

DO WE NEED THE CONCEPT BLUE GENTRIFICATION? A systematic literature review on water-related gentrification processes

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With 8 figures and 1 table

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Summary: The term ‘blue gentrification’ has emerged to describe socio-spatial transformations linked to waterfront redevelopment and blue infrastructure projects. However, the concept lacks a clear definition and is used inconsistently in academic discourse. Following the PRISMA guidelines, this paper systematically reviews 54 English and German publications to assess the state of research on blue gentrification, its conceptual clarity, and its socio-environmental implications. Despite the focus on these two languages, the findings reveal that blue gentrification is often subsumed under broader frameworks such as green or environmental gentrification, with only a minority of studies explicitly using or defining the term. Key characteristics of the phenomenon include rising property values, the displacement of economically deprived populations and restricted access to water-based amenities, which are often driven by neoliberal urban policies. Despite its growing relevance in the context of blue-green climate adaptation measures, the term lacks a robust theoretical framework, limiting its usefulness as an independent concept. Methodological and geographical biases further constrain the field, as most studies focus on the Global North and employ qualitative methods. While questioning the need for an explicit definition and introduction of the term, this review sets out its own approach to defining the term and argues in favor of a diversified research agenda to capture the particular dynamics of blue gentrification. Closing these gaps is crucial for promoting equitable urban planning and ensuring inclusive access to blue spaces.

Keywords: Blue gentrification, waterfront redevelopment, human geography, neoliberal urbanism, blue infrastructure, renaturation

1 Introduction: Understanding blue spaces and the rise of gentrification

Urban waterfront spaces, such as rivers, canals, harbors, and coastal strips, are becoming increasingly important in urban development. These ‘blue spaces’ are valued not only for ecological compensation or climate adaptation, but also for recreation, tourism, transportation, and investment (KUMAR et al. 2024, SMITH et al. 2022, WILBERS et al. 2021). Waterfront revitalization often includes climate adaptation measures such as green and blue infrastructure, and it can also refer to the renaturation of inner-city bodies of water (TOMMARCHI 2025). In neoliberal urban contexts, however, the economic aspects of waterfront redevelopment seem to dominate (AVNI & MOSER 2026). These redevelopment processes undeniably drive far-reaching urban transformations (GILBERT et al. 2022, ISMAIL & ISMAIL 2024, VEERKAMP et al. 2021), which involve not only ecological and urban design changes, but also both intended and unintended social change, particularly gentrification (DI MATTEO & GUADAGNO 2025, YONEGURA et al. 2025).

Since Ruth GLASS (1964) first coined the term ‘gentrification’ to describe processes of upgrading and social displacement in the London housing market in 1964, research on these processes, their causes, and their impacts has been an integral part of interdisciplinary urban studies. Since then, the concept of gentrification has expanded—both conceptually and geographically—as scholarship increasingly examines novel forms and varieties of the process (RÉRAT et al. 2010, SMITH 2002, WYLY 2019). Apart from more established concepts like tourism gentrification (COCOLA-GANT 2018) or commercial gentrification (HÜBSCHER et al. 2021), new labels have emerged in recent years. The intersection of environmental and climate protection measures with social displacement has become a new focal point of critical urban research, giving rise to terms like environmental gentrification, green gentrification, and climate gentrification (ANGUELOVSKI et al. 2019, 2022, CHECKER 2011, CUCCA et al. 2023).

Meanwhile, evidence suggests that water infrastructure development in urban areas produces phenomena similar to green or climate gentrification (DI MATTEO & GUADAGNO 2025, HIN & WUIJTS 2021, KISTEMANN 2018). For example, exclusive

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housing projects in revitalized waterfront locations, riverside promenades, and climate adaptation measures such as flood protection or sponge city concepts lead to these places becoming more attractive and consequently result in typical patterns of gentrification (ANGUELOVSKI et al. 2022). This paper argues that it is worthwhile to distinguish more precisely between the modes of gentrification associated with blue and green infrastructure, given their differing characteristics in terms of relevance to city marketing and representativeness (DESFOR & LAIDLEY 2012, SANDERCOCK & DOVEY 2002), as well as health and recreational aspects (VÖLKER & KISTEMANN 2015). Hence, one might ask to what extent the restructuring of urban blue infrastructures (re)produces social and spatial injustices and how these consequences are addressed and investigated in the scientific literature.

The intersections between gentrification processes and blue infrastructures are increasingly being discussed in academia. Still, there is neither a common understanding, nor a systematic global review of these relations. Against this backdrop, this article aims to systematically record and analyze the scientific literature on the term ‘blue gentrification’ as well as the direct links to water infrastructure development. The question to be answered is thus: In the academic discussion, is there such a phenomenon as blue gentrification, how is it related to blue infrastructure, what does it imply, and how is it explored? To this end, we conducted a systematic literature review in accordance with the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PAGE et al. 2021). Our aim is to document the use and frequency of the term ‘blue gentrification’ and its variants while identifying central themes, spaces, actors, and research approaches and contributing to a critical assessment of how well-established this field is. In the academic literature, ‘blue gentrification’ and ‘green gentrification’ often tend to be used interchangeably. While the terms share some mutual aspects, it is also clear that distribution, the strategic use and social benefits of blue and green infrastructures reveal distinct differences. We therefore suggest a clear-cut definition of ‘blue gentrification’.

This article is structured as follows. In section 2, we develop the theoretical foundations of water-related gentrification processes. Section 3 deals with our methodological approach to the systematic literature review, touching on the search strategy, selection criteria, and analysis procedures. Section 4 will present the results of the literature review, considering both quantitative aspects (e.g., frequency,

temporal development, and geographical focus) and qualitative categories (e.g., use of terms, main topics, and theoretical perspectives). In section 5, we discuss the findings, and section 6 will summarize the main conclusions.

2 Gentrification induced by green and blue infrastructures

2.1 A new focus in gentrification research

Despite six decades of gentrification research, there is no standard definition of the process (BHAVSAR et al. 2020). Referring to Ruth GLASS’ (1964) first coinage of the term, SLATER (2006) argued that “it makes no sense to focus on this narrow version of the process anymore, and to insist that gentrification must remain faithful to the fine empirical details of her geographically and historically contingent definition” (ibid. 744). Indeed, both the process (HACKWORTH & SMITH 2001) and the concept itself (KNIERIEM 2023) have developed dynamically. Against this background and without claiming to be exhaustive, DAVIDSON & LEES (2005) propose the following (and often cited) four core characteristics of gentrification: (1) The (re)investment of capital in a space; (2) the associated change in the appearance of a space, primarily through renovation; (3) the social upgrading through the influx of a more affluent group of residents; and, (4) as the most significant negative social consequence: the displacement of socially and economically vulnerable groups. There are numerous contributions exploring the drivers of gentrification, with prominent arguments proposed by SMITH (1979) on the supply side, and LEY (2003) and ZUKIN (1987) on the demand side. Aside from those market-focused explanatory approaches, scholars have also stressed the role of the state in gentrification processes. Gentrification is being used as a policy tool in the name of an ‘urban renaissance’ or to promote ‘community regenerations’ (LEES & LEY 2008). This type of ‘state-led gentrification’ (LÓPEZ-MORALES 2019) is in line with neoliberal urban planning and policy agendas (PATON & COOPER 2016) and might imply policies revaluating urban land. Here, both blue and green public spaces are of pivotal importance in this process (PINTO et al. 2023, TOOMEY et al. 2023). Although the responsibility of planning such spaces mostly lies with the state (MACKENZIE et al. 2018), the spatial and economic consequences of investing in green and blue infrastructure are negotiated on the housing markets and are far-reaching.

