field, which provide theoretical and methodological perspectives on the concepts of urban resilience, adaptation to climate change, and the sustainable development of water-fronts. These experimental works equipped the theoretical background of integrating the environmental and social factors into city planning. More recent, influential liter-ature (e.g., Bozdogan Sert, 2021; Morabito, 2021; Buchori, 2018a-b) deals with sustain-ability transitions, resilient urban design, and the use of nature, which suggests that the field has moved to applied, multidisciplinary studies. The overlay visualization identifies recent frequently co-cited works published between 2020 and 2025, indicating increased citation activity around topics such as climate resilience, urban well-being, and green-blue infrastructure.

In general, the citation network shows an established, networked knowledge base, where foundational studies continue to shape new research directions and relation-ships among the study of urban design, environmental management, and livability in waterfront and coastal settings.

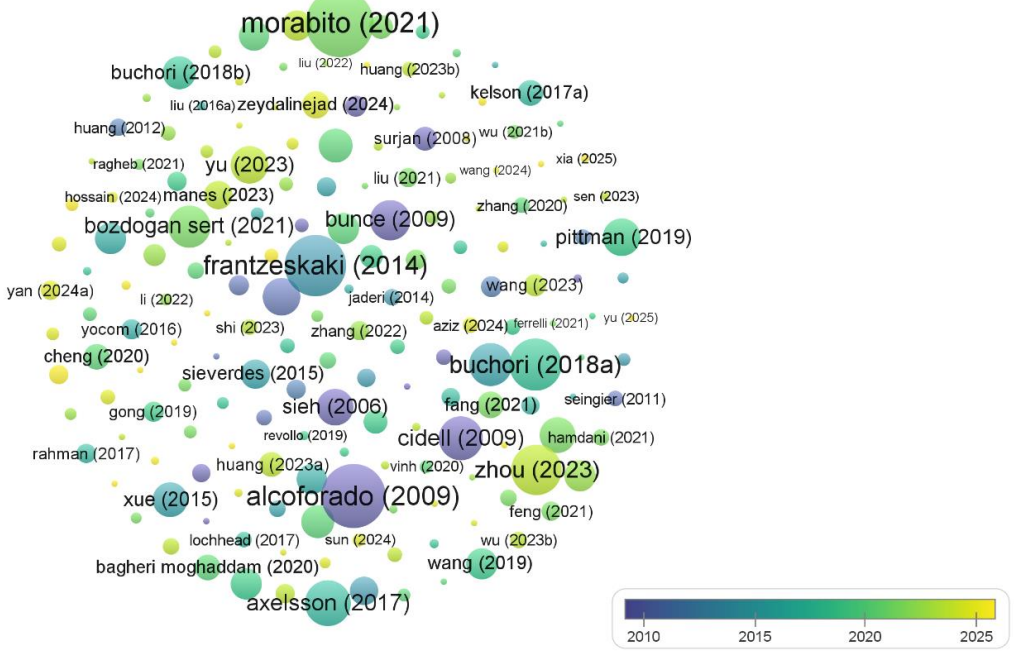

Figure 8. Co-citation network of documents. This figure depicts how often documents are cited together within the dataset [37], [50], [51], [52], [53], [54].

Thematic Evolution (2000–2025)

The thematic mapping analysis of urban waterfront studies in 2000-2025 indicates the obvious development in the prevailing themes. Initial literature (2000-2010) focused more on the physical redevelopment and regeneration, with most references given to post-industrial reuse, real estate development, and aesthetic renewal without much focus on social or environmental aspects [55,56].

Sustainability and environmental planning increased in profile between 2010 and 2015, and were shaped by the increased significance of international agendas like the UN Sustainable Development Goals. Increasing amounts of research were dealing with the concept of sustainable urban design, ecological services, and climate adaptation, which manifested a shift in more multidimensional views, where environmental issues are tied to human well-being [57,58].

The literature has been more thematically varied since 2016. The co-occurrence analysis conducted with the help of VOSviewer shows five key thematic clusters, including sustainable development and urban planning, coastal resilience and ecosystem services, climate change and adaptation, quality of life and well-being, and nature-based and participatory solutions (Figures 3 and 4). The ever-increasing interrelatedness of these clusters signals the system shift on the scale of integrated and cross-disciplinary strategies to bridge the spheres of urban design, environmental management, and the social sciences [26,49].

