Integrating Urban Green Spaces in Settlement Upgrading: A Systematic Review from Sub-Saharan Africa

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Abstract

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| **Aims:** This systematic review explored the integration of urban green space (UGS) as part of settlement upgrade activities in developing countries, specifically sub-Saharan Africa and Ghana. As its aim, the review analyzed the environmental, social, and economic implications inherent in the incorporation of UGS, recognized barriers and enablers of effective integration, discussed equity and inclusivity issues, and investigated the long-term sustainability and resilience implications.  **Study Design:** The study utilised a systematic review design, following the guidelines set forth by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Through a narrative synthesis, the Synthesis Without Meta-analysis (SWiM) guidelines were employed.  **Methodology:** An extensive search strategy, covering the period January 2005 to May 2025, was adopted through several databases, namely, Scopus, Web of Science, Google Scholar, and primary sources of grey literature, e.g., UN-Habitat and the World Bank. Study selection was performed following predetermined eligibility criteria. 22 peer-reviewed and grey literature sources were analysed, with a focused comparison between Ghana, broader sub-Saharan Africa, and other developing countries.  **Results:** The findings revealed substantial environmental and social benefits of UGS integration, including urban heat mitigation, improved air quality, enhanced community cohesion, and improved food security. Economic outcomes were context-dependent and often underreported. Barriers included land scarcity, fragmented governance, and socio-cultural resistance, while enabling factors involved community-led greening, innovative financing, and supportive policy frameworks. Equity concerns, including green gentrification and limited access for marginalised groups, were recurrent yet insufficiently addressed. Critically, long-term sustainability and resilience outcomes were rarely examined, underscoring a major evidence gap.  **Conclusion:** This study delivers a new and geographically-oriented overview that highlights the untapped potential of the integration of green space into the upgrade of sub-Saharan African cities. It highlights the need for place-oriented strategies, multi-level governance tactics, and continuous monitoring initiatives to achieve equitable and sustainable cities. |

***Keywords:*** *Urban Green Spaces, Settlement Upgrading, Urban Resilience, Sustainable Urban Development, Green Gentrification.*

# Introduction

Urban green spaces (UGS), encompassing parks, community gardens, green roofs, and street trees, are pivotal to sustainable urban development, delivering a wide array of environmental, social, and economic benefits that enhance city liveability (Ramaiah and Avtar 2019). These benefits include mitigating urban heat islands, improving air quality, enhancing biodiversity, and promoting public health through reduced stress and increased physical activity (Medeiros et al. 2024). Globally, UGS are recognised as critical for addressing urbanisation challenges, particularly in rapidly expanding cities where environmental degradation and reduced quality of life are pressing concerns (Ramaiah and Avtar 2019).

In developing countries, though, fast and often inadequately regulated urbanization poses significant challenges to the establishment and sustenance of urban green areas. Informal settlements, which have a high population density, a lack of infrastructure, and limited resources, exacerbate the encroachment of green plots, thus increasing environmental and social problems (Ramaiah and Avtar 2019). Urbanization is particularly higher in sub-Saharan Africa, as evidenced by the fact that the rates are among the greatest the world over, with city inhabitants set to double by 2050 (du Toit et al. 2018). In Ghana, the cities of Kumasi and Accra, for instance, are undergoing robust growth, leading to the fragmentation and degradation of native habitats, which diminishes the accessibility of UGS and the services encompassed by them, such as heat regulation and intense precipitation management (Puplampu & Boafo; Adjetey et al. 2023).

Settlement upgrading projects, designed to enhance living conditions in informal settlements through improved housing, infrastructure, and services, provide a strategic opportunity to integrate UGS. Such integration can transform these areas into more sustainable and livable environments by offering recreational spaces, fostering social cohesion, and supporting economic activities like urban agriculture (Medeiros et al. 2024). In sub-Saharan Africa, where informal settlements house a significant portion of the urban population, incorporating UGS into upgrading initiatives could address critical challenges like urban heat and flooding (du Toit et al. 2018). In Ghana, for example, studies highlight the potential of UGS to enhance urban resilience, yet note their decline due to urban sprawl and inadequate planning (Puplampu & Boafo). However, integrating UGS into settlement upgrading projects is complex, facing barriers such as land scarcity, funding constraints, governance issues, and socio-cultural factors (Ramaiah and Avtar 2019). Moreover, ensuring equitable access to UGS for marginalized groups, such as low-income residents and women, is essential to prevent social inequalities, including green gentrification, which can displace vulnerable communities (du Toit et al. 2018).

Inclusion of Urban Green Spaces (UGS) as part of settlement improvement initiatives remains a highly relevant area of practice as it aligns with international sustainability paradigms, specifically the Sustainable Development Goals (SDGs), with a focus on SDG 11 (Sustainable Cities and Communities) and the New Urban Agenda, which promote inclusive and resilient cities (Mensah 2015). In areas such as sub-Saharan Africa, and indeed Ghana, where rapid urbanization exacerbates environmental and social problems, UGS can provide a nature-based approach to enhancing the resilience of cities and ensuring public health (Ansah et al. 2024). Although the benefits are noteworthy, a significant knowledge gap exists for extensive studies which investigate the drawbacks and prospects related to the inclusion of UGS as part of settlement improvement initiatives in low-budget countries, and specifically sub-Saharan Africa and Ghana. The lack of such a space inhibits the ability of policy influencers, city planners, and practitioners to design accurate, evidence-based initiatives that ensure the greatest benefit of UGS while addressing the limitations of the area. Lacking such academic explorations, the ability to establish policies to ensure sustainable and equitable city development in these rapidly urbanizing areas is seriously hampered.