At least two factors underscore the growing importance of green and blue spaces in gentrification processes. Firstly, climate change has intensified the demand for adaptation and mitigation strategies. These strategies aim to foster local urban resilience but often entail trade-offs, such as displacing economically vulnerable households (CUCCA et al. 2023). About two decades ago, SAIRINEN & KUMPULAINEN (2006) emphasized the need for planners and decision-makers to pay closer attention to sociocultural changes in relation to planning activities. In addition to ecological benefits, blue and green infrastructure must integrate social and spatial considerations to ensure long-term social justice. Secondly, societal attitudes are evolving on the incorporation of nature into urban environments. A global trend toward embedding green-blue infrastructure even in established urban structures is now evident (KABISCH et al. 2022, PARKER & SIMPSON 2018), also linked to the growing demand for such infrastructure by the ‘sustainability class’ (GOULD & LEWIS 2017: 2). This trend is especially pronounced in growing cities, where densification might lead to a reduction of public or semi-public (green) spaces (KNIPPSCHILD et al. 2025).

This dilemma between green, livable, and climate-adapted cities, on the one hand, and the social and spatial inequalities reproduced by such strategies, on the other hand, is the basis for ecological (or green) gentrification. Shaping a new strand of gentrification research, DOOLING (2009) defines this process as “[...] the implementation of an environmental planning agenda related to public green spaces that leads to the displacement or exclusion of the most economically vulnerable human population—homeless people—while espousing an environmental ethic” (DOOLING 2009: 630). Since her definition with a focus on homeless people, the phenomenon has been studied extensively in academic literature, with shifting understandings. For example, GOULD & LEWIS propose a broader framing of green gentrification as a process “facilitated in large part by the creation or restoration of an environmental amenity” (2012: 121). More than one decade after DOOLING’s (2009) initial conceptualization, QUINTON et al. (2022) propose the following four layers of green gentrification in their systematic literature review: (1) Reinvestment of capital and green infrastructure development in existing or new spaces; (2) social upgrading processes alongside greening; (3) landscape change; and (4) displacement of vulnerable groups. Typical infrastructures that can lead to green gentrification include parks (RIGOLON & NEMETH 2020),

green urban corridors such as the High Line in New York City (JO BLACK & RICHARDS 2020), street plantings, and the creation of superblocks (BRIEM & HÜBSCHER 2026, HAASE & SCHMIDT 2024), among others (ANGUELOVSKI et al. 2018).

Blue-green infrastructure is often discussed together as one system: “an interconnected network of natural and designed landscape components, including water bodies and green and open spaces” (GHOFRANI et al. 2017: 15). However, we argue that it is necessary to distinguish between blue and green infrastructure. The differences become visible not only in their ecological functions, but also with regard to social and health dimensions or planning and governance aspects.

Thus, when considering gentrification in relation to blue infrastructures, a simple transfer of the concept of green gentrification might be insufficient due to several reasons. Blue infrastructures are very limited in their spatial extent in urban contexts. In contrast, green infrastructures could theoretically be reproduced in a variety of ways (WILCZYNSKA et al. 2023), which could lead to a dilution of gentrification tendencies (BAUMGARTNER 2025). Contrary to that, an urban waterfront forms both a barrier and, at the same time, a source of attraction in urban space (AVNI & FISCHLER 2020). Furthermore, urban water bodies provide different ecosystem services for people and the environment than green spaces. Under certain circumstances, bodies of water can contribute to cooling the surrounding area, for example, rivers with sufficiently cool water temperatures (HATHWAY & SHARPLES 2012). The sea breeze effect can also bring cooler temperatures to coastal cities on hot days (ZHOU et al. 2019). KUMAR et al. (2024) further emphasize that blue and green infrastructures differ not only in the magnitude of their cooling effects, but also in their underlying biophysical mechanisms. While green infrastructure mainly cools through shading and evapotranspiration, blue infrastructure influences the urban microclimate through processes such as the albedo effect, heat storage, and air circulation. Especially in cities suffering from heat stress, this results in numerous positive effects on well-being and health (VÖLKER & KISTEMANN 2015). Leisure activities also differ significantly between green spaces and larger water bodies, with the latter being less accessible (WILCZYNSKA et al. 2023). As for the case of Singapore, USHER (2025) describes how the city has created an urban metabolism over the past decades through targeted revitalization via waterfront redevelopment and city marketing. He refers to the strategic leveraging of the interaction between

water and built infrastructure as the ‘assetization of water,’ as its appeal—enhanced through targeted development—will continue to attract sustained investment in the future. This is yet another example of how waterfronts, in particular, are attracting attention. In summary, it can be said that waterfronts are caught in a competitive tension between economic, social, and environmental considerations within a relatively limited space. Historical land uses, often of an industrial character, clash with neoliberal development strategies and frequently lead to social conflicts (HÜBSCHER 2021, TOMMARCHI 2025). In the following, we will focus on such waterfront redevelopment areas as one particular form of interplay between water and the city.

2.2 Waterfront redevelopment as one form of interplay between water and the city

Blue spaces play pivotal roles in cities in terms of transportation, economy, health, and ecology (KUMAR et al. 2024, SMITH et al. 2022, WILBERS et al. 2021), and they are “important new development frontiers” (SANDERCOCK & DOVEY 2002: 151) where the relationship between water and the city is being renegotiated. This becomes most apparent when looking at the diversity of remodeled blue spaces, that give the appearance and image of these cities a facelift: urban (artificial) beaches in Paris (FREYTAG & BAUDER 2018), Dubai’s Palm Islands (GUPTA 2015), the artificial lake in Santa Cruz de Tenerife’s central square (HÜBSCHER 2019), touristified pit lakes resulting from open-cast mining in East Germany (WEBER 2020), and riverfront redevelopments in Bilbao (RODRÍGUEZ et al. 2001) (see Fig. 1).

The discussion about the development of urban waterfront areas and the associated changes in the social fabric is by no means new. Since the 1980s, an increasing number of waterfront redevelopment projects have been realized along urban riversides and coastlines (AVNI & FISCHLER 2020, VALL 2018, BAUMGARTNER 2025, CHEN 2022), and they have “transitioned from spaces of production to spaces of consumption” (AVNI & MOSER 2026: 2). One reason for this is the transition to the post-industrial city, a process marked by a far-reaching deindustrialization of the inner-city secondary sector (SHAW 2012). Originally a phenomenon in Western industrial nations, this process soon accelerated worldwide (JAUHIAINEN 1995). In port cities, extensive industrial areas with direct connections to ports and water transport routes were particularly affected. Such de-

industrialization processes have led to an increasing number of vacant inner-city industrial sites, also discussed under the umbrella term ‘brownfield.’ Due to the historical development of port-based economies, these were often located in the immediate vicinity of the urban center and thus serve as a projection surface for neoliberal urban development policies (HÜBSCHER 2021, TOMMARCHI 2025).

