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PREFACE

The International Seminar on Livable Space (IS-LiVaS) is an ongoing academic seminar series. Organized by the Department of Architecture at the Faculty of Civil Engineering and Planning at Universitas Trisaki, it is held in collaboration with various academic and professional partners. Since its launch in 2012, the series has become a forum for scholarly discussion about livable space and the built environment. The first seminar took place on February 16–17, 2012, with the theme "Creating Space for a Better Life." Since then, the seminar has been a regular event, addressing new challenges related to livability, sustainability, and spatial development from multiple perspectives.

The fourth International Seminar on Livable Space (IS-LiVaS 2025) took place on August 8–9, 2025, at the Mercure Hotel in BSD City, Tangerang, Indonesia. IS-LiVaS 2025 embraced the theme “Regenerative Livable Built Environment,” emphasizing the need to advance livable space research beyond traditional sustainability methods and toward regenerative and integrative paradigms. The seminar featured keynote and invited speakers from academic institutions, professional practices, and government entities. Representatives from Monash University, Thammasat University, the University of Seoul, UCSI University, Universität Stuttgart, the University of New South Wales, and Swinburne University of Technology were present, as well as practitioners and policy stakeholders from Indonesia.

The articles included in these proceedings were chosen via a review process and are categorized into four subject areas: The Concept of Livable Space; Appearance and Shape of Livable Space; Various Dimensions of Livable Space; and Creation Procedure of Livable Space. These contributions include theoretical discussions, empirical findings, design-based studies, and applied research on the built environment. Contributors to this undertaking represent diverse academic fields, icluding architecture, civil engineering, urban and regional planning, landscape architecture, and environmental studies. Many investigations address the complexities inherent in tropical and rapidly changing urban settings while incorporating broader international perspectives.

As part of the IS-Livas seminar series, this publication aims to document current research trajectories and foster sustained academic dialogue and cooperation within the realm of livable and regenerative built environments. The editors extend their appreciation to the keynote and invited speakers, authors, reviewers, and organizing committee members for their invaluable contributions to IS-LiVaS 2025.

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08 August 2025	Seminar and Exhibition
09 August 2025	Excursion
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KEYNOTE SPEAKER

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(Vice Minister of Public Works)

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Research Institutions
Government
Practitioners/Professionals
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and all disciplines from various fields as well as stakeholders related with the creation of space such as Architecture, Civil Engineering, Urban Design, City Planning, Landscape, Environmental Engineering, Technology, Culture, Economics, Art and Design, Real Estate

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08-09
REGENERATIVE LIVABLE BUILT ENVIRONMENT
August 2025
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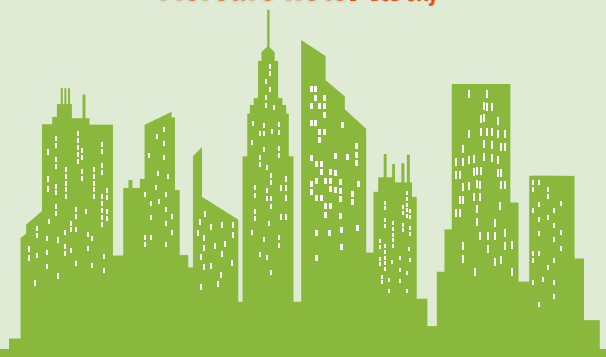

This seminar has been conducted twice before and will continue to be held every four years with similar topic and several themes related to current issues. Department of Civil Engineering and Department of Architecture, Faculty of Civil Engineering and Planning (FTSP), Universitas Trisakti is the organizer of this event in collaboration with some universities as Co-Host, which have the same main research approach as Universitas Trisakti.

BACKGROUND

Regenerative Livable Built Environment (RLBE) is a holistic approach to designing and managing human-made environments, focusing on regeneration, livability, and sustainability. It aims to enhance natural systems, foster inclusive and resilient communities, and minimize environmental impact through efficient resource use. RLBE requires an integrative design approach that considers social, ecological, economical, and technological factors.

Benefits of RLBE include improved air and water quality, enhanced biodiversity, increased community engagement, reduced waste and emissions, economic growth through sustainable practices, and improved public health. RLBE prioritizes the balance between human well-being, ecological health, and economical viability, shifting from traditional built environment practices.

The forum encourages stakeholders to rethink livable spaces, moving towards creating better environments for the prosperity of all living beings. This forum aims to build understanding and creative capacity to create livable spaces for humans and other living beings, while also serving as an initial step in establishing milestones for the study of livable space in educational and research institutions in Indonesia, by gathering ideas and experiences from diverse groups as a collective foundation to raise awareness of the importance of quality living environments for all.