In a bid to cover a significant knowledge gap, the current systematic review aims to synthesize current literature about the inclusion of urban green spaces (UGS) within settlement upgrading efforts found in developing nations, specifically sub-Saharan Africa and the nation of Ghana, with a particular focus. The main aims are as follows: (1) Evaluating environmental, social, and economic benefits that are relevant to the inclusion of UGS while implementing settlement upgrading efforts for developing nations. (2) Recognizing and analysing the challenges and limitations that result from such inclusion found in affected areas. (3) Investigating the opportunities and drivers influencing the effective inclusion of UGS. (4) Determining the sustainability and long-term resilience implications emanating as a result of such inclusion found in sub-Saharan Africa and Ghana.

## Literature Review

Inclusion of urban green spaces (UGS), such as parks, neighbourhood gardens, and street trees - into settlement upgrading strategies of developing countries, specifically sub-Saharan Africa and Ghana, is a crucial yet inadequately explored method for addressing the needs of a sustainable and healthy urban space. As mass urbanisation transforms informal settlements through rising population numbers and insufficient infrastructure, which exacerbate environmental and social difficulties, UGS offer a variety of benefits yet face significant barriers to their adoption. Through the consolidation of current academic literature, this literature review identifies prevailing thematic trends, underscores key gaps and limitations, and clarifies the theoretical foundations of the incorporation of UGS into settlement upgrading activities, thus forming the context for a systematic mapping exercise focused on sub-Saharan Africa and Ghana.

### Multifaceted Benefits of Urban Green Spaces

A central theme in the literature is the diverse environmental, social, and economic benefits of UGS within settlement upgrading contexts. Environmentally, UGS mitigate urban heat islands, enhance air quality, and support biodiversity, addressing climate vulnerabilities prevalent in sub-Saharan African cities (du Toit et al. 2018; Puplampu & Boafo). For instance, studies in Accra demonstrate that green spaces can reduce urban temperatures by up to 3°C, a critical intervention in informal settlements lacking cooling infrastructure (Puplampu & Boafo). Socially, UGS promote mental health, reduce stress, and foster community cohesion, with evidence from emerging economies indicating strong public support for green spaces as recreational and cultural assets (Medeiros et al. 2024). Economically, UGS contribute to property value appreciation and job creation through maintenance and urban agriculture, as seen in Ghanaian cities where community gardens support livelihoods (Akanbang et al. 2024). These benefits align with global sustainability imperatives, yet their realization in settlement upgrading remains constrained by contextual factors.

### Barriers to UGS Integration

There are commonly discussed issues with incorporating urban green spaces (UGS) into settlement upgrade initiatives, particularly in resource-scarce areas. Limited land is a common challenge in sub-Saharan Africa, brought about by strong land demands in densely populated informal settlements and weak land rights (Ramaiah and Avtar 2019; du Toit et al. 2018). In Ghana, the green space has declined by 26% over two decades as a result of city expansion as well as land use (Adjetey et al. 2023). Institutional and budgetary issues are also encountered, as the Government likes to use funds for basic infrastructure rather than UGS (Mensah 2015). Social and cultural considerations, such as the perception that UGS are not that significant, particularly when housing comes first, make it difficult to incorporate UGS, as UGS are perceived to be of lower significance when compared to basic needs (Ramaiah and Avtar 2019). Examples illustrate the importance of developing special designs to address institutional challenges.

### Opportunities for Effective Integration

Methods to integrate green space in cities address issues through new ideas and the building of communities. Local initiatives, such as household gardens at Wa, Ghana, demonstrate how communities are beginning sustainable green initiatives that have local control, offering models that can work when applied to informal areas (Akanbang et al. 2024). Innovative approaches to funding these initiatives, such as public-private collaborations and green bonds, are increasing but are new to sub-Saharan Africa (du Toit et al. 2018). Policies for green space, such as Ghana's National Urban Policy, offer a constructive course, and improved practices offer real rewards (Mensah 2015). These prospects offer adaptable and inclusive methods that are responsive to local needs and ability.

### Gaps, Limitations, and Unanswered Questions

Studies indicate significant gaps, which justify the difficulty of duplicating approaches when cities are able to help their societies with urban green space (UGS). First, sub-Saharan Africa, as well as Ghana, lacks extensive studies (du Toit et al. 2018; Ansah et al. 2024). These are short studies discussing general concepts of how-to green cities rather than transform societies (Puplampu & Boafo). Due to the short nature of the studies, it becomes challenging to duplicate approaches benefiting wider areas. Secondly, the long-term consequences, such as how long UGS endures and how the city reaps benefits when managing greenhouse gases, have been inadequately explored (Puplampu & Boafo). Thirdly, equity matters, such as how excluded others benefit when they utilize UGS and how to prevent green gentrification, have been inadequately explored, particularly among African cities that have wide economic disparities (du Toit et al. 2018). Gaps make us question the ability to utilize UGS equitably and how the benefits may trickle down despite limited funds.

### Theoretical and Conceptual Frameworks

Supporting the use of Urban Green Spaces (UGS) to green the neighbourhood are robust theories that can guide studies. An important one is the framework of ecosystem services, which views UGS as offering regulating services (such as weather control), provisioning services (such as the provision of crops), and cultural services (such as space for recreation). Through the framework, their worth to city systems can be estimated (du Toit et al. 2018; Medeiros et al. 2024). Another significant theory is the social-ecological systems (SES) framework, which considers the relationship people have with the environment. UGS require people's active use for them to be utilized effectively (Akanbang et al. 2024). International guidelines such as the scale of the Sustainable Development Goals (SDGs) (United Nations 2015) are supported by the theory of sustainable urban development, particularly the goal of SDG 11 (Sustainable Cities and Communities) (United Nations 2015). Guidelines strongly recommend UGS as a central element of just urban planning (Mensah 2015). Application of these concepts, though, for sub-Saharan Africa, particularly Ghana, occurs seldom, and the models required must consider the peculiar social, economic, and environmental circumstances of informal settlements.