Amid growing international competition among cities, striking waterfront skylines have been, and still remain, highly sought-after landmarks (DESFOR & LAIDLEY 2012, HAWKEN et al. 2021, SANDERCOCK & DOVEY 2002). Waterfront redevelopment projects also renegotiate public access to urban waterfronts. These projects can create distinct forms of use, reflecting the diverse facilities and benefits associated with blue infrastructure, but they can also generate new injustices. For example, many case studies have shown how waterfront redevelopment projects include the production of high-priced residential areas and highly consumer-oriented spaces, often tailored to a wealthy clientele, such as in Toronto (LEHRER & LAIDLEY 2008), Shanghai (CHEN 2022), or Rotterdam (DOUCET et al. 2010). This is particularly problematic as many working-class residential areas have traditionally been located close to these former industrial zones, benefiting from the workers’ physical proximity to their workplace. Historically, this proximity implied residents being directly exposed to contaminated and polluted spaces caused by industrial activity (BAUMGARTNER 2025). Today, the new centrality of these neighborhoods and spillover effects from adjacent waterfront projects might trigger revalorization processes such as gentrification (FAINSTEIN 2008). Social, spatial, and environmental justice perspectives are therefore essential when redeveloping waterfronts, yet they are often neglected in practice (GRAUSLUND KRISTENSEN 2025, SAIRINEN & KUMPULAINEN 2006).

Apart from that, it is particularly the waterfront where climate gentrification is discussed. Although climate gentrification can still be regarded as an emerging topic with limited understanding (MATTEUCCI et al. 2024, see also the literature review by BEST & JOUZI (2022)), blue spaces such as waterfronts are a perfect example of the existing paradoxes in climate justice dynamics, as “socioecologically vulnerable neighborhoods receiving green climate interventions are often simultaneously those being targeted for urban regeneration projects” (SHOKRY et al. 2021: 212). KEENAN et al. (2018) discuss different types of pathways in coastal areas threatened by floodings, differentiating between the impacts due



Fig. 1. Waterfront redevelopment projects in European cities. Top left: Canal in Leipzig (Germany). Top right: 'Hafencity' in Dresden on the river Elbe (Germany). Bottom left: 'Dock' in Prague on the river Vltava (Czechia). Source: the Authors. Bottom right: Plaza de España (main plaza) in Santa Cruz de Tenerife (Spain) with artificial lake. Source: Marcos Javier Alonso Pérez.

to higher risks and the (unintended) consequences of public investment to increase local resilience.

The question remains how such gentrification processes linked to green and blue infrastructure differ, and whether 'blue gentrification' warrants recognition as a distinct concept to grasp the phenomena described above. Firstly, one might argue that integrating waterfront districts into the urban fabric is often a highly polarizing process (TOMMARCHI 2025), amplified by the installation of consumer-oriented facilities. This might indeed differ from green gentrification, which typically manifests in housing markets or shifts in everyday practices near green areas.

Furthermore, we must acknowledge that blue spaces such as waterfronts are an inherently more limited resource compared to green infrastructure in most cities. This scarcity enhances the significance of water bodies in the perception of the city, potentially intensifying gentrification pressure on these areas.

The concept of the urban amphibious coined by ACIERNO et al. (2021) describes another difference between gentrification induced by green and blue spaces. They define the urban amphibious as a special zone of human interaction between land and sea which is not just a dividing line, but also a system of spatial and functional interaction. Often, this area is heavily modified by humans and incorporates other public (green) spaces and business uses. In these urban amphibious zones, societal interactions might differ from other urban areas, shaped by the specifics that water bodies bring along, such as urbanistic barriers, symbolic representations (such as landmarks) or water-related activities of any kind (LAND 2017).

Lastly, existing concepts such as 'waterfront redevelopment' focus on upgrading urban structures as part of an entrepreneurial city, and they often fail to grasp the social and cultural implications (AVNI & FISCHLER 2020, TOMMARCHI 2025). In this sense, a justice perspective is missing, despite growing

recognition of its importance (TOMMARCHI 2025). Gentrification research, however, provides this perspective when analyzing blue, as well as green spaces. Against this background, this review aims to systematically organize existing research on gentrification induced by blue infrastructure.

Summarizing, and apart from the research gap identified, this systematic review also highlights the increasing practical relevance of gentrification processes related to blue infrastructure. Here, we firstly refer to the above-mentioned transition to post-industrial structures, implying that formerly industrially used spaces adjacent to blue infrastructures are reconfigured (SHAW 2012). Secondly, one might also place the growing relevance of blue (and green) infrastructure in the context of the ongoing social-ecological transformation and climate change adaptation (CAO & WANTZEN 2023). Thirdly, we regard the continued growth of tourism related to the 'blue economy' (PICKEN 2023) as a further practical field of relevance. Hence, this literature review shall contribute to a more systematic understanding of the field and serve as a basis for both future research and policy.

3 Methodology: A systematic approach to blue gentrification research

Given the research gap identified and the question raised, a systematic approach to blue gentrification, a largely unexplored phenomenon, is necessary. An initial unstructured keyword search revealed a comparatively small number of relevant scientific publications. Building on this, we conducted a systematic literature review to obtain a well-founded and comprehensive overview of the current state of research, the use of terms, thematic focuses, and regional priorities. The analysis aims to document the state of existing research on blue gentrification, identify potential conceptual commonalities, and evaluate the relevance and maturity of the research field.

The literature analysis is based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) scheme (MOHER et al. 2009). PRISMA is an internationally established guideline designed to enhance the transparency, accuracy, and completeness of systematic reviews and meta-analyses. This guideline was chosen for this study because it provides a structured framework which ensures rigorous documentation and reporting of the review process. This approach facilitates reproducibility and allows readers to assess the trustworthiness and ap-

plicability of the findings, making it particularly suitable for our systematic review (PAGE et al. 2021).

The research was conducted using subject-specific and interdisciplinary databases, including Google Scholar, Scopus, and Web of Science. A combination of direct and related keywords was used in the search strategy to capture the different uses of terms in the context of waterfront locations and gentrification processes. The selection of search terms was informed by an initial review of thematically related literature and subsequently refined through reflection and discussion within a seminar colloquium, resulting in the following set:

'Blue gentrification'
'Waterfront gentrification'
'Water gentrification'
'Riverfront gentrification'
'River gentrification'
'Blue infrastructure' AND 'gentrification'

During the exploratory phase of the literature search, additional term combinations—including non-adjacent keyword pairings such as 'waterfront' OR 'river' AND 'gentrification'—were tested across all three databases. As these broader searches did not yield relevant results beyond those already captured by the primary search strategy outlined above, we report only the final, systematic search strings to ensure transparency and reproducibility.

The research covered the period from 1995 to June 2025, as defined by the database results, and included only publications in English and German in order to match our language proficiency and avoid potential inaccuracies arising from translations.

A total of 519 sources were identified. After removing duplicates, 309 sources remained. Of these, 290 were retained based on language availability (German or English). Of these, 222 full texts could be viewed and downloaded with the available access and licenses. Both first authors independently reviewed all available texts regarding their relevance to the research objective. A three-stage category system was used.

Category 1 – suitable in terms of content (direct reference to blue gentrification)
Category 2 – limited suitability (indirect reference, thematically related)
Category 3 – not suitable (no recognizable reference to the subject of the study)

After comparing and merging the evaluations, 54 texts were identified as suitable for further qualitative and quantitative analysis. Due to the

limited number of relevant peer-reviewed articles, the analysis also included non-peer-reviewed literature, such as academic theses and selected gray literature, provided that it was methodologically comprehensible and thematically relevant to the research focus. Although we are aware of the potential problems associated with gray literature, we have decided to include it to account for possible uses of terms outside of established scientific discourse (e.g., in reports on practical projects). Figure 2 illustrates the literature search conducted according to the PRISMA scheme, followed by an initial content analysis.

