Review

Barriers to Sustainable Urban Green Space Management: A Review of Limitations and Integrative Proposals

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Abstract: Urban green spaces (UGS) are crucial for delivering ecosystem services (ES), enhancing urban resilience, and enhancing public well-being. However, despite increased awareness and policy attention, the management of UGS continues to face significant challenges. This work synthesises findings from literature published between January 2010 and September 2025 addressing the limitations affecting UGS management in urban contexts, with a world coverage. A total of 40 documents were assessed. The analysis identifies a set of recurrent themes such as improper planning and management (42.5% of the documents), lack of supporting data (30.0%), accessibility and environmental equity issues (including gentrification risks) (17.5%), competing land use demands (15.0%), fragmented governance and inter-institutional silos (15.0%), financial and human resource constraints (12.5%), limited stakeholder participation (12.5%), or resistance to bottom-up approaches (7.5%). Despite contextual variations, shared principles emerge across case studies, including the importance of co-governance, multifunctionality, participatory planning, and integrated decision-making. Addressing these systemic barriers will require long-term investment, intersectoral collaboration, and planning cultures that prioritise equity, adaptability, and local capacity. The findings underscore the importance of cross-sector coordination, equitable access, and context-sensitive approaches in supporting transformative change in UGS planning and management. The review concludes by outlining research gaps and suggesting priorities for policy and practice that align with environmental sustainability and social justice goals. A final section proposes measures to address the highlighted issues in an integrated way, oriented towards the definition of a UGS sustainable management framework.

Keywords: urban green spaces; environmental justice; participatory planning; green infrastructure governance; nature-based solutions; sustainable management

1. Introduction

Urban green spaces (UGS)—including parks, street trees, green roofs, community gardens, and green corridors—are recognised as essential green infrastructure that deliver a broad range of ecosystem services (ES), including air purification, urban heat mitigation, stormwater regulation, biodiversity support, and recreational and cultural benefits. These services directly contribute to the achievement of several United Nations (UN) Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health & Well-Being), SDG 11 (Sustainable Cities & Communities), and SDG 13 (Climate Action) [1,2]. UGS are considered basic and fundamental components of sustainable cities [3]. Addressing them is vital to urban development due to their positive impact in human well-being and quality of life [4], being relevant to a wide range of disciplines, from medical to social sciences [5].

Recent studies have emphasised the importance of integrated and multidimensional UGS management frameworks. These frameworks aim to optimise ecosystem service delivery while addressing issues of accessibility, social equity—fair access to, and quality of, urban green spaces across different social groups and neighborhoods, and spatial justice—complementary principle ensuring that green spaces are fairly distributed across urban areas to reduce spatial inequalities [6,7]. Battiston and Schifanella [6], for instance, argue that relying solely on distance-based accessibility indicators underestimates the complexity of UGS access, advocating for frameworks that account for demographic needs and the quality of green infrastructure. Wang et al. [8] further support the integration of adaptive ecological principles into UGS governance to ensure resilience in the face of climate change and urbanisation. Several authors highlight the role of UGS in climate-resilient management [9,10], e.g., through the creation of a cohesive network supporting urban cooling and resilience [9].

UGS multifunctionality offer opportunities to address environmental pressures due to urbanization and provide social benefits and enhancing resilience to climate change while connecting diverse disciplines (biodiversity conservation, urban planning, and ecosystem service provision with the social aspects of sustainable development), bringing together social equity and urban sustainability through adaptive UGS management [8].

Despite such advances, the practical implementation of these frameworks remains limited. Reviews indicate that fragmented governance, short-term funding cycles, and weak institutional integration are key barriers to effective UGS management [7,11]. Additionally, urban planning practices often overlook the socio-ecological complexity of green spaces, resulting in an uneven distribution of benefits and risks associated with green gentrification—process where new or improved green spaces raise property values, leading to displacement or exclusion of lower-income residents [12]. Participatory, bottom-up approaches—approaches where local authorities involve residents and community actors from the start—are increasingly recognised as essential for improving the relevance, use, and sustainability of UGS, while improving social equity.

In a 2023 study, Hansen et al. [13] identified a positive advancement across Europe regarding policy and management tools focused on ecological issues, as well as a shift towards co-governance—approach where authorities and stakeholders share management responsibilities—and co-design processes—approach where stakeholders and residents collaboratively shape plans and solutions from the outset—for the period between 2014 and 2021. Mapping and co-design initiatives, such as those in the UK [14,15] and Finland [16], reveal that residents prioritise a wide range of provisioning (e.g., biodiversity) and cultural ecosystem (e.g., tranquillity and social gathering) and that aligning green space planning with these preferences can increase public support and usage.

