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Public green space adaptation and real estate market dynamics: the politics of designing resilient and just green spaces

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1. Introduction

Urban greening has become a crucial aspect of contemporary urban development, aiming to enhance environmental sustainability, improve public health, and mitigate the effects of climate change (see for example, Hansen et al., 2023; Kabisch et al., 2021; Triguero-Mas et al., 2015) The growing global adoption of urban greening strategies—such as parks, green roofs, and community gardens—aims to combat climate-related challenges like heat islands, flooding, and poor air quality (Frantzeskaki, 2019; Meerow, 2020; Pauleit et al., 2019). However, while green spaces bring many benefits, their distribution and accessibility often exacerbate existing social inequalities (Kabisch & Haase, 2014; Venter et al., 2020; Wüstemann et al., 2017). The interplay between market forces and social equity remains complex, as urban greening can inadvertently contribute to rising property values and displacement of marginalized communities (Anguelovski et al., 2018; Garcia-Lamarca et al., 2021) (Anguelovski et al., 2018; Garcia-Lamarca et al., 2021; Wu et al., 2022).

Moreover, fragmented governance structures and administrative silos frequently constrain the design and implementation of integrated greening policies, leading to inconsistent priorities between environmental, housing, and social agendas (Bush, 2020; Hansen et al., 2023; IPCC, 2022). The concept of "green gentrification" highlights this tension, wherein well-intentioned greening projects trigger real estate speculation, raising property values and excluding lower-income residents (Anguelovski et al., 2022; Gould & Lewis, 2016; Rigolon & Németh, 2018). The phenomenon of "green grabbing" is also well-documented, highlighting how economic interests drive exclusive green spaces that marginalize disadvantaged groups (Fairhead et al., 2012; García-Lamarca et al., 2022). Scholars have long advocated for "just green enough" approaches to avoid displacement (Curran & Hamilton, 2017; Wolch et al., 2014) and propose combining urban greening with affordable housing policies to ensure equitable urban development (Oscilowicz et al., 2022). However, there is insufficient research on how municipal policymakers actively navigate these dynamics in practice. Understanding local government strategies could help identify mechanisms to counteract the unintended consequences of greening efforts.

In this study, we gather knowledge, perceptions and experiences from local actors who directly engage with the challenges of urban greening. Through a comparative analysis of three Spanish cities, we explore the everyday practices in planning and implementing green space projects, with a focus on understanding how real estate market dynamics influence decision-making processes. Drawing on planning documents and key informant interviews with urban planners, policymakers, and other stakeholders, the paper sheds light on the organizational, financial, and strategic challenges that cities

face in balancing greening efforts with the need to prevent unjust outcomes. By foregrounding these local actors' experiences, the study assesses whether and how cities perpetuate or mitigate injustices during the planning and implementation of urban green spaces.

Based on the study of everyday municipal practices, this research contributes to debates on urban climate adaptation governance, responding to calls for restructuring institutional processes and conducting comparative analyses of climate adaptation planning (Fünfgeld & Schmid, 2020; Olazabal & Castán Broto, 2022; Patterson, 2021). The study's comparative approach highlights how municipalities leverage housing market data, socio-economic vulnerability indices, and environmental assessments to design equitable greening projects.

The paper is structured as follows: Section 2 outlines the research methods, including case study selection, key informant interviews, and data analysis. Section 3 presents the results, focusing on three project phases: (a) assessing needs and vulnerabilities to identify potential risks of unjust greening; (b) designing and implementing green space projects; and (c) post-implementation monitoring of outcomes. Section 4 discusses the key findings, emphasizing the challenges related to greening-related injustices that emerged from the interviews. Finally, Section 5 concludes with implications for urban greening policies and practice, with a focus on fostering resilience and justice in urban environments.

2. Research methods

2.1. A conceptual framework for assessing how municipalities account for real estate market dynamics in public green space adaptation projects

This study employs a conceptual framework that integrates two complementary approaches to analyse municipal actions in green space adaptation (Figure 1). The first approach delineates three key phases of municipal intervention: (a) *Assessing needs and vulnerabilities* to identify areas for intervention and the risks of unjust greening, whether by omission or commission; (b) *Greenspace design and implementation*; and (c) *Monitoring and evaluation processes* to track how urban greening projects unfold post-implementation and to identify any emerging injustices. This classification reflects established approaches in urban planning literature, particularly the work of Castán Broto and Westman (2020), who emphasize the importance of distinguishing between whether municipalities act (i.e., initiate greening projects) and evaluating the outcomes of those actions in terms of justice. By separating these phases, this framework allows for a more structured analysis of how and when unjust outcomes might occur during different stages of urban greening projects.

The second approach draws on by Anguelovski et al. (2016) to classify urban injustices as acts of omission (when greening efforts prioritize already privileged areas—such as economically valuable coastal or central districts—while neglecting areas of greater social and ecological vulnerability) and commission (or green gentrification, when urban greening projects in disadvantaged areas catalyse processes of capital investment, social upgrading, and ultimately, displacement of low-income and minority residents). Additionally, it incorporates Davidson and Lees' (2005) model of gentrification drivers: *landscape change*, *capital investment*, *social upgrading*, and *displacement*. Acts of omission

stem from concentrated investment and landscape improvement in affluent areas, whereas acts of commission emerge when all four drivers interact, leading to displacement in disadvantaged neighbourhoods. This dual framework enables a nuanced examination of municipal strategies in urban greening.