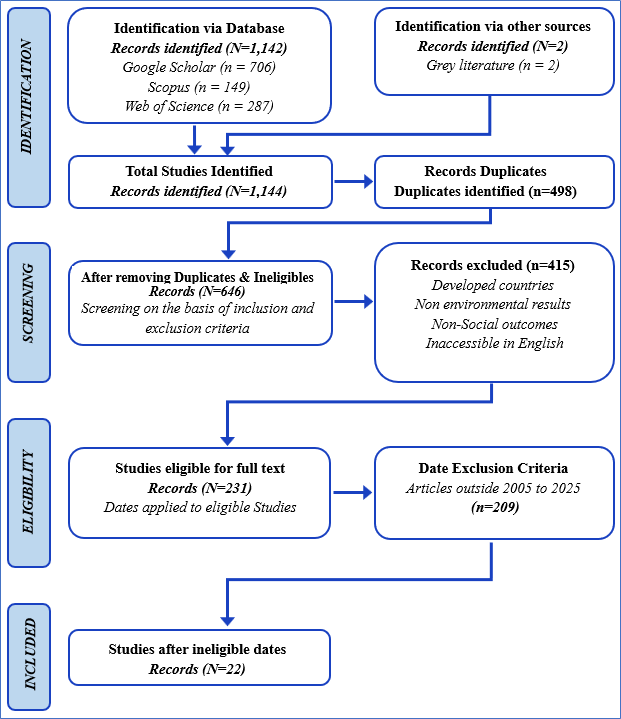
# methods

This review adhered to the PRISMA process to systematically and transparently seek evidence of the addition of urban green space (UGS) as a measure to improve settlements in developing nations, particularly sub-Saharan Africa, such as Ghana (Moher et al. 2009). There are the following searches, selection of studies, selection of appropriate studies, data gathering, quality checking, and data combination: All these activities contributed to the aims of the review: observing environmental, social, and economic impacts; identifying lessons, opportunities, and challenges; ensuring equity and fairness; linking up best practice; and investigating long-term resilience and sustainability effects.

## Search Strategy

A comprehensive search strategy was developed to identify relevant peer-reviewed and grey literature published between January 2005 and May 2025, capturing recent trends in UGS and settlement upgrading. The search was conducted across multiple electronic databases, including Scopus, Web of Science, and Google Scholar, to ensure broad coverage of interdisciplinary literature. Grey literature was sourced from repositories such as UN Habitat and World Bank reports to address the paucity of peer reviewed studies in sub-Saharan Africa. Search terms were derived from key concepts, including “urban green space” (e.g., parks, gardens, green infrastructure), “settlement upgrading” (e.g., slum upgrading, informal settlement improvement), and “developing countries” (e.g., low- and middle-income countries, sub-Saharan Africa, Ghana), combined using Boolean operators (AND, OR).

**Fig. 1: PRISMA Flowchart**

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*Source: Authors’ Construct*

## Inclusion and Exclusion Criteria

Studies were included based on predefined eligibility criteria aligned with the review’s objectives and geographic focus. Inclusion criteria were: (1) studies examining UGS (e.g., parks, community gardens, green roofs) (2) studies conducted in developing countries, as defined by World Bank classifications, with a priority on sub-Saharan Africa and Ghana; (3) empirical studies, reviews or grey literature (e.g., policy reports, case studies) published between 2005 and 2025; and (4) studies reporting outcomes related to environmental, social, or economic impacts, barriers, opportunities, equity, best practices, or long-term sustainability. Exclusion criteria include: (1) studies focused solely on developed countries; (2) studies inaccessible in English or without English abstracts. These criteria ensure relevance to the review’s focus on UGS integration in resource-constrained, rapidly urbanising contexts. The study selection process depicted above, followed a two-stage screening approach to ensure systematic inclusion. Full-text articles were retrieved and assessed against the same criteria by the same reviewers, with reasons for exclusion documented. The PRISMA flow diagram generated, reports the number of studies screened, included, and excluded at each stage, ensuring transparency (Moher et al. 2009).

## 2.3 Data Extraction

Data was extracted using a standardised form developed in Microsoft Excel, tailored to capture information relevant to the review’s objectives. Extracted data included: (1) study characteristics (e.g., author, year, country,); (2) outcomes (e.g., environmental impacts like temperature reduction, social impacts like community cohesion, economic impacts like job creation); (3) barriers and opportunities (e.g., land scarcity, community participation); (4) equity considerations (e.g., access for marginalized groups); and (5) long-term sustainability outcomes (e.g., maintenance, climate resilience).

## 2.4 Data Synthesis

Given the heterogeneity in study designs, outcomes, and contexts, a narrative synthesis approach was employed to integrate findings, guided by the Synthesis Without Meta-analysis (SWiM) guidelines (Campbell et al. 2020). Data was organised thematically according to the review’s objectives, with sub-themes including environmental, social, and economic impacts; barriers and opportunities; equity and inclusivity; best practices; and long-term sustainability. Findings were synthesised using textual descriptions, tables, chart and conceptual diagram to illustrate relationships between themes (e.g., how barriers influence equity outcomes). Subgroup analyses explored differences by region (e.g., sub-Saharan Africa vs. other developing countries, Ghana-specific findings). The synthesis will highlight areas of consensus, divergence, and evidence gaps, particularly for sub-Saharan Africa and Ghana, to inform policy and future research.