However, vertical integration between national and local levels is often inconsistent, with misalignments obstructing effective implementation. These innovations also face institutional barriers, such as departmental silos, entrenched routines, and weak interdepartmental collaboration [13,17,18]. In many cases, progress depends heavily on individual staff initiative rather than institutional support, while municipalities frequently lack the capacity or resources to enforce necessary changes [13,18]. Furthermore, despite promising results, participatory approaches often remain disconnected from formal governance structures, they lack inclusivity (especially for marginalised populations), and are seldom evaluated for long-term impact [12,16].

Considering these challenges, there is a growing need to assess the limitations in UGS management critically. These include gaps in operational frameworks, governance fragmentation, and participatory mechanisms that fail to influence decision-making. These barriers highlight a web of complex structural issues, encompassing both social and institutional limitations. Addressing these issues is crucial to ensure that urban green infrastructure can deliver the full range of ecosystem services equitably and sustainably, leading UGS planning and management towards the necessary transformative change—process of systemic, long-term shift toward sustainability. This study contributes to this effort by synthesising recent literature on the limitations affecting UGS management and exploring how participatory and ecosystem-based strategies might help overcome them. Furthermore, based on the findings, the study proposes an integrated set of specific ideas towards the optimisation of a sustainable management framework for UGS.

2. Materials and Methods

This review started with a search in SCOPUS based on the keywords "urban green spaces" AND sustainable AND management AND (barriers OR constraints OR limitations), restricted to the period from January 2010 to August 2025, and limited to peer-reviewed articles, reviews, and book chapters. A total of 39 documents were found. One extra document was included, resulting from snowballing. In total, 40 documents form the basis of this review. The assessment included 2 main questions: Question 1—does the article addresses difficulties for efficient urban green space sustainable management? If so, which are the main issues?; and (2) Do the authors suggest

possible measures to address these limitations? If so, which are the most relevant measures? We also assessed geographical coverage (see Table S1 in Supplementary Materials).

3. Limitations Affecting the Management of Urban Green Spaces

Despite increasing recognition of the ecological and social value of urban green spaces (UGS), this assessment identified persistent and often overlapping limitations that hinder the effective and equitable management of UGS in many cities worldwide. Table 1 summarises the findings from the assessed literature.

Table 1. Main limitations found regarding the management of UGS (based on [19]).

Limitations	Supporting References	# (%)
Improper planning and management	[20–36]	17 (42.5)
Lack of detailed and relevant data to support decision-making	[30,32,35–44]	12 (30.0)
Accessibility and environmental equity issues	[26,33,35,40,45–47]	7 (17.5)
Competing land use demands	[21,25,29,48–50]	6 (15.0)
Insufficient/non-existent collaboration between institutions	[25,31,33,38,51,52]	6 (15.0)
Lack of funding and resources	[20,22,23,25,37]	5 (12.5)
Community engagement and participation	[21,24,40,42,48]	5 (12.5)
Climate change and environmental impacts	[40,43,53–55]	5 (12.5)
Conflicting development goals (economic vs. ecological vs. social)	[21,25,48,51]	4 (10.0)
Resistance to change, e.g., shifting from top-down approaches to bottom-up	[33,40,42]	3 (7.5)
Maintenance and stewardship	[24,29,46]	3 (7.5)

Improper planning and management in general is the most referred issue (e.g., [23]), encompassing many of the more detailed limitations such as the conversion of green land for real estate or infrastructure development (e.g., [20,48]), green gentrification, uneven spatial distribution of parks, and limited access for marginalised groups (e.g., [35,45,46]).

Technical constraints include inconsistent or inaccessible spatial data, lack of harmonised monitoring tools, and overreliance on simplified greenery metrics [41,56,57]. Huang et al. [41] caution against using street-level vegetation indicators as proxies for ecological function without calibration. Laatikainen et al. [43] and Brown and Fagerholm [58] advocate for the use of participatory GIS to better reflect user preferences and ecosystem services. Increasingly, data-rich planning approaches (e.g., like the BDA-UGSPD model proposed by Li et al. [36]) are seen as promising but remain limited to a few pilot applications.