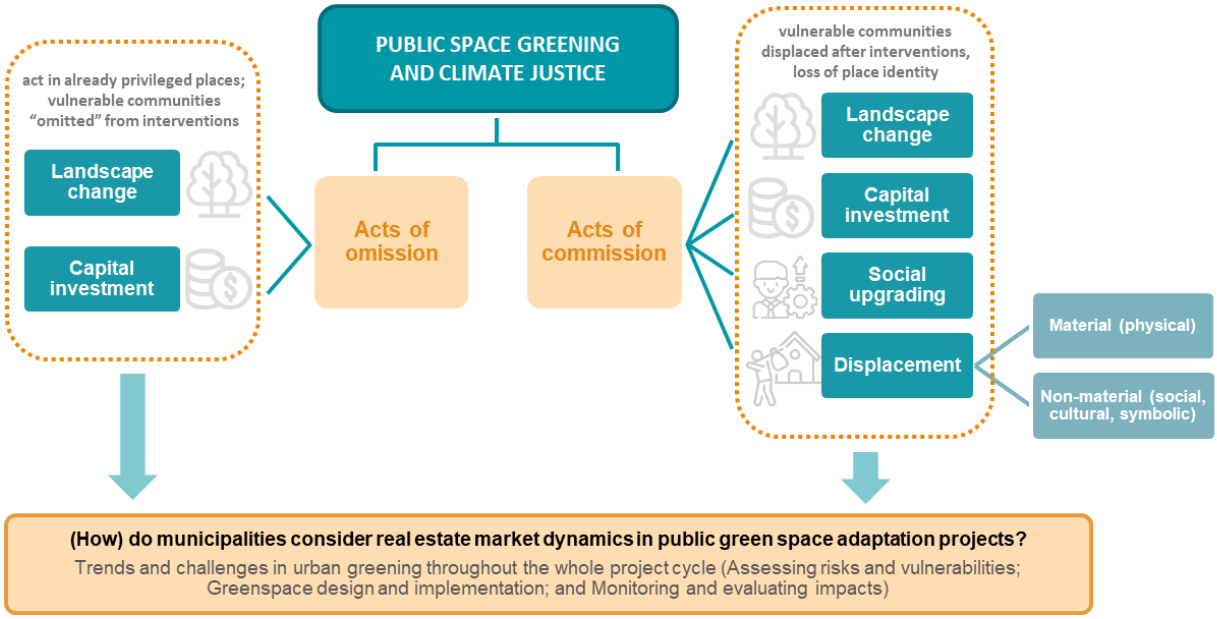

Figure 1. Conceptual framework for assessing how municipalities account for real estate market dynamics in public green space adaptation projects. Developed by the authors combining categories of urban injustice (Anguelovski et al., 2016); and characteristics of gentrification (Davidson & Lees, 2005)

Based on the above framework, we hypothesize that integrative analyses—where data on landscape change, capital investment, social upgrading, and displacement are overlaid—are crucial for municipalities to avoid unjust and maladaptive outcomes. Without this layered approach, acts of omission can perpetuate inequalities in green space access, while acts of commission can exacerbate social injustices, particularly through processes like gentrification. Therefore, our analysis of interviews with local officers seeks to examine whether, and how, municipal offices adopt this integrative lens when planning, implementing and evaluating urban greening initiatives. By integrating these two frameworks, the paper provides a nuanced analysis of municipal actions in public green space adaptation projects, highlighting the complexities of achieving socially and environmentally just outcomes in the face of market pressures and urban inequality.

2.2. Data collection and analysis

This study employs a multiple case study design to explore how municipalities account for real estate market dynamics in public green space adaptation projects. The research involved semi-structured interviews with key municipal actors, complemented by a systematic review of grey literature and municipal documents. The methodology is structured to ensure that the selected case studies and participants are representative of the broader processes of urban greening and real estate management in Spain, providing a comprehensive and well-contextualized understanding of these dynamics.

2.2.1 Case Study Selection

The selection of the three case studies—Bilbao, Valladolid, and Malaga, see Table 1 and Figure 2—was informed by a thorough review of municipal climate adaptation plans and informal consultations with experts, including discussions with research supervisors and personal contacts across various Spanish municipalities. These cities were chosen for their strong emphasis on urban resilience, as evidenced by their municipal climate adaptation plans, climate assessments or participation in adaptation research projects. They were also chosen for their varying levels of pressure from real estate markets and their diverse greening strategies shaped by their unique bioclimatic regions. Each city represents a distinct context of urban greening and social inequality, making them well-suited for examining how municipalities integrate real estate dynamics into urban greening initiatives:

1. **Bilbao**, located in the Basque Country, is renowned for its post-industrial urban regeneration projects since the 1990s, which have revitalized the city's economy and landscape. However, these initiatives have faced criticism for prioritizing international investor and tourism-focused infrastructure over local needs. The city's geographic constraints, surrounded by mountains, contribute to a shortage of green spaces in the city centre, while rising tourism exacerbates housing affordability issues.
2. **Valladolid, with** a slower real estate market, faces rising rental prices affecting vulnerable households. The city focuses on conserving historic sites while promoting social housing and sustainability, with efforts to integrate green spaces into urban regeneration projects. This approach is supported by municipal, provincial and European funding for innovative urban sustainability projects. However, lower income levels and economic constraints challenge equitable greening, and declining rental supply increases pressure on vulnerable populations.
3. **Malaga**, on Spain's southern coast, faces intense real estate pressures driven by international investment and luxury property demand. While the city's economy benefits from tourism, technology, and commerce, these sectors have deepened social inequality, creating a housing market that many locals find unaffordable. This development model also limits opportunities for urban greening, particularly in densely populated areas. Advocacy groups highlight how luxury developments overshadow green space needs