# results and discussion

This systematic review synthesises evidence from 20 studies on the integration of urban green spaces (UGS) into settlement upgrading projects in developing countries, with a focus on sub-Saharan Africa and Ghana. Adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, the analysis organises findings into five thematic categories: environmental, social, and economic impacts; barriers and challenges; opportunities and enabling factors; equity and inclusivity; and sustainability and resilience outcomes. The results are presented through a narrative synthesis, supported by a thematic table (Table 1) and a conceptual map (Figure 3). A subgroup analysis compares findings across Ghana, broader sub-Saharan Africa, other developing countries, highlighting contextual nuances and evidence gaps in long-term sustainability and equity.

## Subgroup Analysis

The subgroup analysis examines geographic contexts (Ghana, sub-Saharan Africa, other developing countries).

### Geographic Contexts

In Sub-Saharan Africa, (Shackleton et al. 2015; White et al. 2017; du Toit et al. 2018; UN-Habitat 2018; Adegun 2019; Titz and Chiotha 2019; Venter et al. 2020; Pedrosa et al. 2021; Wijesinghe & Thorn 2021; Ansah et al. 2024; Muhoza and Zhou 2024) focus on climate resilience and green gentrification risks. Studies highlight that community forestry and hybrid infrastructure are emerging.

There have been a number of studies in Ghana, (Mensah 2014; Nero 2017; Cobbinah et al. 2020; Puplampu & Boafo, 2021; Cobbinah and Asibey 2021; Adjetey et al. 2023; Akanbang et al. 2024; Safo et al. 2024;) which discuss severe green space loss due to sprawl and governance failure, benefits of community gardens such as food security and equity. However, equity issues are noted but underexplored. In other developing countries, (Ramaiah and Avtar 2019; Medeiros et al. 2024; Vijayalaxmi and Dnyanesh 2021) note stronger economic outcomes of urban green spaces (e.g., property values in India).

**Fig. 2: Illustration Of Geographic Contexts of Included Studies**

*Source: Authors’ Construct*

## Narrative Synthesis

The synthesis dealt with the i) environmental, social, and economic impacts, ii) Barriers and Challenges, iii) opportunities and enabling factors, iv) equity and inclusivity, and iv) sustainability and resilience outcomes.

### Environmental, Social, and Economic Impacts

UGS integration yields significant environmental and social benefits, with economic impacts less consistently reported. Environmentally, UGS reduce urban heat, improve air quality, enhance biodiversity, and mitigate flooding (Adegun 2019; White et al. 2017). Socially, UGS promote community cohesion, mental health, and recreation, particularly in informal settlements (Medeiros et al. 2024; Akanbang et al. 2024). Economic benefits include job creation (e.g., maintenance in Johannesburg; Adegun 2019) and property value increases (du Toit et al. 2018), though Ghana-specific studies emphasise urban agriculture income (Akanbang et al. 2024). Studies like Ansah et al. (2024) focus on health, leaving economic outcomes underexplored.

### Barriers and Challenges

Land scarcity, governance failures, and rapid urbanisation are dominant barriers. In Ghana, Accra and Kumasi lost huge green spaces due to sprawl and weak planning (Adjetey et al. 2023; Mensah 2014). Sub-Saharan Africa faces similar land tenure and funding constraints (Cobbinah et al. 2020; Titz and Chiotha 2019). Socio-cultural preferences for housing over greening persist in Ghana and India (Akanbang et al. 2024; Ramaiah and Avtar 2019). Corruption and political instability exacerbate challenges in Malawi and Namibia (Titz and Chiotha 2019; Wijesinghe & Thorn 2021).

### Opportunities and Enabling Factors

Community-driven greening and innovative financing are key opportunities. Home gardens in Ghana, and community forestry in Malawi demonstrate sustainable, low-cost models (Akanbang et al. 2024; Titz and Chiotha 2019). Public-private partnerships and green bonds are viable in Brazil and South Africa but nascent in Ghana (Medeiros et al. 2024). Policy frameworks, like Ghana’s National Urban Policy, and participatory planning in Nairobi, enhance implementation (Mensah 2014; UN-Habitat 2018).

### Equity and Inclusivity

Equity is understudied, with green gentrification risks prominent in South Africa (Venter et al. 2020). In Ghana, UGS access favours wealthier areas, marginalising low-income earners. (Adjetey et al. 2023; Cobbinah et al. 2020). Community-based greening in Wa and Lilongwe promotes inclusivity, but systematic data is lacking (Akanbang et al. 2024; Titz and Chiotha 2019). Children’s participation in Angola highlights the potential for inclusive planning (Pedrosa et al. 2021).

### Sustainability and Resilience Outcomes

Sustainability and resilience outcomes are sparsely documented. UGS reduce flooding and heat stress in Accra and Lilongwe (Puplampu & Boafo; Titz and Chiotha 2019), and Ghana’s community gardens support food security (Akanbang et al. 2024). However, long-term maintenance and scalability are rarely addressed (du Toit et al. 2018; White et al. 2017), limiting evidence on durability.