TOPICS

The topic of this international seminar is Livable-Space with the theme "REGENERATIVE LIVABLE BUILT ENVIRONMENT". The sub themes will be chosen from the following areas:

- The Concept of Livable-space
- Appearance/Shape of Livable Space
- Various Dimensions of Livable-space
- Creation Process of Livable-space

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Integration of green open spaces in regenerative housing development: Developer and government policy

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Abstract

The integration of Green Open Spaces (GOS) within regenerative housing development is increasingly recognized as essential for achieving sustainable, livable, and climate-resilient urban environments. However, in many developing regions, economic constraints, fragmented regulations, and limited policy coordination continue to hinder effective implementation. This study aims to address this research gap by systematically reviewing global and regional approaches to GOS integration, emphasizing the interaction among governments, developers, and communities. A Systematic Literature Review (SLR) guided by the PRISMA 2020 framework was conducted, analyzing 22 peer-reviewed studies published between 2019 and 2024 from databases including Scopus, ScienceDirect, and Google Scholar. The analysis focused on four variables: environmental and social benefits of GOS, existing barriers, policy and developer strategies, and best practices from international case studies. Findings reveal that GOS significantly enhance ecological resilience, public health, and social cohesion, yet remain undervalued in market-oriented housing systems. Effective governance, financial incentives, and participatory design emerged as critical success factors. This study contributes a conceptual framework linking ecological restoration, socioeconomic equity, and policy mechanisms under a regenerative paradigm. The results provide actionable insights for policymakers and developers to integrate GOS as a core component of regenerative housing, aligning with the Sustainable Development Goals (SDGs) and advancing cities toward net-zero and restorative futures.

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Integration of green open spaces in regenerative housing development: Developer and government policy

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Abstract. The integration of Green Open Spaces (GOS) within regenerative housing development is increasingly recognized as essential for achieving sustainable, livable, and climate-resilient urban environments. However, in many developing regions, economic constraints, fragmented regulations, and limited policy coordination continue to hinder effective implementation. This study aims to address this research gap by systematically reviewing global and regional approaches to GOS integration, emphasizing the interaction among governments, developers, and communities. A Systematic Literature Review (SLR) guided by the PRISMA 2020 framework was conducted, analyzing 22 peer-reviewed studies published between 2019 and 2024 from databases including Scopus, ScienceDirect, and Google Scholar. The analysis focused on four variables: environmental and social benefits of GOS, existing barriers, policy and developer strategies, and best practices from international case studies. Findings reveal that GOS significantly enhance ecological resilience, public health, and social cohesion, yet remain undervalued in market-oriented housing systems. Effective governance, financial incentives, and participatory design emerged as critical success factors. This study contributes a conceptual framework linking ecological restoration, socio-economic equity, and policy mechanisms under a regenerative paradigm. The results provide actionable insights for policymakers and developers to integrate GOS as a core component of regenerative housing, aligning with the Sustainable Development Goals (SDGs) and advancing cities toward net-zero and restorative futures.

1 Introduction

The accelerating pace of urbanization and the growing demand for sustainable housing have renewed attention to the critical role of Green Open Spaces (GOS) in improving environmental quality, social well-being, and urban resilience. However, the integration of GOS within housing development remains insufficiently addressed, particularly in rapidly

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developing regions where urban expansion often prioritizes economic growth over ecological balance [1, 2]. Previous studies have demonstrated that GOS contribute significantly to mitigating urban heat island effects, enhancing biodiversity, and providing social and recreational benefits that improve public health and livability [3-5]. Nevertheless, many urban developments continue to underallocate green spaces due to fragmented policies, economic pressures, and weak inter-sectoral coordination [6, 7].

Existing literature has predominantly focused on the environmental and aesthetic functions of GOS but less on their integration within *regenerative housing development* — a paradigm that goes beyond sustainability to actively restore ecosystems and enhance community vitality [8]. While studies in Europe and East Asia have explored the planning and governance aspects of green infrastructure [1, 9], limited research examines how developers, local governments, and communities interact to operationalize GOS in the context of housing policies and market constraints in developing nations such as Indonesia and Malaysia. This gap underscores the need to connect ecological principles with socio-economic and institutional dimensions under a regenerative framework.