Table 1. Overview of case study cities and preliminary evaluation of real estate pressures and urban greening challenges. Source: National Institute of Statistics (INE), 2022; Basque Institute of Statistics (Eustat), 2022. See also Supplementary Material 1 (SM1)

City	Population	Bioclimatic Region	Real Estate Pressure	Urban Greening Challenges	Average per capita income Levels
Bilbao	346.096	Oceanic	High, driven by tourism	Limited green spaces, rising rents, social tensions	27% above Spanish average
Valladolid	297.459	Continentalized Mediterranean	Moderate, rising rental prices	Social housing focus, slower economic revitalization, low tourist housing	9% above Spanish average
Malaga	586.384	Mediterranean	Very high, international investment	Housing affordability, real estate expansion limiting greening	9% below Spanish average

For each case study, policy documents, reports, and planning materials were analysed (Table SM1 in Supplementary Material 1, SM1). This background review helped contextualize the interviews and provided supplementary data for triangulating the findings from the interviews.

Figure 2. Case studies location map

2.2.2 Selection of Key Informants

Key informants were selected based on their professional roles and expertise in urban planning and sustainability, including Heads of Sustainability Departments, Urban Planning Directors, Project Managers, and Councillors for Urban Regeneration. Participants were identified through document reviews and expert consultations, ensuring representation of technical and political perspectives. The study focused exclusively on municipal decision-makers, excluding grassroots organizations and private actors.

2.2.3 Data Collection: Semi-Structured Interviews

Between February and April 2024, we conducted twelve semi-structured interviews (four per city), exploring municipal considerations of real estate dynamics in urban greening. with 12 key informants, four from each of the three case study cities. These interviews were guided by the primary research question: "(How) do municipalities consider real estate market dynamics in public green space adaptation projects?" and focused on three key phases of urban planning: (a) assessing needs and vulnerabilities, (b) greenspace design and implementation, and (c) post-implementation monitoring (see Interview Guide in Supplementary Material 2, SM2).

Interviews were conducted in Spanish, recorded and transcribed verbatim. Anonymity was ensured, with participants identified numerically (e.g., I1, I2). Table 2 provides a summary of the interviewees' professional fields across the three case studies. The study received ethical clearance from the Institutional Review Board of the Basque Centre for Climate Change, and all participants signed informed consent forms before the interviews.

Table 2. Profiles of interview participants.

City	Professional field	Interviewee ID
Bilbao	Urban Planning	I1
	Urban Planning	I2
	Urban Regeneration	I3
	Urban Sustainability	I4
Valladolid	Urban Planning	I5
	Urban Sustainability	I6
	Urban Planning	I7
	Innovation Agency	I8
Malaga	Urban Planning	I9
	Urban Planning	I10
	Urban Sustainability	I11
	Urban Sustainability	I12

2.2.5 Data Analysis

We conducted a hybrid thematic analysis using NVivo, combining deductive and inductive coding methods (Boyatzis, 1998). Deductive coding was based on the theoretical framework established in section 1, focusing on four key dimensions relevant to urban greening and real estate dynamics: capital investment, social upgrading, landscape change, and displacement. Inductive coding identified emerging themes related to municipal responses to real estate pressures (see Table SM2 in Supplementary Material 3, SM3 for Coding frame). To ensure robustness and result validity, findings were triangulated with secondary data from policy and planning documents in each city, including municipal reports, statistical data, and other relevant sources (documents used for background review, see SM1).

3. Results

Despite the distinct profiles of the three cities studied, notable similarities emerged in how the municipalities of each city approach urban greening and manage the risks associated with real estate market dynamics. Findings are structured according to three key municipal planning phases: 1) Assessing needs and vulnerabilities; 2) Greenspace design and implementation; and 3) Project Monitoring. For each phase, we examine how municipalities address the challenges of promoting just urban greening and the obstacles they encounter, guided by the conceptual framework outlined in

Figure 1. Table 3 presents the main sub-themes identified in the interviews, illustrative quotes, and corresponding justice impacts (acts of omission and commission identified), organized by the key phases of municipal action. The sub-themes are color-coded according to the main challenge they reflect, which will be further explored in the discussion section.

3.1. Assessing current vulnerabilities and potential risks derived from urban greening

Municipalities collect extensive environmental and socio-economic data but rarely integrate this information to guide urban greening initiatives. This failure to cross-reference data on landscape change, capital investment, social upgrading, and displacement hinders the identification and prediction of potential cases of unjust greening.

Most respondents informed that they routinely collect information on environmental and climatic indicators such as air and noise pollution, temperature or precipitation, as well as socioeconomic indicators through the census. The CIEDES Foundation in Malaga, for example, publishes an extensive annual report on various socioeconomic, environmental, and real estate market indicators (Fundación CIEDES, 2023). However, uncertainty remains regarding whether these data inform specific urban greening projects: *"What I am not clear about, and I think not, is whether the urban planning and management area of the City Council makes any use of the data collected and the information produced by CIEDES"* (I10, Malaga). In some recently revised PGOUs (Plan General de Ordenación Urbanística, the fundamental urban planning instrument produced by municipalities in Spain), such as the one in Bilbao from 2023, there was a stronger emphasis on socio-demographic and climate resilience studies. However, these efforts have not significantly influenced the design of specific urban greening projects. As local planning officers pointed out, this only happens every 30-50 years and the resulting plan remains *"very vague, only giving general guidelines"* (I1, Bilbao).