Urban densification frequently displaces or fragments existing UGS, especially in peri-urban and vulnerable areas [28,49,56]. Haaland and van den Bosch [49] argue that densification often occurs at the expense of green multifunctionality. In Nanjing, Zhang et al. [56] document ecological degradation at the city fringe due to unplanned expansion. Hasan and Haider [29] note similar trends in Chittagong, where weak land-use controls and pollution compromise GI potential. These pressures necessitate improved spatial planning and more stringent zoning regulations.

Regarding green gentrification Rigolon [45] and Rutt and Gulsrud [26] describe how park investments can unintentionally drive rents up and displace low-income communities. Furthermore, the lack of equity considerations in decision-making exacerbates disparities in who benefits from urban greening [45]. Huang et al. [41] highlight the importance of demand-driven planning, particularly in underserved areas. Rambhia et al. [25] propose using social vulnerability maps and co-benefit indicators to prioritise green investments more equitably. Nonetheless, these methods remain underused in most formal planning processes.

Fragmented governance structures are a consistent theme across case studies [21,38]. Interdepartmental silos and overlapping mandates hinder integrated green space planning, particularly when multiple agencies (e.g., parks, transportation, environment) are involved without coordination [33,38,51]. Feltynowski et al. [38] underscore the difficulty of aligning goals and responsibilities across city departments in Poland. In China, Jia et al. [51] identify siloed implementation as a key reason why green stormwater infrastructure fails to scale. These challenges are further exacerbated by unclear leadership and weak policy enforcement [21,28].

Top-down governance remains dominant in many cities, limiting the effectiveness of participatory processes [40,42]. Studies consistently highlight barriers such as superficial consultation, lack of continuity in engagement, and the exclusion of seniors, youth, or migrants from planning [44,48]. In Tokyo, Zong et al. [24] found that local park initiatives struggled with low turnout and communication gaps. Multiple authors advocate for co-management models and digital participation tools, including social media, to improve engagement (e.g., [59]).

Several studies report underfunding, limited budgets, and personnel shortages as primary barriers to long-term UGS maintenance and innovation (e.g., [23,37]). These challenges are particularly acute in cities undergoing rapid urbanisation or facing budget decentralisation (e.g., [23]). In São Paulo, Brazil, for example, Bressane et al. [48] highlight how budget disparities across municipalities result in unequal quality of green spaces. Similar concerns are found in Gilgit-Baltistan, Pakistan, where Hussain et al. [59] observe chronic shortages of both funding and staff for park upkeep. These issues are intensified by the underutilisation of public-private partnerships [24].

4. The Need for Informed Cross-Sectoral and Bottom-up Governance

This assessment confirms that sustainable and inclusive UGS management is constrained not by isolated technical issues but by structural, financial, institutional, and socio-political limitations that intersect in complex ways. These findings align with recent urban sustainability literature, which emphasises systemic thinking and cross-sectoral governance as preconditions for effective green infrastructure [38].

Financial and staffing limitations remain foundational challenges, especially in emerging economies and decentralised governance contexts. However, the inability to allocate or coordinate funding often reflects broader issues of political will and institutional inertia. As seen in São Paulo, Brazil [48], and Chittagong, Bangladesh [29], green space management frequently competes with short-term development agendas, leading to reactive rather than proactive planning.

Governance fragmentation is another recurrent obstacle. The literature consistently demonstrates that UGS responsibilities are distributed across multiple agencies with misaligned objectives. This not only slows implementation but also weakens accountability. Jia et al. [51] and Feltynowski et al. [38] advocate for the establishment of interdepartmental planning units and cross-sectoral coordination frameworks, which are currently rare in practice. Institutional silos also affect data sharing and long-term monitoring, reducing the learning capacity of public agencies.

Land-use conflicts and densification exacerbate the spatial mismatch between UGS supply and population demand. While compact city models are often promoted for their sustainability, they are not always accompanied by strategies for maintaining or enhancing green space on a per capita basis. The ecological degradation observed in Nanjing, China [56], and the zoning ambiguities reported by Xu et al. [34] underscore the need for enforceable planning tools that balance growth with nature-based solutions.

Equity concerns are gaining recognition, particularly through the lens of green gentrification, displacement, and spatial (in)justice. Yet, despite a growing emphasis on "just green enough" planning, few cities embed equity into performance indicators or investment criteria. Rambhia et al. [25] and Raymond et al. [35] propose vulnerability-based prioritisation and justice-oriented design, but these remain exceptions. Bridging the equity gap will require institutionalising social targeting mechanisms and evaluating access not just in terms of distance, but also in terms of quality, safety, and cultural relevance.