Therefore, this study aims to bridge the identified research gap by systematically analyzing the integration of GOS in regenerative housing development through a multi-stakeholder perspective. Specifically, it investigates (1) the environmental, social, and climate benefits of GOS; (2) barriers and challenges that hinder their implementation; (3) the roles of government policies and developer strategies; and (4) international best practices that can be adapted to local contexts. By synthesizing recent publications from 2019–2024 through a PRISMA-guided Systematic Literature Review (SLR), this research provides an updated conceptual framework that links ecological restoration with socio-economic and policy mechanisms. The novelty of this study lies in its regenerative orientation — shifting from conventional sustainability, which focuses on impact reduction, to a regenerative approach that emphasizes ecosystem renewal and community co-creation — thereby offering actionable insights for urban policymakers and housing developers.

2 Methodology

This study adopted a Systematic Literature Review (SLR) approach to synthesize existing knowledge on the integration of Green Open Spaces (GOS) in regenerative housing development. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework [10], ensuring transparency and reproducibility throughout the research process. The methodological design consisted of four stages: identification, screening, eligibility assessment, and inclusion.

2.1 Data sources and search strategy

Data collection was conducted across major academic databases, including Scopus, ScienceDirect, and Google Scholar, focusing on publications from 2019 to 2024 to capture the most recent developments. The search used combinations of the following keywords: *"green open space," "regenerative housing," "sustainability policy," "developer strategies,"* and *"urban livability."* Boolean operators (AND, OR) were applied to refine the results and ensure comprehensive coverage across environmental planning, architecture, and urban policy disciplines.

2.2 Eligibility criteria

The inclusion and exclusion of studies were guided by predefined eligibility criteria (Table 1). Only peer-reviewed journal articles, conference papers, and policy reports that explicitly discussed GOS integration within the housing or urban development context were included. Studies focusing solely on ecological restoration without a housing component, those lacking empirical or conceptual grounding, and non-English publications were excluded.

Table 1. Eligibility criteria.

Criteria Type	Inclusion Criteria	Exclusion Criteria
Publication Type	Peer-reviewed journals, conference papers, policy reports	Non-peer-reviewed materials, editorials, book reviews
Language	English	Non-English
Time Range	2019–2024	Prior to 2019
Thematic Focus	Studies addressing GOS integration in housing or regenerative urban development	Studies focusing solely on general sustainability or unrelated urban topics
Stakeholder Scope	Government, developers, and community perspectives	Single-variable ecological analyses

2.3 PRISMA flow and screening process

The PRISMA flow process followed four sequential steps:

1. Identification – A total of 186 publications were initially retrieved from Scopus (72), ScienceDirect (64), and Google Scholar (50).
2. Screening – After removing 42 duplicates, 144 unique records were screened based on titles and abstracts.
3. Eligibility Assessment – Of these, 54 full-text articles were reviewed for relevance and methodological rigor according to the inclusion criteria.
4. Final Inclusion – A total of 22 studies met all criteria and were included in the synthesis for thematic analysis.

This process ensured that only high-quality and thematically relevant studies were included, minimizing bias and maintaining the integrity of the review.

2.4 Data extraction and analysis

Selected publications were analyzed using a thematic content analysis approach. Each study was coded according to four key variables:

1. Benefits of GOS,
2. Barriers and challenges,
3. Policies and developer strategies, and
4. Case-based practices and recommendations.

Thematic coding was conducted manually and cross-validated to identify emerging patterns and correlations among variables. A cross-comparative analysis was then applied between global (Germany, Poland, Malaysia) and regional (Indonesia, Malaysia) cases to identify transferable lessons and contextual differences. The final synthesis produced a conceptual framework for systematically integrating GOS into regenerative housing development, linking ecological, socio-economic, and policy dimensions.

3 Results and discussion

The findings of this systematic literature review reveal that the integration of Green Open Spaces (GOS) in regenerative housing development provides multidimensional benefits encompassing environmental, social, and climatic dimensions. From the analysis of 22 eligible studies, GOS consistently emerged as a critical factor for achieving urban livability and resilience, as summarized in Table 1.

3.1 Environmental and health benefits

GOS play a vital role in mitigating urban heat island effects, improving air quality, supporting biodiversity, and offering spaces for recreation and mental restoration. These ecological functions contribute to residents' physical and mental health, while fostering a sense of community belonging [3, 4]. Studies in tropical cities have further shown that vegetated corridors and urban forests reduce surface temperatures by up to 3–5°C, which directly supports *climate resilience* [11].