Sources with suitable content were analyzed using qualitative coding with MAXQDA software. Following a hybrid coding approach, we first developed a set of deductive top-level categories derived from the foundational literature discussed in Section 2 (e.g. AVNI & FISCHLER 2020, BAUMGARTNER 2025, TOMMARCHI 2025). These initial categories include ‘terminological framing,’ ‘field of study,’ ‘method used,’ ‘spatial context,’ and ‘type of publication.’ These categories were chosen to capture the core dimensions of the analyzed literature, ensuring a comprehensive understanding of the thematic, methodological, and contextual aspects of the studies.

Each top-level category was further refined into subcategories through an iterative process using inductive coding. For example, the ‘field of study’

category was divided into disciplines (e.g., environmental science, law, and health). ‘Spatial context’ was divided into two categories: the location of the first author and the location of the research, while ‘type of publication’ included (journal) paper, gray literature, and book chapters.

While the top-level categories were theoretically informed, the subcategories emerged primarily inductively from the data itself, allowing for a responsive and comprehensive coding structure. Additionally, frequency analyses were performed to visualize temporal and spatial trends.

4 Findings from the systematic review: trends, gaps, and insights on blue gentrification

4.1 Overview of included studies

As described before, 54 publications were included in the final analysis after applying inclusion and exclusion criteria (see methods). These sources span from 2007 to 2025, reflecting the emerging character of green, climate, and blue gentrification and its relatively recent academic attention. As Figure 3 shows, the use of the term ‘blue gentrification’ and related concepts has increased noticeably over the past decade. While studies on gentrifica-

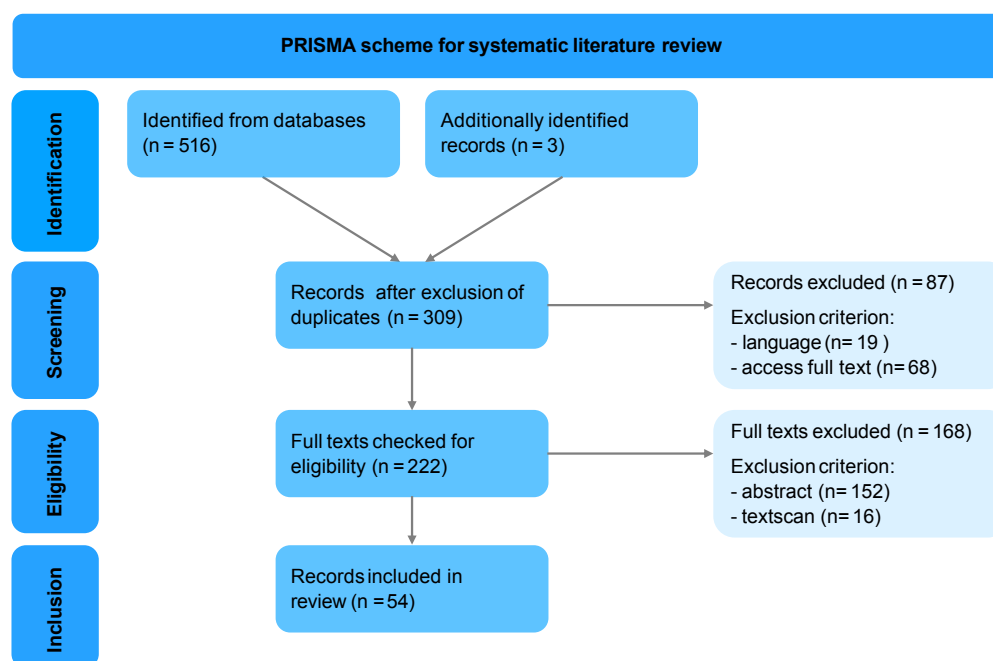
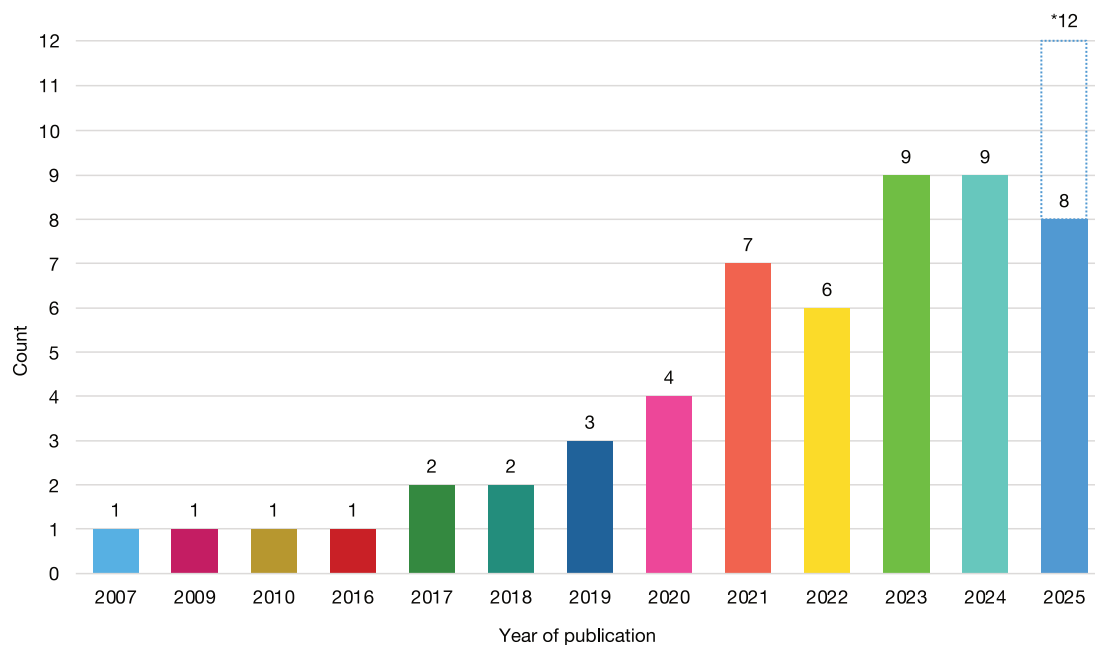


Fig. 2: Process of the systematic literature search. Own elaboration based on the PRISMA scheme (MOHER et al. 2009).



*The review was conducted in June 2025, and 8 texts were identified and included until then. In May 2026, we identified 4 more texts published in the second half of 2025 using the term 'blue gentrification' explicitly. However, these texts were not included in this review.

Fig. 3: Year of publication of texts included in the review

tion near water bodies date back to the 1990s and early 2000s, the first explicit mention of blue gentrification in a title or abstract appeared in 2017. Most literature was published after 2015, with a peak of nine publications in 2023 and 2024, and in 2025 eight texts had already been published by mid-year.

The majority are peer-reviewed journal articles (36), indicating growing academic attention. In addition, five master's theses or doctoral dissertations, seven book chapters, and three forms of gray literature (e.g., working papers, research reports) were included to capture the still-developing state of the field. Non-peer-reviewed sources were considered necessary due to the low number of titled publications explicitly using the term 'blue gentrification.'