Overall, in the latest (2020-2025) period of time, climate resilience, nature-based solutions, and urban livability have become increasingly popular subjects of research, with the areas of equity, governance, and public health also being addressed. The timeline shows that the prevailing and recurring themes include sustainability, climate change, and quality of life, which are the signs of a maturing field of research based on the socio-ecological resilience and human-driven planning [28,59]. On the whole, the thematic development should be evaluated in the context of the wider movement in urban scholarship, which is the transition to considering waterfronts as the places of economic renewal, to the element of managing climate change and improving the urban quality of life.

Overlay Analysis

Figure 9 visualizes the temporal evolution of research priorities, which was created via VOSviewer, illustrating the shift from physical redevelopment in early years to sustainability, climate adaptation, and QoL in recent publications. With the colors attributed to keywords in terms of years of publication on average, the map will show how the field has evolved since the early days of spatial and environmental studies to more integrative, sustainability-focused ones.

The initial period (2000-2010), presented in dark colors, is characterized by such keywords as urban growth, land use, and coastal cities that demonstrate the initial concentration on the urban expansion and redevelopment of the waterfront. In this period, the studies were more concerned with the physical regeneration of port and industrial waterfronts into mixed-use cities, with little emphasis made on environ-mental and social factors.

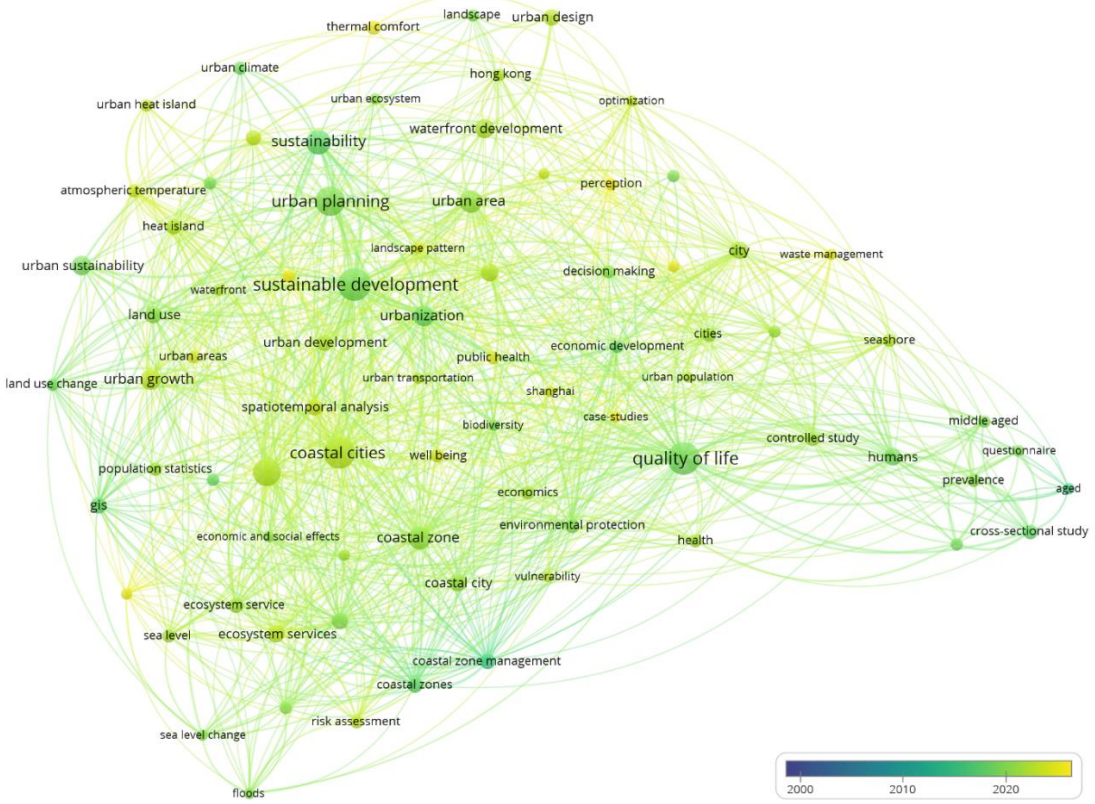

Figure 9. Overlay Visualization of Keyword Co-Occurrence on Urban Waterfront and Quality of Life Research (2000–2025).