3.2 Social and livability dimensions

Beyond environmental gains, GOS enhance social cohesion by providing spaces for cultural interaction, inclusivity, and recreation [5]. Such spaces become nodes of urban vitality that encourage community engagement and civic identity. These outcomes reflect the regenerative approach's emphasis on restoring both ecological and social systems — a paradigm shift from conventional sustainability that focuses merely on minimizing impacts [8]. Benefits of green open spaces can be seen in Table 2.

Table 2. Benefits of green open spaces.

Dimension	Description	Key Outcomes	References
Environmental & Health	Improve air quality, provide recreational spaces, support biodiversity	Better physical & mental health, higher life satisfaction	[3, 4]
Climate Adaptation	Mitigate urban heat island, regulate stormwater, enhance biodiversity	Enhanced urban resilience, reduced climate risks	[11]
Social Cohesion	Foster community interaction, inclusivity, cultural engagement	Stronger social bonds, improved equity	[4, 5]

3.3 Barriers and challenges

Despite their benefits, the review indicates that GOS integration faces persistent economic, regulatory, and technical barriers (Table 3). Economic pressures remain dominant, as market-driven housing developments often prioritize financial returns over long-term ecological value [9]. Fragmented regulations and inconsistent enforcement further hinder policy alignment across government levels [6, 7]. High implementation costs — particularly for retrofitting existing developments or adopting green technologies — discourage developers, especially in emerging markets where consumer awareness of green housing remains low [2, 12].

Table 3. Challenges and barriers in GOS integration.

Barrier	Description	Impact on Development	References
Economic Pressures	Market-driven priorities focus on short-term profit	Reduced GOS allocation and ecological imbalance	[9]
Policy/Regulatory Gaps	Lack of consistent frameworks for sustainable urban planning	Slow adoption of green practices, weak enforcement	[6, 7]
High Costs	Expensive green technologies and retrofitting	Developers reluctant to adopt sustainable design	[2, 12]

3.4 Government policies and developer strategies

Governments and developers play essential roles in overcoming these barriers through policy instruments and strategic interventions (Table 4). In Indonesia, the **Spatial Planning Act** mandates that 30% of urban land must be allocated for GOS, embedding ecological considerations into legal frameworks [13, 14]. Economic incentives — such as tax reliefs and subsidies — have been used in Malaysia to stimulate the adoption of green housing initiatives [7, 15]. Furthermore, participatory planning processes enhance community ownership and long-term maintenance of GOS, ensuring their functionality and sustainability [5, 11].

Table 4. Government policies and developer strategies.

Strategy	Description	Example / Application	References
Regulatory Frameworks	Legal mandates for GOS allocation in urban planning	Indonesia: Spatial Planning Act (30% GOS)	[13, 14]
Incentives & Subsidies	Financial relief such as tax breaks, grants, and subsidies	Malaysia: Incentives for green housing	[7, 15]
Public Participation	Community engagement in design and management	Participatory GOS planning increases public acceptance	[5, 11]

3.5 Case studies and best practices

Comparative analysis of international case studies demonstrates that effective GOS integration depends on governance, adaptability, and socio-cultural alignment (Table 5). Leipzig (Germany) exemplifies how ecological restoration can coexist with social renewal through community-based urban regeneration programs [1, 16]. In Malaysia, regulatory incentives have gradually improved the integration of green infrastructure in private housing developments [6, 17]. Kraków (Poland), meanwhile, has implemented pocket parks within dense neighborhoods as a scalable and low-cost strategy to improve urban greenery and accessibility [18].

Table 5. Case studies and best practices.

Country/City	Approach	Outcome	References
Leipzig, Germany	Urban regeneration integrating GOS	Balanced ecological and social outcomes despite economic pressures	[1, 16]
Malaysia	Regulatory mandates and green housing incentives	Gradual adoption of sustainable housing practices	[6, 17]
Kraków, Poland	Pocket parks in dense urban settings	Increased GOS accessibility, scalable implementation model	[18]

3.6 Recommendations for future policy and practice

The synthesis of findings leads to three key recommendations (Table 6):

1. Enhanced Multi-Stakeholder Cooperation — Collaboration among governments, developers, and communities can align ecological, economic, and social objectives [11, 19].
2. Flexible Policy Frameworks — Adaptive policies tailored to local contexts ensure more effective implementation [20].
3. Alignment with Sustainable Development Goals (SDGs) — Integrating GOS strategies within the SDG framework strengthens long-term resilience and inclusivity [21].

Table 6. Recommendations for future policy and practice.