To capture the disciplinary background of the publications, we referred to the overarching research field or departmental affiliation of the first author. The findings reflect the topic's interdisciplinary nature (Fig. 4). Most studies appeared in human geography (15), urban planning (10), and environmental planning (7). Smaller numbers were published in journals focusing on architecture (4), law (3; e.g. ARNOLD et al. 2023, MARTINEZ 2023), political science (1; CAMPBELL et al. 2024), and sport science/health (1; BOOK 2025). This indicates that blue gentrification is primarily explored from

spatial and planning perspectives, with comparatively less attention from law, political science, or engineering.

The authors of the included studies predominantly work in institutions located in the Global North, especially the United States (15; e.g. CHANG & ROSS 2024, TOOMEY et al. 2023), the United Kingdom (7; e.g. SÁNCHEZ et al. 2024, SMITH et al. 2022), and the European Union, with a focus on Scandinavia (9; e.g. CUCCA et al. 2023, GRAUSLUND KRISTENSEN 2025). This likely reflects both the prominence of waterfront development in these contexts and greater availability of research funding. The geographic bias also shapes the framing of blue gentrification, with most contributions rooted in post-industrial or global city contexts in the US and Europe. It must also be acknowledged that excluding non-English texts neglects discourses in other parts of the world such as South America or Asia.

4.2 Methodical and spatial characteristics

The included studies span a range of methodological approaches, from theoretical and conceptual analyses to empirical case studies using qualitative, quantitative, or mixed methods (see Fig. 5). In total, a majority (38 publications or 70.4%) had predominant-

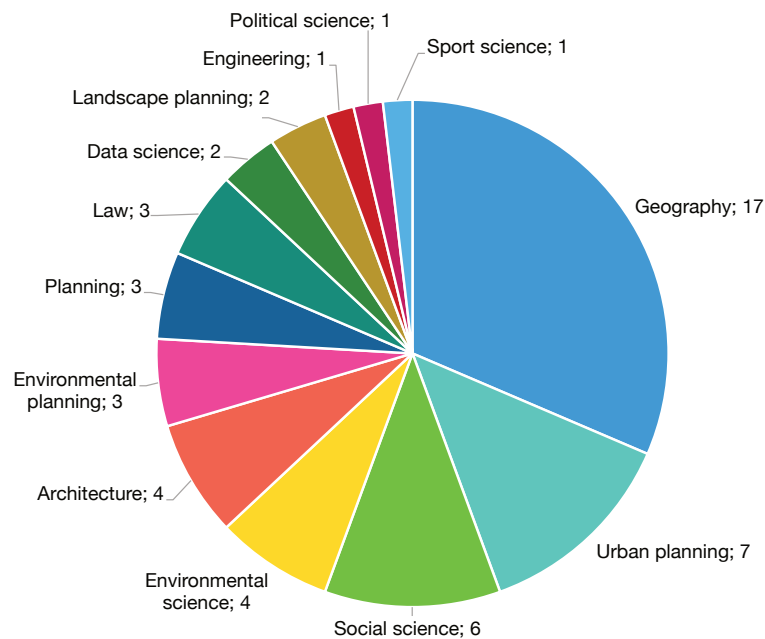


Fig. 4: Research areas of the analyzed studies

ly empirical approaches, five (9.2%) were conceptual or theory-building, and eleven (20.4%) lacked valid methodological information. Among the empirical works, qualitative case studies dominate. Many rely on interviews with planners, policymakers, and residents to examine social impacts and governance dynamics. Other approaches include literature reviews, participant observation, and document or policy analysis. Overall, 31 empirical studies employed qualitative methods as their primary strategy.

A smaller subset of studies used quantitative methods, primarily in the form of GIS-based spatial analysis (e.g. FRIESENECKER et al. 2025, SÁNCHEZ et al. 2024), housing market data (e.g. DI MATTEO & GUADAGNO 2025), water management modeling (e.g. NAPIERALSKI 2019), and various regression analyses (e.g. HAEFFNER et al. 2017, TIEGES et al. 2020). These studies often focus on measuring property value increases, mapping population shifts, or quantifying access to blue spaces across different income groups. Just seven of the studies used exclusively quantitative methods.

In addition, five theoretical contributions, such as term definitions or opinion papers, were found in the included texts (e.g. ANGUELOVSKI et al. 2019, KISTEMANN 2018).

The geographic focus of the reviewed literature is heavily skewed toward the Global North, particularly Western Europe and North America. The most frequently represented countries are shown in Figure 6.

This distribution highlights a strong regional bias in current research. The United States dominates the field, with case studies focusing on major cities such as New York and Boston. In Europe, most cases are located in Scandinavia (10), the United Kingdom (5), and Spain (3; e.g. HIN & WUIJTS 2021, SANTASUSAGNA RIU 2024), often examining riverside or coastal transformations in the context of urban regeneration, climate adaptation, or housing markets.

Studies from the Global South are clearly underrepresented. Despite rapidly transforming waterfronts in countries like Brazil, Nigeria, or Indonesia, only ten studies addressed such contexts (e.g., ABRAHAM et al. 2024, CHANG & ROSS 2024, PRADILLA & HACK 2024). This gap indicates that the field may reproduce structural imbalances in knowledge production. While analogous phenomena likely occur in non-Western settings, they may be framed differently or remain undocumented in English- or German-language literature.

4.3 Use of the term ‘blue gentrification’

Analyzing the 54 included texts reveals that blue gentrification remains a conceptually fragile term, rarely defined and inconsistently applied. However, the underlying phenomenon to which it refers, appears with striking regularity across the literature.

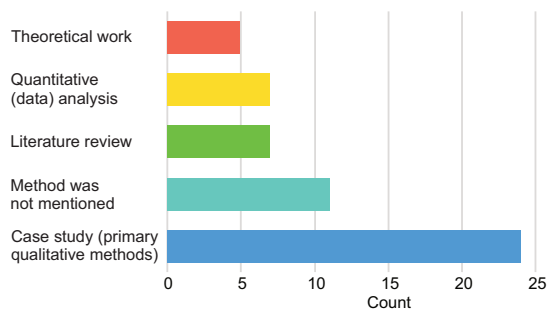


Fig. 5: Methods used in studies included in review

Whether authors use the term explicitly or not, the included studies converge on a shared set of mechanisms, outcomes, and tensions. The studies summarized in Table 1 either explicitly use the term ‘blue gentrification’ or identify mechanisms and socio-spatial effects that align with the concept. This convergence suggests that blue gentrification may be cohering as a research area even in the absence of a unified vocabulary.

Across the literature, blue gentrification is almost never treated as a fully independent concept. Studies that apply the term explicitly, derive it from the more established framework of green gentrification. KISTEMANN (2018), NAPIERALSKI (2019), and DI MATTEO & GUADAGNO (2025) all anchor their usage explicitly in green gentrification theory, applying its logic, environmental upgrading triggering displacement and exclusion, to water-adjacent spaces. Several other authors, including HAEFFNER et al. (2017) and AVNI & FISCHLER (2020), treat blue gentrification as a straightforward variation of green gentrification without elaborating on any conceptual distinction.

For example, HAEFFNER et al. (2017: 144) suggest that real estate market dynamics and rising property values near desirable water-access points “could be planting the seeds of future green—or blue—gentrification [...]”. SÁNCHEZ et al. (2024) go further, introducing the compound term ‘blue-green gentrification’ to capture the intertwined social effects of combined water and green infrastructure investments. Overall, this pattern suggests that the field has not yet established what, if anything, makes blue gentrification analytically distinct from its green counterpart—a question that requires more explicit attention.