**Table 1: Thematic Analysis on UGS Integration into Settlement Upgrading Projects**

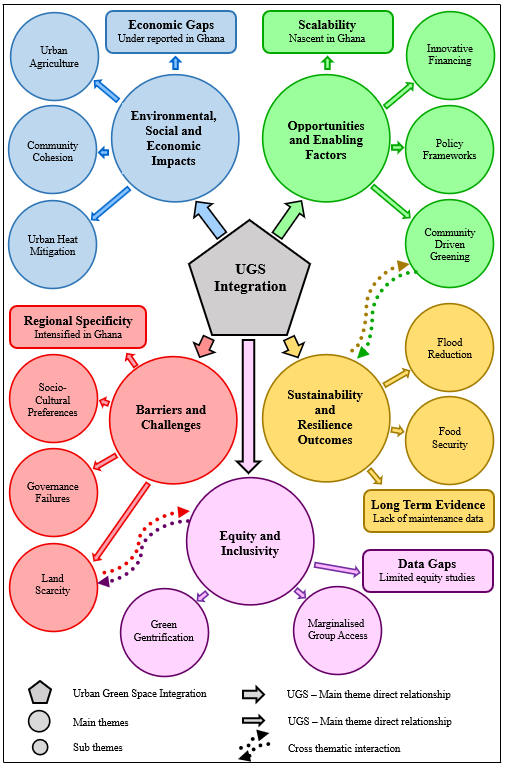
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| --- | --- | --- | --- | --- | --- | --- |
| **Study Identification** | **Study Context** | **Sustainability and Resilience Outcomes** | **Opportunities and Enabling Factors** | **Barriers and Challenges** | **Environmental, Social, and Economic Impacts** | **Equity and Inclusivity** |
| Mensah (2014) | Ghana (Kumasi); urban green spaces | Not explicitly addressed | Community awareness; policy frameworks | Urbanization; governance failures; land scarcity | **Env**: Reduce heat **Soc**: Recreational spaces **Eco**: Not addressed | Not explicitly addressed |
| Shackleton et al. (2015) | Sub-Saharan Africa; urban forestry | Enhance climate resilience; maintenance issues | Community forestry; policy integration | Land competition; weak enforcement | **Env**: Carbon sequestration **Soc**: Community engagement **Eco**: Not addressed | Limited access for marginalized groups |
| Nero (2017) | Ghana (Kumasi); urban green spaces | Carbon sequestration | Community awareness | Urban sprawl; inequitable access | **Env**: Heat reduction, carbon sequestration  **Soc**: Socio-environmental benefits **Eco**: Not addressed | Socio-environmental inequity |
| White et al. 2017 | Sub-Saharan Africa; slum upgrading | Flood and heat resilience; scalability unclear | Donor funding; participatory planning | Financial constraints; governance gaps | **Env**: Mitigate heat, flooding **Soc**: Community spaces **Eco**: Not addressed | Not explicitly addressed |
| du Toit et al. (2018) | Sub-Saharan Africa; urban green infrastructure | Enhance heat stress, resilience to flooding; maintenance unclear | Participatory planning; urban green policies | Land scarcity; weak governance; limited funding | **Env**: Mitigate heat, improve air quality **Soc**: Enhance cohesion **Eco**: Property value increase | Risk of green gentrification |
| UN-Habitat (2018) | Sub-Saharan Africa; slum upgrading | Flood mitigation; scalability unclear | Participatory design; donor funding | Resource constraints; governance gaps | **Env**: Improve drainage **Soc**: Community spaces **Eco**: Not addressed | Not explicitly addressed |
| **Study Identification** | **Study Context** | **Sustainability and Resilience Outcomes** | **Opportunities and Enabling Factors** | **Barriers and Challenges** | **Environmental, Social, and Economic Impacts** | **Equity and Inclusivity** |
| Ramaiah and Avtar (2019) | India; urbanizing cities | Urban cooling; long-term outcomes unclear | Green policies; community awareness | Land scarcity; socio-cultural resistance; funding | **Env**: Improve air quality, reduce heat **Soc**: Mental health benefits **Eco**: Property value increase | Not explicitly addressed |
| Adegun (2019) | South Africa (Johannesburg); slum upgrading | Enhance flood resilience; maintenance unclear | Community involvement; green policies in infrastructure | Land tenure issues; funding shortages | **Env**: Mitigate flooding **Soc**: Community cohesion **Eco**: Job creation | Limited access for low-income groups |
| Titz and Chiotha (2019) | Malawi (Lilongwe); informal settlements | Enhance flood resilience; long-term outcomes unclear | Community-driven greening; low-cost models | Limited institutional support; land scarcity | **Env**: Mitigate flooding **Soc**: Community ownership **Eco**: Food security | Equitable access via community greening |
| Cobbinah et al. (2020) | Ghana; informal settlements | Not explicitly addressed | Community engagement | Complex land tenure; governance issues | **Env**: Not addressed **Soc**: Community spaces **Eco**: Not addressed | Unequal access; marginalized groups excluded |
| Venter et al. (2020) | South Africa; urban green spaces | Not explicitly addressed | Urban planning frameworks | Green gentrification; funding constraints | **Env**: Reduce heat stress **Soc**: Recreational benefits **Eco**: Property value increase | Green gentrification displaces low-income residents |
| Cobbinah and Asibey (2021) | Ghana (Accra); informal settlements | Improve environmental quality | Community associations | Encroachment; poor authority cooperation | **Env**: Reduce floods, noise, heat **Soc**: Social gatherings **Eco**: Not addressed | Slum residents’ access and perceptions |
| Pedrosa et al. (2021) | Angola (Luanda); peri-urban informal settlements | Ecosystem services; long-term outcomes unclear | Children’s participation; community suggestions | Safety concerns; maintenance issues; parental restrictions | **Env**: Ecosystem services **Soc**: Children’s use, perceptions **Eco**: Not addressed | Children’s access and participation |
| **Study Identification** | **Study Context** | **Sustainability and Resilience Outcomes** | **Opportunities and Enabling Factors** | **Barriers and Challenges** | **Environmental, Social, and Economic Impacts** | **Equity and Inclusivity** |
| Puplampu and Boafo (2021) | Ghana (Accra); urban green spaces | Potential climate resilience; not quantified | Community engagement; urban planning frameworks | Urban expansion; land use pressure; governance gaps | **Env:** Support ecosystem services (e.g., air quality, heat reduction) **Soc:** Recreational spaces, community well-being **Eco:** Potential tourism, property value increase | Risk of green gentrification; unequal access to green spaces |
| Vijayalaxmi and Dnyanesh (2021) | India (Pune); urban green spaces | Carbon sequestration; climate resilience | Community awareness; urban planning frameworks; native species prioritization | Urbanization; maintenance costs; need for long-term data | **Env:** Carbon sequestration, air quality improvement, heat reduction **Soc:** Mental health benefits, community engagement **Eco:** Potential energysavings | Not explicitly addressed |
| Wijesinghe & Thorn (2021) | Namibia (Windhoek); informal settlements | Not explicitly addressed | Community governance; policy integration | Governance gaps; funding shortages | **Env:** Not addressed **Soc:** Community well-being **Eco:** Not addressed | Limited access for low-income groups |
| Adjetey et al. (2023) | Ghana (Accra); urban parks | Potential climate resilience; not quantified | Public-private partnerships; community involvement | 26% green space loss; governance gaps | **Env**: Support biodiversity **Soc**: Recreational spaces **Eco**: Tourism potential | Unequal access; wealthier areas benefit |
| Ansah et al. (2024) | Sub-Saharan Africa; urban greening | Potential health resilience; not quantified | Community-based greening; health policies | Lack of region-specific data; funding shortages | **Env**: Not addressed **Soc**: Improve health **Eco**: Not addressed | Not explicitly addressed |
| **Study Identification** | **Study Context** | **Sustainability and Resilience Outcomes** | **Opportunities and Enabling Factors** | **Barriers and Challenges** | **Environmental, Social, and Economic Impacts** | **Equity and Inclusivity** |
| Akanbang et al. (2024) | Ghana (Wa); home gardens | Sustained via community maintenance; food security | Resident-led greening; low-cost models | Limited institutional support; housing prioritization | **Env**: Support urban agriculture **Soc**: Community ownership **Eco**: Income from produce | Equitable access via community involvement |
| Medeiros et al. (2024) | Brazil; emerging economies | Potential health benefits; sustainability unclear | Public willingness to pay; green bonds | High costs; governance challenges | **Env**: Improve air quality **Soc**: Reduce stress **Eco**: Job creation | Not explicitly addressed |
| Muhoza and Zhou (2024) | Africa (focus on South Africa, Ethiopia, Ghana, Nigeria, Egypt); urban green spaces | Climate resilience; ecosystem services; health benefits | Policy integration; research collaboration; community awareness | Urbanization; governance gaps; limited funding; low green space coverage | **Env:** Support biodiversity, carbon sequestration, heat reduction **Soc:** Public health benefits, recreational spaces **Eco:** Potential tourism, property value increase | Unequal access; wealthier areas benefit more |
| Safo et al. (2024) | Ghana; built environment | Not explicitly addressed | Collaborative planning; public-private partnerships | Urbanization; planning gaps | **Env**: Improve environmental quality **Soc**: Community perceptions **Eco**: Not addressed | Not explicitly addressed |