Participation and engagement are commonly cited as goals, but they are rarely implemented in depth. Several studies [24,42,59] show that engagement often suffers from communication gaps, representational bias, and inconsistent follow-up. Promisingly, some cities are experimenting with co-governance models and digital engagement tools. The use of social media and mobile apps offers new channels for involvement, though access and digital literacy remain concerns.

Finally, technical and data limitations hinder both planning and evaluation. Despite calls for evidence-based policy, many cities rely on outdated or mismatched datasets. Advanced spatial methods, such as MGWR [32], big data analytics [36], and mixed-method CES mapping [39], show strong potential for improving decision-making; however, they are not widely adopted due to a lack of capacity or political support. Moreover, methods must be critically assessed for their assumptions and equity implications, as highlighted by Huang et al. [41].

Collectively, the reviewed studies suggest that overcoming these barriers will require a shift in planning culture, from a technocratic and reactive approach to a participatory, adaptive, and justice-oriented one. Rather than viewing UGS as static amenities, cities must integrate them into broader sustainability transitions, embedding ecological, social, and economic goals into everyday governance. Cross-sectoral coordination, sustained funding, and inclusive evaluation frameworks will be essential for translating UGS visions into resilient and equitable urban futures.

5. Prospective Integration—Notes for a UGS Sustainable Management Framework

Overall, future research on UGS management should operationalise equity, resilience, and multifunctionality in more measurable and transferable ways. There is a need for longitudinal studies that evaluate the long-term impacts of participatory and ecosystem service-based approaches, particularly in underrepresented regions and diverse socio-political contexts. Moreover, integrating spatial data tools (e.g., remote sensing, participatory GIS), digital citizen engagement, and transdisciplinary methods can help bridge the gap between planning theory and on-the-ground implementation. At the policy level, fostering interdepartmental coordination and embedding UGS management into climate adaptation, health, and housing agendas will be critical. Supporting experimentation and institutional learning will be crucial for developing adaptive, inclusive, and context-sensitive urban governance models across cities.

To counter environmental justice issues in UGS development, research suggests the 'just green enough' approach, creating networks of smaller UGS across cities [60–62]. This reduces costs and gentrification impacts, while promoting reconversion of informal spaces (e.g., brownfields), improving access for vulnerable groups such as children and seniors [63].

Authorities should regulate real estate prices and soil values to limit housing price increases from green investments [64]. This must follow a holistic approach, adapted to local contexts, to ensure effectiveness.

A bottom-up approach is crucial for including local needs [65]. It fosters ownership, reduces maintenance costs, and improves ES quality. Authorities should promote a long-term vision of green cities, treating UGS as critical infrastructure. WHO [46] considers UGS a public health and social investment, within the concept of green public administration.

Accessibility requires investment in intermodality: (1) shared mobility and improved bus services for UGS access; (2) non-motorised transport need further investment, e.g., bike lanes; (3) car restrictions, including limited access areas, speed reductions, and parking limits. This enhances well-being at multiple levels [66]. Physical activity supports health, reduced traffic lowers accidents and pollution. European cases confirm the effectiveness of car-use reduction initiatives [67].

UGS management must address near-future challenges: water shortages, heatwaves, intense rainfall, and higher use levels. Solutions should be sustainable, locally informed, and based on NbS.

Seasonal UGS use is shifting, with winter conditions resembling warmer seasons, stressing vegetation and soils [68]. Preventive, context-based design is needed, considering local specificities such as severe winters, dry summers, or wet mid-seasons. Climate-change scenarios must also be integrated. Governance requires multi-sectoral teams to tackle growing environmental and equity challenges.

Accurate data is critical for sustainable UGS management, but municipalities face discrepancies between collected and needed information [69]. Holistic planning requires diverse data types and addressing dataset gaps [25].

Based on the analysis, an efficient framework for the sustainable management of UGS should focus on a set of critical topics, namely (1) ensure effective access to relevant data, promoting concrete measures for data collection and analysis, (2) ensure efficient stakeholder engagement and collaboration, (3) ensure the effective promotion of accessibility and environmental justice, (4) enhance UGS infrastructure and facilities, (5) promote sustainable UGS management, (6) ensure proper funding and resource mobilization, and (7) ensure efficient and continuous monitoring and evaluation. Table 2 shows examples of concrete measures per each subject, based on [19].

Table 2. Proposed measures for an integrated sustainable management of UGS (based on [19]).