During 2011-2018, the color gradient became greener, and the time was high when the concepts were introduced, connected to the sustainability area, including sustainable development, urban planning, ecosystem services, and climate change. In this move, the author is following the global spread of the Sustainable Development Goals (SDGs) and increased attention to environmental resilience within cities. Studies in this phase involved the consideration of ecological planning and social well-being in the waterfront development model, which was beyond design-only planning.

The most recent period (2019-2025), provided in a yellow-green hue, demonstrates the appearance of the novel thematic priorities, such as quality of life, public health, nature-based solutions, and urban resilience. The keywords denote theoretical cross-roads, with the main pillars of research being environmental sustainability, human well-being, and climate adaptation. The increasing uptake of such terms as climate change" and "ecosystem services" suggests a move towards a multidisciplinary, systems-based perspective that makes the social equity and the ecological performance interconnected.

Overall, the overlay analysis is required to ensure that research on urban water-fronts and QoL continues to grow and diversify. The interest in redevelopment and spatial change has shifted into a broader debate, with the introduction of terms such as sustainability, livability, and resilience. The overlay visualization highlights temporal changes in keyword prominence, with earlier studies emphasizing urban growth and land use and later studies incorporating terms such as sustainable development, eco-system services, climate change, and QoL.

DISCUSSION

The bibliometric trends obtained with the help of VOSviewer analysis (Figure 2) can be considered as a coherent overview of the intellectual and thematic development of 242 papers on the redevelopment of the urban waterfront and quality of life (QoL). As can be seen, with the last twenty years, the literature has broadened into a more interdisciplinary context comprising of environmental sustainability, social well-being, governance, and place-specific psychological aspects of regeneration. This change is indicative of wider-spread planning debates across the world, which are increasingly conceptualizing waterfronts as the environment of sustainable, resilient, and habitable urban futures [60].

The networks of co-occurring keywords demonstrate that such concepts as sustainable development, ecosystem services, and climate change have become nodes (Figure 3), which suggests a tendency toward developing a concept of waterfronts as socio-ecological systems in the Triple Bottom Line approach. The quality of life and well-being emerge as separate yet correlated clusters (Figure 4), which indicates the growing presence of scholarly interest in planning that is based on humans (research) [16,61]. Though recent findings indicate a relationship between waterfront settings, and subjective well-being, mental renewal, and place attachment [12,62,63], these links are reported in themes but not in the current analysis which has empirically measured variables. The significant rise in the number of publications since 2015 is linked to the growing global policy focus on sustainable and livable cities, such as the Sustainable Developing Goals, which have given more weight to the scholarly interest in waterfront redevelopment and its connections with QoL.

Older themed groups that were predominantly urban growth, land use and physical redevelopment help trace the original focus of the field on economic regeneration [64]. However, latter clusters pertaining to nature-based solutions, climate resilience, and community health indicate a shift towards integrative and adaptive urbanism (Figures 3 and 4). The country collaboration networks (Figure 7) indicate that the output of research is still centrally found in China, the United States, and a few countries in Europe in agreement with the citation and publication rankings (Tables 4 and 5). The rise of China, in particular, is reminiscent of its expansive agenda of coastal development and deep interest in the research of blue-green infrastructure [63].

Conversely, the Gulf and Middle East are still not well represented in the bibliometric networks even though there are mega-waterfront projects in the countries, including Saudi Arabia, the UAE, and Qatar, among others [65]. This gap indicates the lack of connection between mass practice and scholarly delivery, which can be used to pursue empirical studies on governance, socio-spatial equity, and QoL performance in such situations. The co-citation network (Figure 5) further demonstrates the dominance of sustainability-oriented frameworks, with key references on climate resilience and socio-ecological systems shared across clusters, aligning waterfront scholarship with international climate-adaptive urbanism agendas [60].

However, the keywords governance, social equity, and participatory planning occur with lower frequency in the keyword network (Figure 3) even though they are considered to play an important role in the formulation of equitable waterfront outcomes [9,66,67]. Scholars caution that insufficient attention to these dimensions may result in exclusionary or spectacle-driven developments [68]. Visualizations of the recent papers (Figure 9) suggest that in recent years the focus of the research moved towards more resilient, well-being, adaptive design, and nature-based solutions as global interests in the subject of the climate vulnerability and the ability of blue spaces to restore began to grow.