Regarding Bilbao's recent PGOU, its climate change adaptation and mitigation strategy primarily focuses on intermodality and urban density, with limited flood risk interventions, lacking vulnerability assessments at the neighbourhood level. No guidelines or specific actions were developed for green space design and placement beyond regional climate scenarios (Ayuntamiento de Bilbao, 2023).

Real estate market trends, a critical factor in assessing capital investment and displacement risks, are also largely overlooked. Municipal planning offices do not consider real estate data within their jurisdiction, relying instead on provincial-level valuation reports that lack granularity: *"What we receive each year are the prices provided by the Association of Real Estate Agents for land valuation purposes. They give us the prices they observe for finished housing. This includes everything: the constructions value, the urbanization value, and the value of everything else, making it difficult to break down"* (I5, Valladolid). Although detailed real estate assessments occur in municipal housing programs, they are not applied to urban greening initiatives, preventing early detection of gentrification risks.

The primary focus on landscape change factors (green cover distribution) when assessing urban greening needs, without considering variables like socioeconomic vulnerability, capital investment or displacement potential, prevents the identification of areas with the greatest vulnerability or those at higher risk of gentrification. Consequently, the empirical data from these interviews suggest that cities are not conducting the necessary preventive analyses to avoid cases of unjust greening, whether by omission or commission.

3.2. Planning and implementing green interventions

Interviews with municipal officers revealed the factors that give rise to unjust urban greening. These stem most notably from the lack of a comprehensive approach integrating landscape change, capital investment or demographics, limited community participation, and the prioritization of green spaces based on land profitability. The absence of specific measures to prevent green gentrification further exacerbates these issues, generating injustices of both omission and commission. While we found significant convergences across the three cities, contextual factors related to local institutional and market conditions shape somewhat divergent outcomes. In Malaga, greening has been shaped by a market-oriented, pro-tourism agenda, with emblematic projects such as the Muelle Uno waterfront or historic park restorations reflecting a selective approach concentrated in high-visibility areas. Administrative priorities often align with real estate and tourism interests, reinforcing socio-spatial inequalities. In Bilbao, post-industrial regeneration under a technocratic governance model has enabled strong public planning coordination and spatial control, yet an emphasis on flagship redevelopment and compact geography has limited more socially equitable greening and affordable housing. Tensions thus remain between growth-oriented regeneration and neighbourhood-scale ecological justice. On the other hand, Valladolid has adopted a more incremental and redistributive approach through small-scale regeneration and participatory planning addressing neighbourhood-specific issues, supported by stable housing markets and slower urban development (Alvarez-Palau et al., 2019; Andrade et al., 2021).

Representatives from all the three municipalities noted that urban greening is approached sectorally, reflecting institutional fragmentation. Different departments (urban planning, environment, security, or culture) review projects independently, often without an integrated approach: *“Right now the developer makes a first proposal and unless the proposals are very discordant, their solution is usually validated, with the adjustments that each department makes (…) But with very sectorial visions without having a vision perhaps so comprehensive of what the project itself is”* (I1, Bilbao). When choosing the location, size, use, and management of green spaces, the focus is often on the distribution of green cover (landscape change) and maintenance affordability, overlooking vulnerable groups and place identity. For instance, projects in areas with untapped potential, like socio-economically depressed neighbourhoods or historic districts, can encourage market speculation if they ignore land affordability or traditional socio-cultural uses of public space. A notable example is the Malaga waterfront promenade, which, while open to the public, has significantly increased the value of high-end housing along the coast.

Moreover, limited public participation reinforces elite-driven urban agendas while excluding vulnerable communities, leading to instances of both omission and commission. Although some district councils and community associations are involved, their input often comes too late for meaningful co-design (I7, Valladolid). Even when participatory processes occur, they often focus only on environmental aspects or greenspace programming, without discussing place identity, land affordability, or the city's overall strategy. This depoliticization of urban greening reduces its potential for meaningful and just impact on cities.

Municipal urban regeneration projects appear to be an exception, as they apply tailored solutions considering neighbourhood vulnerabilities, income levels, and local priorities. A municipal official in Bilbao noted: *"... both in municipal aids and those from the Basque Government, more interventions and greater subsidies are given in areas declared vulnerable (...) The neighbourhoods that feel more unprotected have one positive aspect: they engage more in social activities (...) This is why we are*

committed to promoting small projects (…) spaces for recreation and social gatherings. This is what the residents of these neighbourhoods want and value. Meanwhile, in the city centre, they prefer gardens and leisure spaces..." (I3, Bilbao).

Capital investment and project financing sources also shape green space quality and distribution. Officers from the three cities stated that privately financed projects exhibit stark differences in quality depending on the expected land sale profits. A Malaga municipal officer explained: *"Municipal urban planning sets minimum quality standards, but developers aim to maximize their profit, resulting in varied quality across different areas"* (I11, Malaga). A Valladolid officer added: *"everything depends on the final value you want to achieve in the housing development. If you are going to sell it for 3,000 euros or for 1,000 (…) for the business model to work out for me, I have to spend on urbanization X. And I can't spend more, because if I spend more it will be at the expense of my profits"* (I5, Valladolid). Consequently, high-value developments attract substantial greening investments, while lower-value areas receive minimal green infrastructure, constituting an injustice by omission.