Subject	Suggested Measures	Stakeholders
1. Data collection and analysis	[a] Assess UGS accessibility for different transport modes via GIS. [b] Create synergies with universities and local NGOs. [c] Develop and implement protocols to regularly gather on-site data on UGS preferences. [d] Monitor UGS maintenance status through data protocols. [e] Identify derelict areas with UGS conversion potential. [f] Use synergies to study pocket garden networks. [g] Promote links between existing and new UGS. [h] Analyse UGS characteristics, policies, and management practices. [i] Identify strengths, weaknesses, opportunities, and threats.	Municipal departments, Local universities, Polytechnical schools Local NGOs

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Table 2. *Cont.*

Subject	Suggested Measures	Stakeholders
2. Stakeholder engagement and collaboration	[a] Facilitate collaboration among departments and stakeholders for solutions. [b] Promote a shared green vision among stakeholders. [c] Establish partnerships to leverage expertise and resources. [d] Coordinate data protocols and regular collection efforts.	Municipal departments, Local universities/ Polytechnical schools, Local NGOs, Private companies, local communities
3. Promote accessibility and environmental justice	[a] Ensure accessible paths, entries, and amenities for all users. [b] Provide free or low-cost transport options to UGS. [c] Improve public transport links by including UGS as destinations. [d] Propose UGS in underserved areas for low-income access. [e] Offer programs tailored to diverse user groups. [f] Mitigate displacement and preserve affordability near new green spaces. [g] Involve communities, especially marginalized groups, in UGS planning. [h] Address unequal distribution of environmental benefits and burdens. [i] Maintain UGS to meet surrounding community needs.	Local universities, Polytechnical schools, Local NGOs, local communities
4. Enhance UGS infrastructure and facilities	[a] Distribute facilities efficiently to ensure multifunctionality and avoid conflicts. [b] Integrate universal design to improve accessibility and inclusivity. [c] Ensure adequate availability of shaded areas. [d] Upgrade and maintain amenities based on user needs.	Local universities/ Polytechnical schools, Local NGOs, local communities
5. Promote sustainable UGS management	[a] Use sustainable landscaping to boost biodiversity and resilience. [b] Promote community involvement via volunteering and citizen science. [c] Create educational programs and signage on UGS benefits. [d] Apply NbS in UGS design to replace grey solutions. [e] Develop UGS management guides on species, facilities, and adaptation.	Local universities/ Polytechnical schools, Local NGOs, Private companies, local communities
6. Funding and resource mobilization	[a] Explore EU funding and grants for projects and capacity-building. [b] Seek partnerships with private sector, NGOs, and researchers. [c] Prioritize investments by cost-effectiveness, impact, sustainability goals. [d] Optimize project planning to cut costs and maximize reach.	Local universities/ Polytechnical schools, Local NGOs, Private companies, local communities
7. Monitoring and evaluation	[a] Establish KPIs to track UGS use, safety, satisfaction. [b] Regularly monitor and evaluate intervention effectiveness and improvements. [c] Adapt strategies using stakeholder feedback and collected data.	Local universities/Polytechnical schools, Local NGOs, local communities

6. Conclusions

This review highlights the complex and interlinked limitations affecting the sustainable management of UGS. The findings underscore that financial constraints, fragmented governance, land-use pressures, inequities in access, weak public engagement, and technical data gaps continue to challenge the implementation of inclusive and effective green space strategies. While many of these barriers are persistent, a growing body of literature points toward solutions grounded in co-governance, multifunctionality, and adaptive planning. These require not only policy adjustments but also shifts in institutional culture and planning practice. Integrating UGS into broader sustainability transitions will depend on cities' ability to align ecological goals with social justice and systemic governance reforms.

This study proposes an integrative approach for a management framework focused on the sustainable management of UGS addressing the multiple issues found in the review. One of the most important issues is related

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to adequate data access. Sustainable and equitable UGS management requires robust ground-truth data for complex decisions. Furthermore, an efficient framework should remain flexible across urban contexts and grounded in community engagement, equity, and sustainability. A bottom-up approach integrates user preferences, well-being, and climate factors to guide actions and outcomes. Monitoring, evaluation, and feedback integration, are essential for the framework flexibility.

Supplementary Materials

Additional data and information can be downloaded at: https://media.sciltp.com/articles/others/2511101545 364651/EESUS-2508000128-Author-Supplementary-material-V2-LVP.pdf. Additional data contains Table S1: Summary of reviewed documents on UGS management limitations and proposed responses.

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