*Source: Authors’ Construct*

## Conceptual Framework

The conceptual framework illustrates the dynamic interplay between five key thematic domains that shape the integration of urban green spaces (UGS) into settlement upgrading projects in developing countries. Anchored in sustainability and resilience outcomes, the framework positions environmental, social, and economic impacts as central drivers of UGS value within informal settlements.

**Fig. 3: Conceptual Diagram**



*Source: Authors’ Construct*

These advantages are impacted by issues and difficulties, such as insufficient land, bad management, and opposition by the people. They are further affected by opportunities and enabling factors, such as local engagement, innovative funding strategies, and conducive policy. Inclusion and equity are necessary everywhere, indicating the importance of equitable representation and access to UGS planning and services. Success of the model indicated that, to include UGS effectively, we must consider systems appropriate for local circumstances, shared power, and long-term planning. Feedback loops are significant because improved resilience and sustainability result in continuous UGS initiatives. Our framework contributes to altering policy and practice through the use of real case studies and shaping policy and practice for expanding areas with scarce funding, such as sub-Saharan Africa and Ghana. An illustration of the conceptual diagram follows.

## Implications for Long-Term Impact of UGS Integration

It demonstrates how sub-Saharan African cities, such as Ghana, can become stronger and more sustainable in the long term through the use of urban green space (UGS). It identifies key gaps and how to deliver lasting benefits. The report aligns itself with international sustainability targets, such as the UN Sustainable Development Goal No.11 and the New Urban Agenda. They are relevant to city planners, policy-makers, and scientists in resource-poor areas that are rapidly expanding. Eziama et al. (2025) provide valuable insights into air quality dynamics that underscore the potential of UGS as a long-term strategy. Using a machine learning and spatial clustering framework, the study analyzed global air quality data, highlighting the disproportionate burden of air pollution mortality in low- and middle-income countries, particularly in South Asia and Africa, where PM2.5, NO2, and CO levels frequently exceed WHO thresholds. These findings suggest that UGS could be strategically deployed to reduce these pollutants, as vegetation is known to sequester particulate matter and absorb gaseous pollutants.

### Strengthening Climate Resilience through UGS

Urban Green Spaces, such as neighbourhood gardens and parks, can alleviate climatic issues, such as heat and flooding, which are significant concerns in sub-Saharan African city areas (du Toit et al. 2018; Puplampu & Boafo 2021). In Accra, Urban Green Spaces might decrease the heat by 3°C, benefiting areas without cooling (Puplampu & Boafo 2021). In Lilongwe, various forms of structures can decrease the risk of flooding, benefiting areas with varying rainfall (Titz and Chiotha 2019). For the long-term, designs must include Urban Green Spaces that can expand, such as green covers that allow water to pass through and tree-covered streets, as part of the betterment of neighbourhoods (Review comments 2019). Review comments insist on long-term data to analyse how Urban Green Spaces are effective during climatic events over the course of several years (White et al. 2017).