Recommendation	Key Focus	Expected Impact	References
Enhanced Cooperation	Collaboration among government, developers, and communities	Integrated ecological, economic, and social outcomes	[11,19]
Flexible Policies	Context-based, adaptable policy design	Increased relevance and long-term sustainability	[20]
Alignment with SDGs	Incorporation into global sustainability agendas	Long-term environmental protection and social inclusion	[21]

3.7 Discussion summary

Overall, the review identifies a paradox: while GOS are essential for urban resilience and livability, they remain undervalued in market-oriented housing systems. Bridging this gap requires a regenerative governance model that integrates ecological, socio-economic, and institutional dimensions. Unlike traditional sustainability approaches that aim to minimize harm, regenerative frameworks seek to restore ecosystems and strengthen community interdependence. This integrative perspective positions GOS not only as environmental assets but as *drivers of regeneration* — enabling housing developments to become catalysts for both ecological restoration and human well-being.

4 Conclusion

The integration of Green Open Spaces (GOS) into regenerative housing development represents a transformative pathway toward sustainable, resilient, and inclusive urban environments. This study systematically reviewed 22 publications from 2019 to 2024, identifying the environmental, social, and policy dimensions that shape the effectiveness of GOS integration. Despite economic pressures, regulatory inconsistencies, and financial barriers, the synthesis demonstrates that effective governance, financial incentives, and participatory planning can significantly enhance the role of GOS in regenerative urban systems.

4.1 Theoretical and practical contributions

This study contributes to the growing body of regenerative architecture and urban planning literature by developing a conceptual framework that links ecological restoration**,** socio-economic equity, and governance mechanisms within housing development. Unlike conventional sustainability studies that focus on impact mitigation, this research emphasizes

regenerative principles—restoring ecosystems, fostering community resilience, and promoting long-term urban livability. Practically, the findings provide actionable insights for governments and developers, highlighting how policy instruments (such as mandatory GOS allocations, fiscal incentives, and participatory approaches) can be effectively combined to achieve balance between market needs and environmental stewardship.

4.2 Limitations

The scope of this study is limited by its reliance on secondary data derived from published literature. The analysis may therefore not fully capture ongoing policy changes or undocumented local practices in developing countries. Furthermore, while the SLR method ensures rigor and transparency, it does not include quantitative meta-analysis due to variations in data reporting among the reviewed studies. These limitations suggest caution in generalizing the findings across all urban contexts.

4.3 Future research directions

Future studies should expand upon this framework through empirical validation, using mixed-method or quantitative models to evaluate the real-world performance of GOS-integrated housing projects. Comparative field studies across different climatic, cultural, and governance settings would enhance understanding of local adaptability. Additionally, integrating spatial analysis, carbon accounting, and digital tools (such as GIS and Life Cycle Assessment) could deepen insights into how GOS contribute to net-zero carbon and regenerative city goals. Such research would provide stronger evidence for policy formulation and for scaling regenerative housing practices globally.

In conclusion, this study reinforces that the integration of GOS is not merely an environmental intervention but a regenerative strategy that bridges ecology, society, and policy. By aligning housing development with the principles of regeneration and the Sustainable Development Goals (SDGs), cities can evolve beyond sustainability—toward urban systems that continuously restore, renew, and revitalize both nature and human life.

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Integration of green open spaces in regenerative housing development: Developer and government policy

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Abstract. The integration of Green Open Spaces (GOS) within regenerative housing development is increasingly recognized as essential for achieving sustainable, livable, and climate-resilient urban environments. However, in many developing regions, economic constraints, fragmented regulations, and limited policy coordination continue to hinder effective implementation. This study aims to address this research gap by systematically reviewing global and regional approaches to GOS integration, emphasizing the interaction among governments, developers, and communities. A Systematic Literature Review (SLR) guided by the PRISMA 2020 framework was conducted, analyzing 22 peer-reviewed studies published between 2019 and 2024 from databases including Scopus, ScienceDirect, and Google Scholar. The analysis focused on four variables: environmental and social benefits of GOS, existing barriers, policy and developer strategies, and best practices from international case studies. Findings reveal that GOS significantly enhance ecological resilience, public health, and social cohesion, yet remain undervalued in market-oriented housing systems. Effective governance, financial incentives, and participatory design emerged as critical success factors. This study contributes a conceptual framework linking ecological restoration, socio-economic equity, and policy mechanisms under a regenerative paradigm. The results provide actionable insights for policymakers and developers to integrate GOS as a core component of regenerative housing, aligning with the Sustainable Development Goals (SDGs) and advancing cities toward net-zero and restorative futures.