On the whole, the bibliometric findings demonstrate a obvious conceptual progression of the physically oriented redevelopment to the integrated socio-ecological models. Urban waterfronts are becoming regarded as strategic resources in the further development of a sustainable, resilient, and quality of life, although the empirical evaluation of these results is an essential direction of future studies.

LIMITATIONS AS CONSTRAINTS AND AS DIRECTIONS FOR FUTURE RESEARCH

Although the present study provides a thorough bibliometric and thematic overview of the world literature on the topic of urban waterfront redevelopment and its connection to quality of life (QoL), one must admit a number of limitations. To begin with, the study was restricted to English-based literature that is covered by Scopus and Web of Science, not including multilingual and regionally based literature, especially the Arabic-based studies. This

limitation can fail to represent localized knowledge, particularly of the fast-growing coastal areas. Second, non-peer-reviewed sources, including policy documents, government reports, and planning guidelines, are restricted, which deprives the study of institutional and practical perspectives, representing the impact they have on development on the waterfront. Third, the research has only used bibliometric methods and lacks empirical triangulation in the form of fieldwork, survey, interviews and spatial. Therefore, the results contain conceptual trends of the literature instead of direct evidence of results or cause-effect links. Moreover, the data retrieval process on the basis of keywords presents the probability of selection bias since some studies might have been excluded due to the usage of other terms.

These limitations lie on a number of directions of future research. Inclusion of more sources of data such as literature in more languages and that of a particular area such as the Arabic literature would offer a more comprehensive picture of waterfront redevelopment. Integrating policy documents and environmental evaluation would serve to close the gap between the study and practical planning. Mixed method methodological diversification in the form of bibliometric analysis and empirical studies would also enhance validation of conceptual interrelations between waterfront redevelopment and QoL outcomes. The comparative regional and global research would also put observed trends in context and improve the external validity of results.

On balance, though this study can be considered as laying a groundwork of understanding the intellectual and thematic lines of the waterfront redevelopment of cities, future research needs to be more integrative and empirically based and multilingual in order to progress with knowledge generation and make the development of more sustainable, resilient and habitable cities at the coast.

CONCLUSION AND RECOMMENDATIONS

This paper is informed by these research issues that focus on identifiable global trends in redevelopment of waterfronts in research in the year 2000 and 2025, the strengths and gaps in the literature on the same, and how redeveloped waterfronts affect the social, economic, and environmental aspects of the quality of life in various urban settings. In order to answer these issues, the research will carry out a bibliometric and thematic analysis of the global scholarship published since 2000 on urban redevelopment and QoL of the waterfront.

The analysis identifies four dominant thematic clusters that structure contemporary debates in waterfront planning: sustainable planning and climate adaptation, blue–green infrastructure and ecosystem services, quality of life and public health, and governance, participation, and place attachment. Together, these clusters reflect an expanding interdisciplinary focus that moves beyond physical redevelopment toward broader socio-ecological and human-centered considerations.

Despite this thematic expansion, significant research gaps remain. Issues related to inclusive governance, social equity, long-term quality-of-life measurement, and post-occupancy evaluation continue to be underrepresented compared to more established agendas such as climate adaptation, ecological restoration, and urban regeneration. These gaps highlight important opportunities to strengthen the social and outcome-oriented dimensions of waterfront research and practice.

It is also shown that there is an uneven geographical distribution of scholarly influence. The production and cooperation in research are still geographically concentrated in China, the United States, or some parts of Europe, and the quickly growing coastal areas, especially in the Middle East and the Gulf, do not make much of an impact on the world literature. This disproportion highlights why more regionality should be represented, more data should be shared, and more research should be done globally in order to make waterfront scholarship more policy relevant and globally applicable.

According to these findings, it is possible to draw a number of implications regarding further research and practice. They should also pay increased attention to the integration of quality-of-life indicators into the planning and evaluation systems and to the intensification of the focus on participatory governance and social inclusion to overcome the issues of equity. The sustained focus on the solution-based approach, based on nature, climatic resilience, and long-term observation, will be vital to the sustainable redevelopment of the waterfront. Lastly, it is important to conduct an increased amount of inter- and cross-regional studies, particularly in the fast-changing cities along the coastal band, to come up with context-specific evidence and to create a more balanced and internationally interconnected research environment.

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