### Ensuring Sustainable Maintenance and Scalability

Long-term UGS management for sub-Saharan Africa and Ghana needs proper growth and management, yet UGS are inadequately researched (du Toit et al. 2018). Local initiatives, such as Wa, Ghana, home gardens, are cheap and environmentally sustainable to build local interest and reduce external funding dependence (Akanbang et al. 2024). Institutional capacity gaps and funding gaps, however, are a threat to long-term management, as indicated by the decrease witnessed in the green cover in Accra (Adjetey et al. 2023). For the situation to improve, innovative funding strategies, such as the use of green bonds and public-private partnership, must be utilized, taking a leaf from the book of South Africa (Medeiros et al. 2024). Budgeting UGS management as part of the city budget and involving local people as UGS users can make UGS management effective and sustainable, ensuring benefits such as food security persist (Akanbang et al. 2024; UN-Habitat 2018).

### Promoting Equitable Resilience Outcomes

Long-term resilience must be equitable to not exacerbate social inequalities, as cautioned by the risk of green gentrifications in South Africa (Venter et al. 2020). In Ghana, city green areas benefit mostly affluent areas, while women and children in informal settlements are deprived of these benefits (Adjetey et al. 2023). Community-led green areas, such as those in Wa and Lilongwe, benefit through the engagement of people, their design, and their care, yet equitable access does not have a structured program (Akanbang et al. 2024; Titz and Chiotha 2019). Policymakers must employ inclusive planning strategies, as adopted by Angola, to ensure that the interests of the disadvantaged are secured and the risk of displacement decreased (Pedrosa et al. 2021). Future studies must design fairness-oriented metrics to capture access to and benefits from green areas for cities with varying economic profiles, such that resilience benefits all proportionally.

### Leveraging Policy and Governance for Sustained Impact

Good governance makes urban green space (UGS) function effectively for resilience. Ghana's National Urban Policy demonstrates how to integrate UGS, yet weak implementation renders it ineffective (Mensah 2014). Challenges such as corruption and weak land rights hinder progress in sub-Saharan Africa (Cobbinah et al. 2020; Wijesinghe & Thorn 2021). Governments can address these problems through better land use planning and regulations for UGS as cities expand. Collaborative effort with various governments and organizations such as UN-Habitat can allow the sharing of information and expertise, as demonstrated in Nairobi when stakeholders became engaged (UN-Habitat 2018). Integrating UGS into national plans for climate change can also allow funding and political backing for long-term resilience.

### Addressing Evidence Gaps for Informed Decision-Making

There are insufficient long-term studies of the sustainability and resilience of sub-Saharan Africa's (and Ghana's) urban green spaces (UGS) to provide evidence-based policy (du Toit et al. 2018). We observe short-term UGS advantages such as reduced flooding and improved food security, yet we don’t know how to retain and enhance these benefits (Puplampu & Boafo 2021; Akanbang et al. 2024). Long-term studies are necessary because cities are expanding rapidly and are shifting as a result of climatic changes. Furthermore, nation-specific studies such as for Ghana are necessary to deal with local issues such as city sprawl and governance, which complicate the incorporation of UGS (Adjetey et al. 2023; Cobbinah et al. 2020). Studies must adopt various methods taking into account ecological, social, as well as economic factors, to provide a complete UGS effect picture.

# Conclusion

This systematic review emphasized the transformative capability of urban green spaces in facilitating long-term sustainability and resilience in Ghanaian and sub-Saharan African settlement upgrading initiatives. UGS minimize climate risk, provide food security, and ensure inclusivity but are constrained in their sustainability by maintenance limitations, unequal access, and governance limitations. To ensure lasting gains, policymakers ought to give high priority to community-led greening, creative financing, and strong land-use planning, ensuring marginalised groups have access. Upcoming research must provide evidence to bridge the gaps through longitudinal and place-based studies to support scalable, inclusive measures. By integrating UGS into urban development strategies, sub-Saharan Africa and Ghana can create resilient, sustainable cities with global sustainability focus.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

# References

Adegun, Olumuyiwa Bayode. 2019. “Green Infrastructure in Informal Unplanned Settlements: The Case of Kya Sands, Johannesburg.” *International Journal of Urban Sustainable Development* 11 (1): 68–80. <https://doi.org/10.1080/19463138.2019.1565412>.

Adjetey, E., et al. 2023. “The Fate of Urban Green Spaces: Assessment of the Ownership, Availability and Conditions of Parks in Accra, Ghana.” *Urban Forestry & Urban Greening* 80:127845. <https://doi.org/10.1016/j.ufug.2023.127845>.

Akanbang, B. A. A., Akaateba, M. A., & Korah, P. I. (2024). Creating and sustaining urban green spaces in Africa under phenomenal urbanisation: residents’ perspectives on home gardens in Wa, Ghana. *Discover Cities*, *1*(1), 20. <https://doi.org/10.1007/s44327-024-00025-3>

Ansah, E. W., et al. 2024. “Impact of Urban Greening on Population Health in Sub-Saharan Africa: A Scoping Review Protocol.” *BMJ Open* 14(10):e087638.

<https://doi.org/10.1136/bmjopen-2024-087638>.

Bressane, A., dos Santos Galvão, A. L., Loureiro, A. I. S., Ferreira, M. E. G., Monstans, M. C., & de Castro Medeiros, L. C. (2024). Valuing urban green spaces for enhanced public health and sustainability: A study on public willingness-to-pay in an emerging economy. *Urban Forestry & Urban Greening*, *98*, 128386. <https://doi.org/10.1016/j.ufug.2024.128386>

Campbell, M., et al. 2020. “Synthesis without Meta-analysis (SWiM) in Systematic Reviews: Reporting Guideline.” *BMJ* 368:l6890. <https://doi.org/10.1136/bmj.l6890>.