1 Introduction

The accelerating pace of urbanization and the growing demand for sustainable housing have renewed attention to the critical role of Green Open Spaces (GOS) in improving environmental quality, social well-being, and urban resilience. However, the integration of GOS within housing development remains insufficiently addressed, particularly in rapidly

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developing regions where urban expansion often prioritizes economic growth over ecological balance [1, 2]. Previous studies have demonstrated that GOS contribute significantly to mitigating urban heat island effects, enhancing biodiversity, and providing social and recreational benefits that improve public health and livability [3-5]. Nevertheless, many urban developments continue to underallocate green spaces due to fragmented policies, economic pressures, and weak inter-sectoral coordination [6, 7].

Existing literature has predominantly focused on the environmental and aesthetic functions of GOS but less on their integration within *regenerative housing development* — a paradigm that goes beyond sustainability to actively restore ecosystems and enhance community vitality [8]. While studies in Europe and East Asia have explored the planning and governance aspects of green infrastructure [1, 9], limited research examines how developers, local governments, and communities interact to operationalize GOS in the context of housing policies and market constraints in developing nations such as Indonesia and Malaysia. This gap underscores the need to connect ecological principles with socio-economic and institutional dimensions under a regenerative framework.

Therefore, this study aims to bridge the identified research gap by systematically analyzing the integration of GOS in regenerative housing development through a multi-stakeholder perspective. Specifically, it investigates (1) the environmental, social, and climate benefits of GOS; (2) barriers and challenges that hinder their implementation; (3) the roles of government policies and developer strategies; and (4) international best practices that can be adapted to local contexts. By synthesizing recent publications from 2019–2024 through a PRISMA-guided Systematic Literature Review (SLR), this research provides an updated conceptual framework that links ecological restoration with socio-economic and policy mechanisms. The novelty of this study lies in its regenerative orientation — shifting from conventional sustainability, which focuses on impact reduction, to a regenerative approach that emphasizes ecosystem renewal and community co-creation — thereby offering actionable insights for urban policymakers and housing developers.

2 Methodology

This study adopted a Systematic Literature Review (SLR) approach to synthesize existing knowledge on the integration of Green Open Spaces (GOS) in regenerative housing development. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework [10], ensuring transparency and reproducibility throughout the research process. The methodological design consisted of four stages: identification, screening, eligibility assessment, and inclusion.

2.1 Data sources and search strategy

Data collection was conducted across major academic databases, including Scopus, ScienceDirect, and Google Scholar, focusing on publications from 2019 to 2024 to capture the most recent developments. The search used combinations of the following keywords: *"green open space," "regenerative housing," "sustainability policy," "developer strategies,"* and *"urban livability."* Boolean operators (AND, OR) were applied to refine the results and ensure comprehensive coverage across environmental planning, architecture, and urban policy disciplines.

2.2 Eligibility criteria

The inclusion and exclusion of studies were guided by predefined eligibility criteria (Table 1). Only peer-reviewed journal articles, conference papers, and policy reports that explicitly discussed GOS integration within the housing or urban development context were included. Studies focusing solely on ecological restoration without a housing component, those lacking empirical or conceptual grounding, and non-English publications were excluded.

Table 1. Eligibility criteria.

Criteria Type	Inclusion Criteria	Exclusion Criteria
Publication Type	Peer-reviewed journals, conference papers, policy reports	Non-peer-reviewed materials, editorials, book reviews
Language	English	Non-English
Time Range	2019–2024	Prior to 2019
Thematic Focus	Studies addressing GOS integration in housing or regenerative urban development	Studies focusing solely on general sustainability or unrelated urban topics
Stakeholder Scope	Government, developers, and community perspectives	Single-variable ecological analyses

2.3 PRISMA flow and screening process

The PRISMA flow process followed four sequential steps:

1. Identification – A total of 186 publications were initially retrieved from Scopus (72), ScienceDirect (64), and Google Scholar (50).
2. Screening – After removing 42 duplicates, 144 unique records were screened based on titles and abstracts.
3. Eligibility Assessment – Of these, 54 full-text articles were reviewed for relevance and methodological rigor according to the inclusion criteria.
4. Final Inclusion – A total of 22 studies met all criteria and were included in the synthesis for thematic analysis.

This process ensured that only high-quality and thematically relevant studies were included, minimizing bias and maintaining the integrity of the review.

2.4 Data extraction and analysis

Selected publications were analyzed using a thematic content analysis approach. Each study was coded according to four key variables:

1. Benefits of GOS,
2. Barriers and challenges,
3. Policies and developer strategies, and
4. Case-based practices and recommendations.