Additionally, in cities with greater real estate speculation, such as Bilbao and especially Malaga's seafront, injustices by commission arise where high-budget green interventions accompany luxury developments in poorer areas, activating gentrification processes. Publicly funded greening projects face similar constraints from profitability requirements. In Bilbao, a municipal officer remarked that the construction of tall residential towers generated the capital gains needed to conceal train tracks and create new public space: *"…if you say you would need more open space, I would say yes, but if I have more open space, the operation doesn't work. This is a matter of numbers, you have urbanisation charges"* (I2, Bilbao).

Balancing green space creation with multiple public space uses adds further difficulty, often driven by urban competitiveness agendas prioritizing tourism or events. Investments mainly target city centres or tourist areas, which are often already experiencing gentrification. As noted by an urban sustainability officer, such spaces often require harder materials and may conflict with residents' daily needs (I4, Bilbao). The drive to attract major events was mentioned by officials from Malaga and Bilbao, deemed necessary in these times of intense competition among cities: *"The most centric spaces are overexploited for event generation. Territorial centrality is crucial for our city's evolution, especially in these times of intense competition between cities (…) Although we are a city of 350,000 people, we are internationally positioned among cities with a million residents. Maintaining that status is crucial for us"* (I2, Bilbao).

Despite recognizing the importance of justice criteria, no concrete measures exist to prevent cultural or physical displacement due to green gentrification. Interviewees noted those national or regional frameworks—such as the Urban Regeneration and Building Law (2015), Housing Law (2023), or the Basque tourist apartment regulation (2018)—could contribute to fairer greening by mandating social housing ratios or public open space. However, enforcement is inconsistent. The Basque Land and Urban Planning Law (2006), for instance, requires 75% of residential developments to be subsidized, yet developers often bypass this by transferring obligations to poorer districts, perpetuating inequality.

Finally, political and ideological orientation also influences greening approaches. A Valladolid official noted that some administrations are more attuned to neighbourhood needs, while others focus on large-scale macro-projects: *"In Valladolid, there have been cases of spending 15 million euros in one area, while, in other periods, there have been 15 projects of one million each"* (I5). Similarly, the former director of Malaga's Planning Department stated: *"The ideological approach directly affects relations*

with social and economic actors and the investment priorities of the city" (I10, Malaga). Nonetheless, planning frameworks can help mitigate political power. Valladolid's 2020 General Urban Development Plan for example, promotes neighbourhood regeneration through targeted micro-improvements and "urban surgery" projects to address localized issues (Ayuntamiento de Valladolid, 2020).

3.3. Monitoring and assessing the socioeconomic impacts derived from urban greening and real estate dynamics

In this third section, we analyse the extent to which municipalities monitor and assess the socio-economic impacts of urban greening and its corresponding real estate dynamics, as it is these interactions that give rise to unjust urban greening and the lack of project monitoring makes it impossible to identify, understand and correct them as far as possible. Among the key themes identified are the poor monitoring of individual projects compared to the monitoring of plans or strategies, and the primary focus on the geographical dimension (green cover) as opposed to the socio-economic impacts of projects.

First, the interviewed officers stated that individual project monitoring is typically conducted only when mandated by external funding bodies, which require specific reporting: *"Unless they specifically ask you to do so within the project you are carrying out because you have European funding and they want you to also include the results, I believe that each project is not monitored"* (I11, Malaga). As a result, existing project monitoring indicators are often shaped by the criteria set by these funding bodies, potentially overlooking the needs of local vulnerable groups (cases of omission) or aligning with elite interests (cases of commission).

Some urban planners have undertaken personal initiatives to monitor project impacts, though these efforts are not official or not standardized, and depend heavily on the goodwill of individual officials. For example, a planner from the Valladolid Innovation and Economic Development agency monitored the economic activity on streets where greening projects had been implemented to see if there were changes in commercial openings and closures (I8, Valladolid). As in the previous case of monitoring shaped by funding entities, this case can also lead to acts of both omission and commission.

Institutional fragmentation further hinders monitoring effectiveness, as conflicting departmental priorities prevent the establishment of comprehensive assessment frameworks. As a result, individual projects are usually only evaluated in terms of their contribution to the overall green cover increase, neglecting impacts on place identity, demographics, land value, or increased tourist amenities in nearby areas. This narrow focus leads to a lack of awareness and understanding about the socio-economic effects of green projects, both in privileged and deprived areas, and prevents the adoption of corrective measures to address injustices, constituting acts of omission and commission.

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Table 3. Summary of the main sub-themes identified for the different project phases characterized as acts of omission or commission in the three case studies. The colours represent the type of challenge (theme) they relate to, as will be further expanded in the discussion section. LC = Landscape Change; CI = Capital investment; SU = Social Upgrading; D = Displacement.

● = Organizational challenges; ● = Financial challenges; ● = Strategic challenges.

