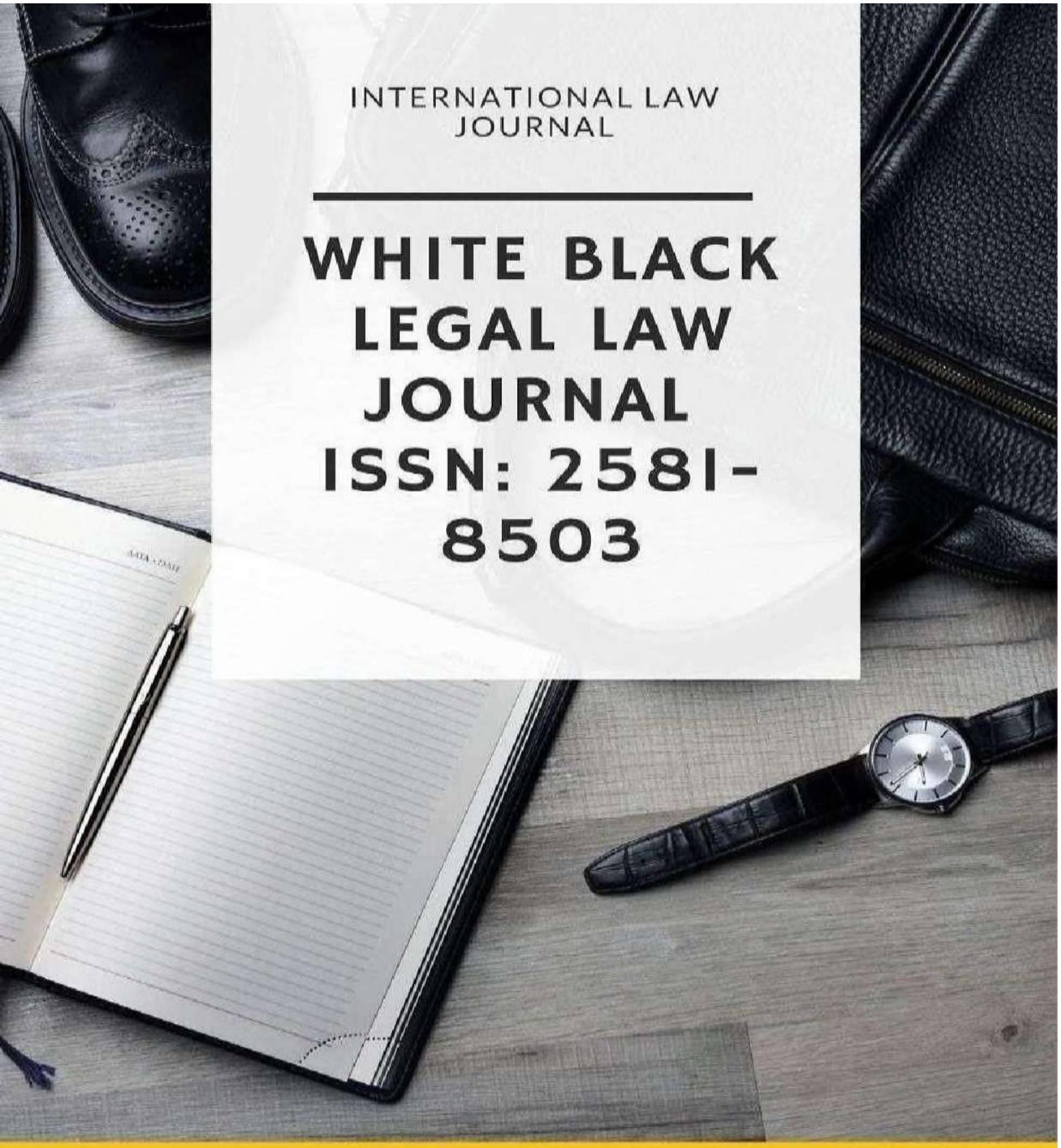

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ABOUT US

WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal provide dedicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you