Thematic coding was conducted manually and cross-validated to identify emerging patterns and correlations among variables. A cross-comparative analysis was then applied between global (Germany, Poland, Malaysia) and regional (Indonesia, Malaysia) cases to identify transferable lessons and contextual differences. The final synthesis produced a conceptual framework for systematically integrating GOS into regenerative housing development, linking ecological, socio-economic, and policy dimensions.

3 Results and discussion

The findings of this systematic literature review reveal that the integration of Green Open Spaces (GOS) in regenerative housing development provides multidimensional benefits encompassing environmental, social, and climatic dimensions. From the analysis of 22 eligible studies, GOS consistently emerged as a critical factor for achieving urban livability and resilience, as summarized in Table 1.

3.1 Environmental and health benefits

GOS play a vital role in mitigating urban heat island effects, improving air quality, supporting biodiversity, and offering spaces for recreation and mental restoration. These ecological functions contribute to residents' physical and mental health, while fostering a sense of community belonging [3, 4]. Studies in tropical cities have further shown that vegetated corridors and urban forests reduce surface temperatures by up to 3–5°C, which directly supports *climate resilience* [11].

3.2 Social and livability dimensions

Beyond environmental gains, GOS enhance social cohesion by providing spaces for cultural interaction, inclusivity, and recreation [5]. Such spaces become nodes of urban vitality that encourage community engagement and civic identity. These outcomes reflect the regenerative approach's emphasis on restoring both ecological and social systems — a paradigm shift from conventional sustainability that focuses merely on minimizing impacts [8]. Benefits of green open spaces can be seen in Table 2.

Table 2. Benefits of green open spaces.

Dimension	Description	Key Outcomes	References
Environmental & Health	Improve air quality, provide recreational spaces, support biodiversity	Better physical & mental health, higher life satisfaction	[3, 4]
Climate Adaptation	Mitigate urban heat island, regulate stormwater, enhance biodiversity	Enhanced urban resilience, reduced climate risks	[11]
Social Cohesion	Foster community interaction, inclusivity, cultural engagement	Stronger social bonds, improved equity	[4, 5]

3.3 Barriers and challenges

Despite their benefits, the review indicates that GOS integration faces persistent economic, regulatory, and technical barriers (Table 3). Economic pressures remain dominant, as market-driven housing developments often prioritize financial returns over long-term ecological value [9]. Fragmented regulations and inconsistent enforcement further hinder policy alignment across government levels [6, 7]. High implementation costs — particularly for retrofitting existing developments or adopting green technologies — discourage developers, especially in emerging markets where consumer awareness of green housing remains low [2, 12].

Table 3. Challenges and barriers in GOS integration.

Barrier	Description	Impact on Development	References
Economic Pressures	Market-driven priorities focus on short-term profit	Reduced GOS allocation and ecological imbalance	[9]
Policy/Regulatory Gaps	Lack of consistent frameworks for sustainable urban planning	Slow adoption of green practices, weak enforcement	[6, 7]
High Costs	Expensive green technologies and retrofitting	Developers reluctant to adopt sustainable design	[2, 12]

3.4 Government policies and developer strategies

Governments and developers play essential roles in overcoming these barriers through policy instruments and strategic interventions (Table 4). In Indonesia, the **Spatial Planning Act** mandates that 30% of urban land must be allocated for GOS, embedding ecological considerations into legal frameworks [13, 14]. Economic incentives — such as tax reliefs and subsidies — have been used in Malaysia to stimulate the adoption of green housing initiatives [7, 15]. Furthermore, participatory planning processes enhance community ownership and long-term maintenance of GOS, ensuring their functionality and sustainability [5, 11].

Table 4. Government policies and developer strategies.

Strategy	Description	Example / Application	References
Regulatory Frameworks	Legal mandates for GOS allocation in urban planning	Indonesia: Spatial Planning Act (30% GOS)	[13, 14]
Incentives & Subsidies	Financial relief such as tax breaks, grants, and subsidies	Malaysia: Incentives for green housing	[7, 15]
Public Participation	Community engagement in design and management	Participatory GOS planning increases public acceptance	[5, 11]

3.5 Case studies and best practices

Comparative analysis of international case studies demonstrates that effective GOS integration depends on governance, adaptability, and socio-cultural alignment (Table 5). Leipzig (Germany) exemplifies how ecological restoration can coexist with social renewal through community-based urban regeneration programs [1, 16]. In Malaysia, regulatory incentives have gradually improved the integration of green infrastructure in private housing developments [6, 17]. Kraków (Poland), meanwhile, has implemented pocket parks within dense neighborhoods as a scalable and low-cost strategy to improve urban greenery and accessibility [18].