Despite terminological inconsistency, the studies converge on a coherent set of mechanisms through which blue space transformation generates gentrification pressures. The most consistently identified driver is rising property values: SMITH et al. (2022) document that properties with blue-space proximity or views command prices up to 51% higher than comparable properties without such amenities, and numerous other studies—including HIN & WUIJTS (2021), BAUMGARTNER (2025), and CUCCA et al. (2023)—identify rising land values as a direct consequence of waterfront regeneration. A second shared mechanism is the reframing of blue spaces as amenity assets. Across urban waterfronts, rivers, coastal zones, and wetlands, studies describe how formerly neglected or industrial water spaces are transformed into recreational and residential attractions, drawing investment and displacing existing users and residents (MALLUM et al. 2023, SANTASUSAGNA RIU 2024, BRÜCKNER et al. 2022). A third mechanism, prominent in more recent work, involves environmental policy: Using the case of an Italian policy originally intended to mitigate

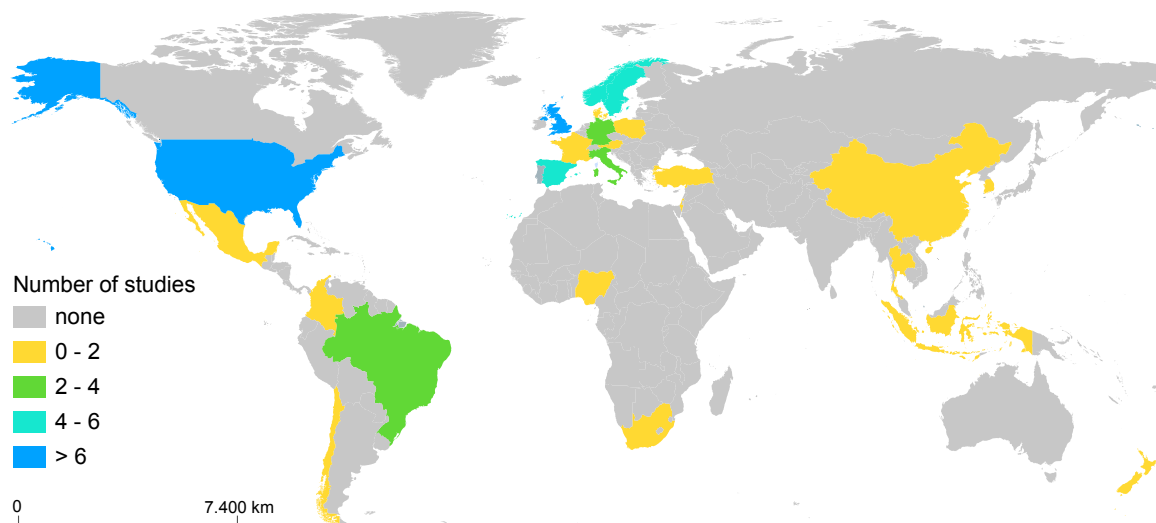


Fig. 6: Geographical distribution of research sites

Tab. 1: Studies on blue gentrification: Explicit usage and aligned mechanisms

Study	Term usage	Spatial context	Key mechanism	Key outcome
HAEFFNER et al. (2017)	Explicit	Urban water-access points	Real estate market dynamics near desirable water amenities	Future displacement risk (seeds of blue gentrification)
KISTEMANN (2018)	Explicit	Urban water-adjacent spaces	Growing attractiveness of water spaces for recreation, housing, and commerce	Socially unbalanced development (“blue gentrification”)
NAPIERALSKI (2019)	Explicit	Urban and suburban blue spaces	Urban planning decisions and structural inequality in water access	Inequitable distribution of water amenities along socioeconomic lines
AVNI & FISCHLER (2020)	Explicit	Urban waterfronts	Environmental renewal linked to housing affordability pressures	Reduced affordability in historically underinvested neighborhoods
BRÜCKNER et al. (2022)	Explicit	Urban waterfronts	Economic exploitation of blue infrastructure—private investment without social safeguards	Health impacts on prior residents, displacement and social injustice
SMITH et al. (2022)	Explicit	Urban blue spaces (general)	Blue-space proximity inflating property values	Potential displacement of lower-income residents through housing market pressure
SÁNCHEZ et al. (2024)	Explicit	Urban wetlands (blue-green infrastructure)	Wetland restoration reframed as amenity, rising ecological and real estate value	Rising property values, exclusionary displacement and altered neighborhood identity
DI MATTEO & GUADAGNO (2025)	Explicit	Maritime-coastal zones	Environmental protection policies triggering real estate inflation in touristified areas	Reduced housing accessibility, spatial segregation and social filtering
HIN & WUIJTS (2021)	Not used	Urban waterfronts	Blue infrastructure investment increasing desirability of waterfront areas	Unequal access along income lines, rising housing costs and displacement risk
CUCCA et al. (2023)	Not used	Lakes, rivers, coastal zones	Ecological restoration and climate adaptation reframing waterfront land use	Rising land values—exclusion of vulnerable populations
MALLUM et al. (2023)	Not used	Former canal	Integration of blue infrastructure into recreational/ecological amenity space	Gentrification: likely displacement of long-established lower-income families
SANTASUSAGNA RIU (2024)	Not used	Urban rivers	Tourism, recreational programming and mixed-use regeneration of riverfront	Rising property values, commodification of rivers, exclusion and homogenization
BAUMGARTNER (2025)	Not used	Lakes, rivers, coastal zones	Renaturalization and ecological enhancement of blue and green infrastructure	Exclusive areas, spillover effects, restricted access to new amenities

over-tourism and enhance environmental quality, DI MATTEO & GUADAGNO (2025) demonstrate how such interventions have unintended consequences, including a sharp increase in real estate prices and reduced housing accessibility for local populations. The authors interpret these effects as constitutive of a blue

gentrification dynamic: one that simultaneously enhances ecological value and business opportunities while exacerbating inequality and the same exclusionary consequences as market-led gentrification. A finding that complicates the assumption that ecological objectives and social equity are invariably compatible.

4.4 Gentrification induced by water bodies

The outcomes of interventions on blue infrastructure described across the literature are similarly consistent. Social displacement, as forced or pressured exit of lower-income residents from areas undergoing blue space (re-)development, is the most commonly identified consequence, appearing across urban (MALLUM et al. 2023, BRÜCKNER et al. 2022), riverine (SANTASUSAGNA RIU 2024), and coastal contexts (DI MATTEO & GUADAGNO 2025). Beyond direct displacement, the studies converge on a second outcome: the unequal distribution of access to blue space amenities along socioeconomic lines. NAPIERALSKI (2019) frames this distributional inequality as the central feature of blue gentrification, while HIN & WUIJTS (2021) document it empirically across five European cities, showing that higher-income groups consistently enjoy superior access to waterfronts. BAUMGARTNER (2025) and CUCCA et al. (2023) extend this finding to ecological restoration projects, demonstrating that renaturalization initiatives can restrict access to the very environmental amenities they create. Together, these studies suggest that blue gentrification consistently produces both displacement and exclusion, even when the triggering interventions are framed as socially or ecologically beneficial. What unites these studies, and what also limits them, is the absence of a shared conceptual framework. Only 14.8% of reviewed texts use the term ‘blue gentrification’ explicitly (AVNI & FISCHLER 2020, BRÜCKNER et al. 2022, DI MATTEO & GUADAGNO 2025, HAEFFNER et al. 2017, KISTEMANN 2018, NAPIERALSKI 2019, SÁNCHEZ et al. 2024, SMITH et al. 2022), while the majority describe the same dynamics through adjacent concepts: waterfront gentrification, green gentrification, climate gentrification, or simply urban regeneration. This terminological fragmentation does not mean the phenomenon is poorly understood. Rather, it indicates that blue gentrification is being studied under multiple labels simultaneously, without sufficient cross-referencing or theoretical consolidation. As with earlier debates around green and climate gentrification, the central open question is whether blue gentrification constitutes a genuinely distinct phenomenon—defined by the specific material properties of water, its health and recreational significance or its ecological relevance—or whether it is best understood as a variant of a more general gentrification dynamic. The studies reviewed here do not resolve this question, but their convergence on common mechanisms