Key planning phases	Sub-themes	Participant quotes (examples)	Urban Greening Injustices: Acts of Omission	Urban Greening Injustices: Acts of Commission	LC	CI	SU	D
Preliminary analyses to assess potential unjust urban greening risks	Lack of systematic integrative analysis	*"What I am not clear about, and I think not, is whether the urban planning and management area of the City Council makes any use of the data collected and the information produced by CIEDES"* (I10)	Municipalities do not integrate landscape change and capital investment data, failing to prioritize vulnerable areas and instead focusing on equal green cover distribution per inhabitant.	In valuable and socio-economically vulnerable neighbourhoods, failing to link landscape change, capital investment, social upgrading, and displacement can cause gentrification and displacement if preventive measures are not taken.	✓	✓	✓	✓
	Lack of citywide cultural identity information		Municipalities do not gather comprehensive information on cultural identity, leading to interventions that neglect the unique identity and socio-political values of local communities.	Without understanding neighbourhood identity and its ecological and socioeconomic vulnerabilities, greening may attract newcomers and tourists, leading to cultural displacement.	✓			✓
Planning and implementation of green interventions	Lack of a comprehensive view integrating landscape change with other variables	*"Right now the developer makes a first proposal and unless the proposals are very discordant, their solution is usually validated (…) with very sectorial visions without having a vision so comprehensive of what the project itself is"* (I1)	-	Uniform greening practices without measures to prevent spectacular or eye-catching projects from attracting tourism or real estate interest leads to the displacement of original residents.	✓	✓	✓	✓
	No specific measures to prevent physical and cultural displacement	*"The local councils have no authority in that regard. We have no authority to deprive people of their freedom to set certain type of business or another in one area or another. Nor do we have the freedom to say, hey, set this price for your home or don't set this rent higher than this"* (I11)	-	National and local regulations about social housing or public space ratios are insufficient to address real needs, allowing gentrification processes to continue, especially in large cities or those with significant historical, commercial, or cultural value.	✓	✓	✓	✓
	Key role of private developers	*"Right now the developer makes a first proposal and unless the proposals are very discordant, their solution is usually validated, with the adjustments that each department makes (…) But with very sectorial visions without having a vision perhaps so comprehensive of what the project itself is"* (I1)	Greenspace quality varies based on private developers' aims, resulting in substantial differences between green enclaves in wealthy residential areas and poor neighbourhoods with minimum quality standards.	Urban greening associated with high-value real estate developments in centric or derelict neighbourhoods can lead to the displacement of vulnerable populations.	✓	✓		

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Key planning phases	Sub-themes	Participant quotes (examples)	Urban Greening Injustices: Acts of Omission	Urban Greening Injustices: Acts of Commission	LC	CI	SU	D
	Green spaces subject to the profitability of urban development operations	*"Everything depends on the final value you want to achieve in the housing development (…) for the business model to work out for me, I have to spend on urbanization X. And I can't spend more, because if I spend more it will be at the expense of my profits"* (I5)	Municipal greening projects often rely on capital gains from urban developments, more funding is available if operations provide real estate profits, while non-profitable areas get fewer resources.	Urban greening associated with high-value real estate developments leads to the displacement of vulnerable populations.	✓	✓		
	Limited community participation	*"The participation prior to the design, which is the good thing, that is, that there is a process with workshops, walks, etc. It is reduced, in general it is reduced"* (I7)	Local vulnerable communities are not engaged from the beginning in the design of green spaces, failing to consider their knowledge and needs.	Elite groups and investors set the urban agenda and the characteristics of individual greening projects. The de-politicization of urban greening and its socio-economic impacts limits its transformative potential.	✓	✓	✓	✓
	Public space use and exploitation determined by urban competitiveness agendas	*"The most centric spaces are overexploited for event generation (…) we are internationally positioned among cities with a million residents. Maintaining that status is crucial for us"* (I2)	Prioritization of the recovery or maintenance of public (green) spaces that can be marketed for tourism or the attraction of events, neglecting non-profitable areas	Investments mostly focused on city centres or tourist areas, which are often already under gentrification processes. This leads to an increased gentrification and displacement (cultural and/or physical) of residents.	✓	✓		
Monitoring and assessing impacts from urban greening and real estate dynamics	Focus on overall green cover increase rather than socio-economic impacts of greening projects in nearby areas	*"We do not focus on socioeconomic issues (...) the plans for parks and gardens are completely linear and transversal (...) green spaces don't recognize social classes, in the sense that we try to make green areas as accessible as possible for everyone"* (I12)	Lack of knowledge about whether green projects generate positive socio-economic impacts in already privileged parts of the city, while other areas are neglected. This hinders the possibility of taking corrective measures.	Limited awareness of potential socio-economic impacts related to gentrification and displacement—including demographic shifts, rising land prices, and unchecked expansion of tourist apartments or terraces in public spaces—hampers the ability to take corrective measures.	✓	✓	✓	✓
	Some municipal officers take personal initiatives to monitor project impacts	*"I would say that there is no system for monitoring and evaluating the socioeconomic impact of specific impacts, and I highly doubt that anyone does. In fact, thanks to Urban Green Up, it was one of the variables that I tried to monitor (…) It was something very specific that I analysed myself"* (I8)	Monitoring depends on the good will of municipal officials, while vulnerable places may remain overlooked.	Municipal officials can prioritize the agendas and monitoring interests from elite groups and investors.	✓	✓	✓	✓
	Monitoring individual projects is uncommon, except if required by external funding organizations	*"Unless they specifically ask you to do so within the project you are carrying out because you have European funding and they want you to also include the results, I believe that each project is not monitored"* (I11)	If project monitoring indicators exist, they are often based on the criteria of funding entities and might overlook the needs of local vulnerable groups.	The lack of monitoring of projects in terms of justice depoliticises urban greening, potentially increasing the vulnerability of marginalized groups.	✓	✓		