CASP. 2018. “Critical Appraisal Skills Programme Checklists.” <https://casp-uk.net/casp-tools-checklists/>.

Chishaleshale, M., Shackleton, C. M., Gambiza, J., & Gumbo, D. (2015). The prevalence of planning and management frameworks for trees and green spaces in urban areas of South Africa. *Urban forestry & urban greening*, *14*(4), 817-825. <https://doi.org/10.1016/j.ufug.2015.09.012>

Cobbinah, Patrick Brandful, Michael Osei Asibey, and Yaa Asuamah Gyedu-Pensang. "Urban land use planning in Ghana: Navigating complex coalescence of land ownership and administration." *Land use policy* 99 (2020): 105054. <https://doi.org/10.1016/j.landusepol.2020.105054>

Eziama, Elvin & Asianuba, Ifeoma & Ugochukwu, Okonkwo & Adimonyemma, JohnPaul & Ogugua, Sandra & Onochie, Ogugua & Dan, Ali & Ogungbemi, Olumide & Francis, Enoh & Babatunde, Ezekiel & Oko-Odion, Courage. (2025). A Machine Learning and Spatial Clustering Framework for Urban Air Quality Prediction.DOI: [10.13140/RG.2.2.25033.45923](http://dx.doi.org/10.13140/RG.2.2.25033.45923)

du Toit, M. J., et al. 2018. “Urban Green Infrastructure and Ecosystem Services in Sub-Saharan Africa.” *Landscape and Urban Planning* 180:249–61. <https://doi.org/10.1016/j.landurbplan.2018.06.001>.

Mensah, C. A. 2014. “Urban Green Spaces in Africa: Nature and Challenges.” *International Journal of Ecosystem* 4(1):1–11. <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Mensah%2C+C.+A.+2014.+%E2%80%9CUrban+Green+Spaces+in+Africa%3A+Nature+and+Challenges.%E2%80%9D+International+Journal+of+Ecosystem+4%281%29%3A1%E2%80%9311.+https%3A%2F%2Fdoi.org%2F10.5923%2Fj.ije.20140401.01%22&btnG>=

Mensah, C. A. 2015. “Sustaining Urban Green Spaces in Africa: A Case Study of Kumasi Metropolis, Ghana.” *Academia.edu*.

<https://www.academia.edu/64970103/Sustaining_urban_green_spaces_in_Africa_a_case_study_of_Kumasi_Metropolis_Ghana>.

Moher, D., et al. 2009. “Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement.” *PLoS Medicine* 6(7):e1000097.

<https://doi.org/10.1371/journal.pmed.1000097>.

Muhoza, J. P., & Zhou, W. (2024). Urban Green Spaces in Africa: A Bibliometric Analysis. *Environments*, *11*(4), 68. <https://doi.org/10.3390/environments11040068>

Pedrosa, E. L. J., Okyere, S. A., Frimpong, L. K., Diko, S. K., Commodore, T. S., & Kita, M. (2021). Planning for Informal Urban Green Spaces in African Cities: Children’s Perception and Use in Peri-Urban Areas of Luanda, Angola. *Urban Science*, *5*(3), 50. <https://doi.org/10.3390/urbansci5030050>

Puplampu, D. A., & Boafo, Y. A. (2021). Exploring the impacts of urban expansion on green spaces availability and delivery of ecosystem services in the Accra metropolis. *Environmental Challenges*, *5*, 100283. <https://doi.org/10.1016/j.envc.2021.100283>

Ramaiah, Manish, and Ram Avtar. 2019. “Urban Green Spaces and Their Need in Cities of Rapidly Urbanising India: A Review.” *Urban Science* 3(3):94.

<https://doi.org/10.3390/urbansci3030094>

Titz, Alexandra, and Sosten S. Chiotha. 2019. “Pathways for Sustainable and Inclusive Cities in Southern and Eastern Africa through Urban Green Infrastructure?” *Sustainability* 11(10):2729. <https://doi.org/10.3390/su11102729>

Tyndall, J. 2010. “AACODS Checklist.” Flinders University.

<https://dspace.flinders.edu.au/xmlui/handle/2328/3326>.

UN-Habitat. 2018. “Promising Practices on Climate Change in Urban Sub-Saharan Africa.” Nairobi: UN-Habitat. <https://unhabitat.org/promising-practices-on-climate-change-in-urban-sub-saharan-africa>

Venter, Z. S., Shackleton, C. M., Van Staden, F., Selomane, O., & Masterson, V. A. (2020). Green Apartheid: Urban green infrastructure remains unequally distributed across income and race geographies in South Africa. *Landscape and Urban Planning*, *203*, 103889. <https://doi.org/10.1016/j.landurbplan.2020.103889>

Vijayalaxmi, R. S., & Dnyanesh, M. M. (2021). Carbon sequestration potential of urban green spaces (PMC gardens) in Pune city, India. *J. Geogr. Environ. Earth Sci. Int*, *25*, 22-38. DOI: [10.9734/JGEESI/2021/v25i630291](http://dx.doi.org/10.9734/JGEESI/2021/v25i630291)

White, Roland; Turpie, Jane; Letley, Gwyneth Letley. 2017. Greening Africa's Cities: Enhancing the Relationship between Urbanization, Environmental Assets, and Ecosystem Services. © World Bank. <http://hdl.handle.net/10986/26730> License: [CC BY 3.0 IGO](http://creativecommons.org/licenses/by/3.0/igo).

Wijesinghe, A., & Thorn, J. P. R. (2021). Governance of Urban Green Infrastructure in Informal Settlements of Windhoek, Namibia. *Sustainability*, *13*(16), 8937. <https://doi.org/10.3390/su13168937>