and outcomes suggests that consolidating this body of work under a shared framework would be both possible and productive. These studies show that blue space regeneration often mirrors or merges with broader gentrification processes, even without a unified conceptual vocabulary. To map alternative terminology, we extracted terms from the literature (see Fig. 7). The most frequent was ‘green gentrification’ (17 uses), followed by the general term ‘gentrification’ (14), and both ‘waterfront’ and ‘blue gentrification’ (8 each). Broader concepts such as environmental gentrification (4), ecological gentrification (2), and green climate gentrification (1) were also used. In addition, one author introduced ‘ocean gentrification’.

In most of the publications, we found evidence that the authors included water-induced gentrification in their applied concepts. For example, BAUMGARTNER (2025: 109) states that green gentrification is: “[...] driven by projects that increase the renaturalization of lakes, lagoons, riversides, and coastal areas [...]”. HANNA et al. (2023: 40) summarize: “The provision of new blue-green infrastructure investment may also catalyze green gentrification [...]”. According to GRAUSLUND KRISTENSEN (2025), the increased quality of life due to blue infrastructure in new city districts is one of the factors causing gentrification trends in the real estate market. Figure 8 offers a summary overview of the interdependencies among the various aspects of gentrification.

5 Discussion: Conceptual gaps and future directions

The term blue gentrification remains conceptually underdeveloped, as highlighted by the limited number of studies explicitly using or defining it. While some authors, such as NAPIERALSKI (2019) and KISTEMANN (2018), attempt to frame blue gentrification as a distinct phenomenon, most studies either subsume it under broader concepts like green or environmental gentrification or use it interchangeably with terms such as waterfront gentrification. This lack of definitional clarity hinders the establishment of blue gentrification as a standalone research field. However, the increasing frequency of mentions in recent years, particularly in interdisciplinary contexts, suggests that there is a growing recognition of its relevance (see DI MATTEO & GUADAGNO 2025, SÁNCHEZ et al. 2024) and thus brings forward conceptual questions.

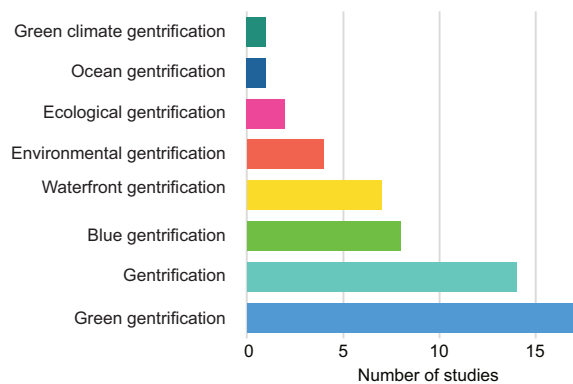


Fig. 7: Terms used in included studies

5.1 Intersections between blue and green gentrification processes

The relationship between blue gentrification and related phenomena such as green and environmental gentrification is complex and multifaceted. While these concepts share parallels such as the displacement of marginalized communities and the commodification of natural resources, they also have distinct characteristics. Green gentrification typically focuses on land-based environmental improvements, such as the creation of parks or greenways, whereas blue gentrification centers on water-based spaces, including rivers, lakes and coastal areas. Or, as ACIERNO et al. (2021) succinctly state, the urban amphibious.

The concept of blue-green gentrification further complicates this relationship. By integrating

blue and green spaces into a single analytical framework, scholars aim to capture the interconnectedness of urban ecological transformations (SÁNCHEZ et al. 2024). For example, the restoration of urban wetlands or former coal-mining sites often involves both green and blue elements, making it difficult to disentangle their social and spatial impacts. While this integrated approach enriches the discourse, it also raises questions about the specificity and utility of the term blue gentrification. Does it risk becoming a subcategory of green gentrification or can it stand alone as a distinct phenomenon? Addressing these questions is crucial for advancing the field.

The socio-spatial impacts of blue gentrification are among its most studied aspects, yet they remain deeply contested. Empirical evidence consistently shows that while they are often framed as ecological upgrades, waterfront developments lead to rising property values, increased rents, and the displacement of low-income residents. For instance, the redevelopment of the Anacostia River area in Washington, D.C., transformed a historically marginalized neighborhood into a high-end residential and commercial district, displacing long-term residents in the process (AVNI & FISCHLER 2020).

These dynamics are not limited to the United States. In European cities like Hamburg and Copenhagen, waterfront regeneration projects have similarly prioritized economic growth and aesthetic appeal over social equity. The commodification of water-adjacent areas often restricts access to these spaces for marginalized groups, turning public goods into exclusive amenities for affluent residents

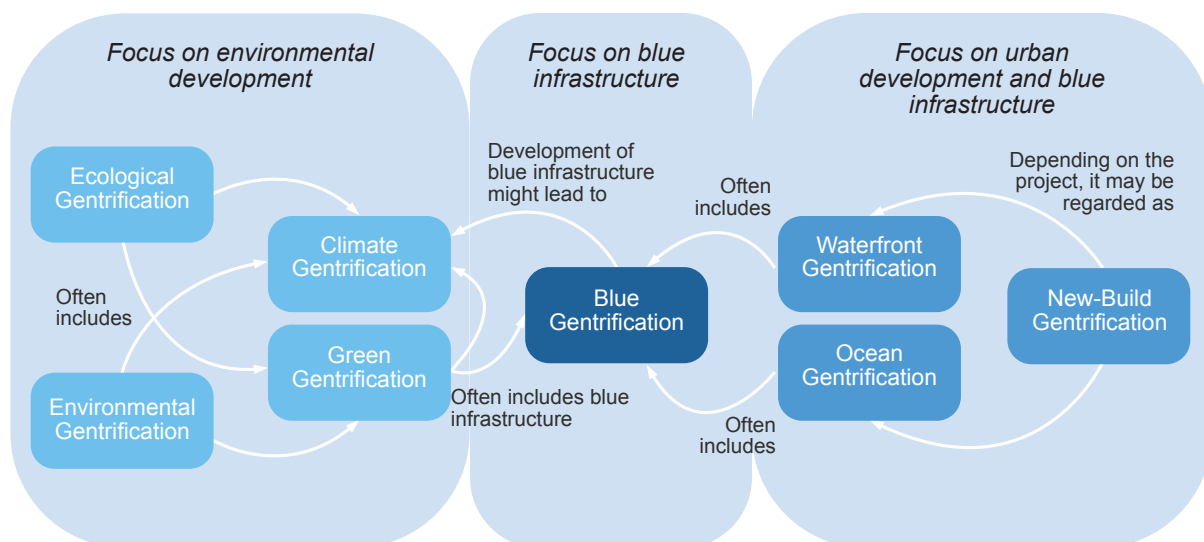


Fig. 8: Interdependencies between the various aspects of gentrification related to environmental aspects

and tourists. This exclusionary process raises important ethical and policy questions: How can cities balance the economic benefits of waterfront development with the need for social inclusivity? What measures can be implemented to ensure that blue spaces remain accessible to all?