4. Discussion

Analysis of interviews and official documents revealed three challenges shaping municipalities' capacity for just urban greening: (1) A siloed and reactive approach to urban green planning, focused predominantly on green cover redistribution (Organizational challenge); (2) Greenspace financing heavily dependent on real estate operations nearby (Financial challenge), and (3) The difficulty of balancing citizen well-being with urban competitiveness strategies through greening interventions (Strategic challenge). These interconnected challenges highlight the urgent need for municipalities to tackle real estate inequality, housing, and public space in tandem with urban greening. Prioritizing property value increases creates a city that is wealthier, but not just, often exacerbating social inequities rather than addressing them.

4.1. Organizational challenge: Siloed and reactive urban planning approach

Based on our conceptual framework, cases of unjust urban greening arise from the intersection of landscape change and capital investment (acts of omission), compounded by social upgrading and displacement (acts of commission) (Anguelovski et al., 2016; Davidson & Lees, 2005). In the three Spanish cities studied, greening efforts greening efforts prioritize green cover expansion over socio-economic vulnerability, land affordability, or neighbourhood cultural identity (see Table 3, sub-themes highlighted in blue). As a result, areas with high socio-economic vulnerability may not be prioritized, or their unique cultural identities might be disregarded. Furthermore, when projects are monitored, evaluations remain concentrated on physical landscape changes, often neglecting the socio-economic and cultural impacts on the community. This narrow focus on landscape outcomes perpetuates structural inequalities and can lead to the displacement of vulnerable communities as green projects drive up area values, unintentionally leading to acts of both omission and commission that undermine local resilience.

The main challenge in this regard lies in moving from a reactive to a proactive and integrated planning approach. In all three cities, municipal departments responsible for greening, housing, and land management operate in institutional silos that impede data sharing and coordinated decision-making. This fragmentation, common across many urban governance systems, prevents the identification of early gentrification indicators, such as proximity to urban renewal zones, business districts, or declining crime rates (Rigolon & Németh, 2020; Shokry et al., 2022). As previous studies highlight, administrative fragmentation constrains cross-sector collaboration, reinforcing short-term, project-based logics rather than long-term strategies that integrate environmental, social, and housing objectives (Bush, 2020; Hansen et al., 2023; Li et al., 2017; Ramyar et al., 2021). Effective greening governance therefore demands institutional coordination mechanisms and shared accountability frameworks that bridge environmental and social policy domains.

Barcelona offers illustrative steps in this direction, integrating greening with urban, environmental, and housing policies, seeking just urban greening through diverse strategies such as the Climate Shelters plan or the Barcelona Nature Plan, which involves residents in over 40 green projects aimed at enhancing biodiversity and climate resilience based on community needs. Similarly, the Superblock plan creates green spaces while ensuring affordable housing, complemented by recent policies reclaiming housing from tourism use and mandating social housing allocations (Barcelona City Council, 2024). These initiatives demonstrate that institutional alignment and interdepartmental coordination

can foster greening processes that serve all residents, rather than primarily benefiting real estate interests.

In summary, the evidence gathered in this study reveals that having the means to foresee, take measures, or monitor the dynamics between greening and the real estate market is not akin to addressing it or to recognizing its unjust nature. Without a fundamental shift in governance frameworks to overcome current administrative limitations and siloed planning practices, municipalities will struggle to prevent greening from exacerbating existing inequalities. Greening initiatives should be embedded within broader, integrated frameworks that balance ecological goals with social equity, economic stability, and cultural identity. This requires proactive and transformative approach to planning (Castán Broto et al., 2019; Pelling et al., 2015), and deep engagement with the local community to ensure that interventions address not only the physical environment but also social networks, place attachment, and the right to stay in one's home. A resilient and just city is one that safeguards the fundamental well-being of its residents, ensuring that green interventions enhance rather than undermine social justice.

4.2. Financial challenge: Greenspace financing tied to real estate operations

While cities seek equitable green access, financial constraints often dictate greening initiatives, particularly the availability of public and private funding. As a result, green projects tend to flourish in areas where real estate operations promise greater profitability, while more vulnerable and less profitable areas receive fewer resources. This dependency on the real estate market creates new landscapes of unequal socio-ecological vulnerability, leading to injustices of omission, where poorer areas are neglected, and commission, where green space creation in economically depressed areas triggers gentrification, displacing vulnerable populations and exacerbating social inequalities (Table 3, yellow sub-themes). While this pattern is particularly evident in Malaga, where planning priorities seem to align closely with tourism and real estate interests, interviewees in Valladolid also noted that higher-value developments tend to attract more investment in greening than average, reinforcing uneven spatial outcomes.

Reducing dependency on real estate profitability requires public control over land and housing. In Amsterdam, where roughly 50% of housing is social and governed by housing associations under strong public oversight, stable housing policies safeguard against the inflationary effects of urban greening (Beskind, 2021). Berlin, with 15%-20% publicly owned housing, is increasing this share through expropriation and public acquisition (T.-J. Smith, 2019). These models and recent comparative studies show that public ownership can, up to some point, control land prices, minimizing gentrification and maintaining affordable housing as cities green (Anguelovski et al., 2024).