INTEGRATING BIODIVERSITY INTO URBAN GREEN SPACE PLANNING: ADVANCING GLOBAL BIODIVERSITY FRAMEWORK TARGET 12

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Abstract

Urbanization is rapidly reshaping landscapes, often at the expense of ecological integrity and human well-being. The Kunming-Montreal Global Biodiversity Framework (GBF) recognizes this challenge through Target 12, which calls for significantly increasing the area, quality, connectivity, and accessibility of green and blue spaces in urban and densely populated areas. This paper explores how biodiversity can be effectively integrated into urban green space planning as a pathway to advancing Target 12. Drawing on case studies from European cities, including Berlin's biodiversity monitoring programmes, benchmarking results of urban nature plans, and policy frameworks from the Global South, the paper examines three interlinked dimensions: ecological integration, governance, and equity. First, it highlights the importance of biodiversity-inclusive planning tools, such as Essential Biodiversity Variables (EBVs), to monitor and evaluate ecological outcomes in urban settings. Second, it underscores the role of collaborative governance, citizen participation, and cross-sectoral coordination in ensuring that green infrastructure contributes both to biodiversity and to social resilience. Third, it emphasizes equitable access to green and blue spaces, particularly for vulnerable and marginalized groups, linking biodiversity conservation with public health and social justice. The analysis demonstrates that achieving Target 12 requires moving beyond conventional urban greening toward systemic approaches that mainstream biodiversity into urban design, policy, and governance. By aligning ecological goals with human well-being, cities can serve

as laboratories for transformative action on biodiversity. This study provides insights and policy recommendations to guide urban planners, policymakers, and communities in operationalizing Target 12 for a nature-positive and inclusive urban future.

Keywords: Urban biodiversity · Green and blue spaces · Target 12 · Global Biodiversity Framework · Collaborative governance · Nature-based solutions

Introduction

Urbanization is one of the most significant drivers of global environmental change. More than half of the world's population already resides in cities, and this proportion is expected to rise to nearly 70% by 2050[1]. Rapid urban expansion often leads to habitat fragmentation, degradation of ecosystems, and loss of biodiversity. At the same time, cities are also centers of innovation, governance, and policy, positioning them as crucial arenas for biodiversity conservation and human well-being.

Recognizing these dynamics, the Kunming-Montreal Global Biodiversity Framework (GBF), adopted at COP-15 of the Convention on Biological Diversity in 2022, established 23 global targets to halt and reverse biodiversity loss by 2030. Among them, Target 12 plays a pivotal role in addressing urban challenges. It calls for a significant increase in the area, quality, connectivity, and equitable access to green and blue spaces in urban and densely populated areas, while ensuring biodiversity-inclusive urban planning and contributing to human health and well-being[2]. Unlike earlier biodiversity targets, Target 12 explicitly situates biodiversity conservation within the urban context, acknowledging that ecological integrity and human development must be pursued together.

Urban green and blue spaces including parks, forests, wetlands, rivers, and urban gardens provide multiple benefits. Ecologically, they support native species, restore ecological connectivity, and enhance resilience to climate change impacts such as flooding and heat stress. Socially, they promote mental and physical health, strengthen social cohesion, and provide equitable access to nature, especially for marginalized groups[3]. However, the uneven

[1] United Nations, *World Urbanization Prospects* (2019), quoted in Keinath et al., *Towards Global Biodiversity Framework Target 12 – Berlin Case Study* (2025).
[2] Convention on Biological Diversity, *Kunming-Montreal Global Biodiversity Framework, Target 12* (2022), https://cbd.int/gbf/targets/12
[3] Urban Bio-Policy Draft on KMGBF Target 12, Stakeholder Rationale

distribution and quality of urban green spaces often create environmental inequities, leaving vulnerable populations underserved.