5.2 Defining blue gentrification

Based on the findings of this review and the multiple impacts of blue infrastructure, we argue that 'blue gentrification' warrants recognition as a separate concept. The geographical spaces of 'urban blue' and 'urban green' differ in their characteristics as well as in their social production and use, despite overlapping aspects such as social and health recreation.

Distinguishing the spaces is essential for studying the specific effects and mechanisms of blue infrastructure, which would be obscured by the use of the umbrella term 'green and blue gentrification.' It is also necessary to draw attention to the (social) disadvantages of the commercialized expansion of blue infrastructure. Based on our systematic literature review and comparison of different gentrification patterns, we propose the following definition: Blue gentrification refers to (1) changing the existing social fabric of water-based communities or (2) regulating access to water-based amenities, resulting in (3) an unjust distribution of space and access to blue infrastructure with all its social, environmental, and health-related benefits. (4) The phenomenon typically arises from physical improvements to blue infrastructure such as waterfront (re)developments and (5) is embedded within neoliberal policy frames. Water-based amenities such as climate improvement, advanced quality of stay, attractive landscapes, etc. accelerate rising property prices and thus blue gentrification. Like green gentrification, blue gentrification can also focus on water-based environmental improvements, as KISTEMANN (2018) demonstrates. However, the broader focus of our definition clearly distinguishes blue gentrification from its green counterpart.

5.3 Methodological and geographical bias

The methodological and geographical biases in the literature on blue gentrification are significant barriers to a comprehensive understanding of the phenomenon. A total of 48 studies (78%) are

based in the Global North, with a strong concentration in the United States and Western Europe. While these regions provide valuable insights, they represent only a fraction of the global processes related to blue gentrification. Due to unique challenges related to informal settlements, climate vulnerability, and governance structures, the dynamics of waterfront development in cities such as Mumbai or Lagos probably differ significantly from those in New York or Amsterdam, yet they remain underexplored. Admittedly, our decision to focus our investigation on English and German studies based on our language skills may have resulted in systematically overlooking publications from countries with other prominent languages in their scientific discourses. Thus, our search protocol might have neglected alternative terms and concepts that exist elsewhere. Methodologically, the dominance of qualitative approaches such as interviews, ethnographies, and case studies provides rich, context-specific insights but has also limited the generalizability of findings. Quantitative studies, particularly those employing spatial analysis or econometric modeling, are underrepresented in the literature. Such methods could provide valuable data on patterns of displacement, changes in property values and shifts in demographic composition, thereby complementing qualitative insights. Addressing these biases requires a more inclusive and diversified research agenda. Future studies should prioritize underrepresented regions and adopt mixed-methods approaches to capture the multifaceted nature of blue gentrification. By doing so, researchers can contribute to a more balanced and comprehensive understanding of this complex phenomenon.

6 Conclusion: Toward inclusive and equitable blue urbanism

The general aim of this paper was to systemize the dynamically evolving academic discussion on blue gentrification by means of a systematic literature review. Our research design implied several methodological shortcomings. On the one hand, we focused on English and German texts only. On the other hand, our review was strongly shaped by the selected search terms (see section three). Although we selected these terms based on several rounds of preliminary reading, they might not have been exhaustive.

The phenomenon of blue gentrification represents a critical yet underexplored dimension of urban transformation, one that intersects with broader

processes of environmental and social change. This review has highlighted how the term is already used and how it is researched methodologically and empirically. As cities worldwide continue to prioritize the expansion of blue infrastructure as a strategy for climate adaptation and livability, the need for a deeper understanding of blue gentrification is becoming increasingly urgent.

One of the most pressing challenges in the study of blue gentrification is the lack of a clear and robust conceptual framework. The term is often used interchangeably with related phenomena such as green or environmental gentrification, which risks diluting its analytical specificity. While these overlaps are understandable given the interconnected nature of urban ecological transformations, they also highlight the need for a more precise definition of blue gentrification. Future research should aim to identify the unique drivers, mechanisms, and impacts of gentrification processes related to waterbodies, distinguishing it from other forms of gentrification while acknowledging its intersections with them. In particular, a systematic comparative study of blue and green gentrification—examining their respective conceptual boundaries, shared mechanisms, and divergent outcomes—would be a valuable step toward establishing blue gentrification as an analytically distinct concept. Such an endeavor could help clarify if (or to which extent) water-related gentrification processes operate independently of broader environmental gentrification dynamics or whether they are best understood as a subtype thereof.

For instance, the commodification of water-based spaces appears to be a defining feature of blue gentrification. However, the social and spatial consequences of these processes remain poorly understood. By developing a theoretical model that captures these dynamics, scholars can contribute to a more nuanced understanding of how blue gentrification unfolds and how it differs from other forms of (urban) gentrification.

The existing literature on blue gentrification disproportionately focuses on case studies from the Global North, particularly the United States and Western Europe. While these studies provide valuable insights, they capture only a fraction of the global experiences of blue gentrification. In the Global South, where urbanization often occurs under vastly different socioeconomic and political conditions, the dynamics of blue gentrification are likely to differ significantly, and one might have to reflect on the transferability of such concepts. Correcting this geographic bias will require a con-

certed effort to include diverse case studies from underrepresented regions.

The findings of this review have significant implications for urban planning and policy. To mitigate the adverse social impacts of blue gentrification, planners and policymakers must prioritize inclusivity and affordability when developing blue infrastructures. Additionally, community engagement should be a central component of the planning process, allowing local residents to have a voice in decisions that affect their neighborhoods.

Equitable access to blue spaces is another critical issue. While especially waterfront redevelopment often aims to enhance public access to water-based amenities, the reality is that these spaces frequently become exclusive enclaves for affluent residents and tourists. To address this, policymakers should consider measures such as maintaining public ownership of waterfront land, ensuring free or low-cost access to recreational facilities, and designing spaces that are inclusive and welcoming to diverse social groups.

Looking ahead, studying blue gentrification offers numerous opportunities for future research. Beyond defining a conceptual framework as mentioned above, there is a need for longitudinal studies that examine how blue gentrification unfolds over time, capturing its long-term social, economic, and environmental impacts. Such studies could provide valuable insights into the sustainability of current approaches to developing (or redeveloping) blue infrastructure and inform more equitable and inclusive practices.

In addition, the role of climate change in shaping blue gentrification deserves greater attention. As rising sea levels and extreme weather events increasingly threaten coastal and riverine cities, the pressure to redevelop and fortify water bodies is likely to intensify. Understanding how these climate-driven transformations intersect with processes of gentrification is a critical area for future research.

In conclusion, blue gentrification is a complex and multifaceted phenomenon that reflects broader tensions between urban development, environmental sustainability, and social equity. While the field is still emerging, the growing body of research underscores its importance as a critical area of inquiry. By addressing the identified gaps and adopting a more inclusive, interdisciplinary, and globally representative approach, future studies can contribute to a deeper understanding of blue gentrification and inform more equitable and sustainable urban development practices.

Disclosure statement

The authors reported no potential conflicts of interest. AI-Tools (recent version of ChatGPT and DeepL) have been used to improve language and style, as well as to shorten certain text segments.

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