Table 5. Case studies and best practices.

Country/City	Approach	Outcome	References
Leipzig, Germany	Urban regeneration integrating GOS	Balanced ecological and social outcomes despite economic pressures	[1, 16]
Malaysia	Regulatory mandates and green housing incentives	Gradual adoption of sustainable housing practices	[6, 17]
Kraków, Poland	Pocket parks in dense urban settings	Increased GOS accessibility, scalable implementation model	[18]

3.6 Recommendations for future policy and practice

The synthesis of findings leads to three key recommendations (Table 6):

1. Enhanced Multi-Stakeholder Cooperation — Collaboration among governments, developers, and communities can align ecological, economic, and social objectives [11, 19].
2. Flexible Policy Frameworks — Adaptive policies tailored to local contexts ensure more effective implementation [20].
3. Alignment with Sustainable Development Goals (SDGs) — Integrating GOS strategies within the SDG framework strengthens long-term resilience and inclusivity [21].

Table 6. Recommendations for future policy and practice.

Recommendation	Key Focus	Expected Impact	References
Enhanced Cooperation	Collaboration among government, developers, and communities	Integrated ecological, economic, and social outcomes	[11,19]
Flexible Policies	Context-based, adaptable policy design	Increased relevance and long-term sustainability	[20]
Alignment with SDGs	Incorporation into global sustainability agendas	Long-term environmental protection and social inclusion	[21]

3.7 Discussion summary

Overall, the review identifies a paradox: while GOS are essential for urban resilience and livability, they remain undervalued in market-oriented housing systems. Bridging this gap requires a regenerative governance model that integrates ecological, socio-economic, and institutional dimensions. Unlike traditional sustainability approaches that aim to minimize harm, regenerative frameworks seek to restore ecosystems and strengthen community interdependence. This integrative perspective positions GOS not only as environmental assets but as *drivers of regeneration* — enabling housing developments to become catalysts for both ecological restoration and human well-being.

4 Conclusion

The integration of Green Open Spaces (GOS) into regenerative housing development represents a transformative pathway toward sustainable, resilient, and inclusive urban environments. This study systematically reviewed 22 publications from 2019 to 2024, identifying the environmental, social, and policy dimensions that shape the effectiveness of GOS integration. Despite economic pressures, regulatory inconsistencies, and financial barriers, the synthesis demonstrates that effective governance, financial incentives, and participatory planning can significantly enhance the role of GOS in regenerative urban systems.

4.1 Theoretical and practical contributions

This study contributes to the growing body of regenerative architecture and urban planning literature by developing a conceptual framework that links ecological restoration**,** socio-economic equity, and governance mechanisms within housing development. Unlike conventional sustainability studies that focus on impact mitigation, this research emphasizes

regenerative principles—restoring ecosystems, fostering community resilience, and promoting long-term urban livability. Practically, the findings provide actionable insights for governments and developers, highlighting how policy instruments (such as mandatory GOS allocations, fiscal incentives, and participatory approaches) can be effectively combined to achieve balance between market needs and environmental stewardship.

4.2 Limitations

The scope of this study is limited by its reliance on secondary data derived from published literature. The analysis may therefore not fully capture ongoing policy changes or undocumented local practices in developing countries. Furthermore, while the SLR method ensures rigor and transparency, it does not include quantitative meta-analysis due to variations in data reporting among the reviewed studies. These limitations suggest caution in generalizing the findings across all urban contexts.

4.3 Future research directions

Future studies should expand upon this framework through empirical validation, using mixed-method or quantitative models to evaluate the real-world performance of GOS-integrated housing projects. Comparative field studies across different climatic, cultural, and governance settings would enhance understanding of local adaptability. Additionally, integrating spatial analysis, carbon accounting, and digital tools (such as GIS and Life Cycle Assessment) could deepen insights into how GOS contribute to net-zero carbon and regenerative city goals. Such research would provide stronger evidence for policy formulation and for scaling regenerative housing practices globally.

In conclusion, this study reinforces that the integration of GOS is not merely an environmental intervention but a regenerative strategy that bridges ecology, society, and policy. By aligning housing development with the principles of regeneration and the Sustainable Development Goals (SDGs), cities can evolve beyond sustainability—toward urban systems that continuously restore, renew, and revitalize both nature and human life.

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