Promoting community-driven housing models, such as Community Land Trusts (CLTs) and cooperatives, can also curb real estate's dominance. These models lower housing costs, build shared resources, and prevent both displacement and social isolation. Amsterdam, facing a severe housing crisis, promotes cooperatives alongside policies like tackling vacancies and banning short-term rentals for new builds (SUP Amsterdam, 2024). In Spain, despite a strong homeownership culture and a lack of protective measures against speculation, cooperative models are emerging. Notably, Barcelona's La Borda cooperative demonstrates how self-managed housing can include shared green spaces and foster neighbourhood cohesion (Barcelona City Council, 2022).

Municipalities can also leverage financial tools like land value capture, participatory budgeting, rent control, and land banking to reinvest in affordable housing and public goods. These mechanisms enable cities to finance greening equitably, resisting real estate speculation and ensuring benefits reach marginalized communities.

4.3. Strategic challenge: Finding the balance between citizen well-being and urban competitiveness

Urban greening is increasingly tied to city branding strategies aimed at attracting tourism and investment. The three municipalities studied, but especially Malaga and Bilbao, show that public space decisions are influenced by local strategies aimed at enhancing city branding and competitiveness at the national and international levels. Municipal decisions frequently prioritize lucrative uses of public space, potentially excluding long-term residents or raising land values in ways that displace local businesses and communities (Table 3, green sub-themes). This trend, which prioritizes economic gains over social justice, has long been critiqued for commodifying public spaces and intensifying gentrification (Curran & Hamilton, 2017; Fairhead et al., 2012; N. Smith, 2007). In contrast, Valladolid's more modest economic and spatial context, together with its limited tourism pressure, has fostered a greening approach less driven by market imperatives, enabling its planning agenda to balance sustainability and social equity more effectively.

While it cannot be denied that cities must navigate the competitive landscape of city branding to attract investment and ensure economic survival (Anttiroiko, 2015), a critical discussion is needed on whether the pursuit of competitiveness is giving away public spaces (and housing plots) to the market. In fact, today, tourism is considered one of the main gentrifying agents in cities, also in Spain, with Malaga as one of its main representative cases (Chamizo-Nieto et al., 2023; OMAU, 2023), but also Bilbao (Ekologistak Martxan Bizkaia, 2024). Yet institutional awareness of green gentrification and other socio-political implications of greening remains limited, often framed as an unintended side effect rather than a structural injustice (Checker, 2020; Neidig et al., 2022; Verheij & Nunes, 2021). Without explicit recognition of these dynamics, city branding and "green growth" narratives risk reproducing exclusionary urbanism under the guise of sustainability.

To counter this, cities should involve residents and community organizations in greening projects, ensuring that public space transformation reflects community priorities rather than market-driven or city-branding objectives (Bonakdar & Audirac, 2020; Jernsand & Kraff, 2017; Kavaratzis & Kalandides, 2015). These initiatives foster community pride and empower local residents to take ownership of green spaces by participating in their design, management, and maintenance. Community-led greening initiatives—such as urban gardens in Rome or Vilnius—demonstrate how shared governance fosters belonging and reduces displacement pressures. For example, in New York, post-Sandy recovery plans required certification that projects would not reduce affordable housing for low- and moderate-income residents. Similarly, revenues from tourism or urban competitiveness strategies should be redistributed to strengthen public services and green spaces in vulnerable areas, prioritizing local suppliers and businesses and creating quality local employment.

Integrating greening with housing and local welfare policies allows cities to move beyond attractive urban landscapes, addressing systemic inequalities and building just urban resilience (Castán Broto & Westman, 2019; Dempsey et al., 2011; Sultana, 2022). By reframing greening as a social right rather than a branding asset, municipalities can ensure that urban nature supports long-term habitability, community stability, and shared prosperity.

5. Conclusions

This work examines how municipalities integrate the dynamics of the real estate market into public green space projects, viewed through a climate justice lens. Focusing on the phases of data analysis, project design, implementation, and monitoring, we reveal how current practices—often fragmented, overly reliant on real estate financing, and driven by the pursuit of urban competitiveness—tend to ignore socio-economic and cultural impacts, unintentionally displacing vulnerable communities. By solely prioritizing green cover expansion, municipalities risk deepening inequality, as these projects frequently lead to rising property values, gentrification and displacement.

A key insight from our research is the organizational, financial, and strategic hurdles cities face in balancing environmental goals with social justice. Our study underscores the urgent need for cross-departmental collaboration that incorporates housing, planning, and environmental data to pre-empt and address unjust socio-economic impacts. Equally important, urban planners and policymakers must be aware of the socio-political implications of greening, recognizing how institutional decisions can unintentionally reinforce exclusionary or market-driven dynamics. Green space financing models must evolve to reduce dependence on the real estate sector, which often prioritizes profitable areas over marginalized communities. Alternative solutions, such as housing cooperatives and community land trusts, can empower residents, reduce gentrification pressures, and enhance resilience. Urban competitiveness strategies must involve the community in planning processes, ensuring that greening initiatives meet local needs and promote long-term neighbourhood stability—the cornerstone of urban prosperity. A truly resilient city is not only greener but also socially just, nurturing the cultural and economic well-being of its residents. Urban greening must, therefore, balance environmental and social benefits, moving beyond economic competitiveness to foster equitable, thriving cities.

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