Recent research underscores both opportunities and challenges in implementing Target 12. A study mapping biodiversity monitoring programmes in Berlin revealed 89 distinct initiatives, covering multiple taxonomic groups and essential biodiversity variables (EBVs). Yet, significant gaps remain, particularly in monitoring the linkages between biodiversity and human health[4]. Similarly, an analysis of urban nature plans across ten European cities found that while biodiversity goals are increasingly integrated into planning, collaborative governance, public participation, and financial mechanisms remain weak points, undermining the robustness of biodiversity-inclusive planning[5]. In developing country contexts, policy consultancy efforts, such as those undertaken in Trivandrum, India, highlight the urgent need to align biodiversity conservation with urban development, health, and social equity agendas, while also mobilizing cross-sectoral collaboration and sustainable financing.

This article examines how biodiversity can be effectively integrated into urban green space planning as a pathway to advancing Target 12. It draws on insights from case studies, governance frameworks, and policy strategies to outline how cities can move beyond conventional greening measures to systemic approaches that embed biodiversity in urban planning and governance. By focusing on ecological integration, collaborative governance, and social equity, the article contributes to both scholarly debate and practical guidance for policymakers, planners, and communities. Ultimately, the goal is to demonstrate how cities can serve as laboratories of innovation for biodiversity action, supporting a nature-positive and inclusive urban future.

2. Urban Biodiversity and Target 12: Key Dimensions

Target 12 of the Kunming-Montreal Global Biodiversity Framework (GBF) reflects a paradigm shift in biodiversity policy. For the first time, global biodiversity targets explicitly recognize cities as critical spaces where ecological integrity and human well-being intersect. The target states:

[4] S. Keinath et al., Mapping Urban Biodiversity Monitoring Programmes – Berlin Case Study, 28 *Urban Ecosystems* 146 (2025).
[5] Mahmoud et al., Collaborative Governance of Biodiversity-Inclusive Urban Planning in 10 European Cities, 28 *Urban Ecosystems* 17 (2025).

"*Significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature*."[6]

This articulation introduces four interrelated dimensions that are central to the achievement of Target 12: ecological integrity, social equity, governance and planning, and monitoring and knowledge systems.

2.1 Ecological Integrity and Resilience

The ecological dimension of Target 12 emphasizes the enhancement of native biodiversity, restoration of ecological connectivity, and safeguarding of ecosystem integrity. In urban areas, biodiversity often suffers from habitat fragmentation, invasive species, and pollution. Yet cities also provide unique opportunities for ecological restoration through green roofs, urban wetlands, ecological corridors, and nature-based solutions.

Evidence from Berlin demonstrates both potential and gaps. A mapping of 89 biodiversity monitoring programmes found strong representation of some taxonomic groups such as arthropods and plants, but significant underrepresentation of microorganisms and ecosystem functioning variables[7]. This indicates that while urban ecosystems are being monitored, critical aspects of ecological health remain poorly understood. Furthermore, the majority of data are oriented toward species occurrence, rather than long-term assessments of ecosystem services or biodiversity's contributions to human well-being.

Urban ecological integrity is not just about conserving charismatic species but about sustaining the processes pollination, soil fertility, carbon storage, microclimate regulation that underpin human survival. Mainstreaming biodiversity into urban design and land-use planning ensures that ecological considerations become integral to how cities expand and redevelop.[8]

[6] Convention on Biological Diversity, *Global Biodiversity Framework Target 12* (2022), https://www.cbd.int
[7] S. Keinath et al., Mapping Urban Biodiversity Monitoring Programmes: Berlin Case Study, 28 *Urban Ecosystems* 146 (2025)
[8] Urban Bio-Policy Draft on KMGBF Target 12, Stakeholder Rationale

2.2 Social Equity and Human Well-Being

Target 12 explicitly links biodiversity to human health and social inclusion, recognizing that equitable access to nature is both a right and a necessity. Studies show that access to green and blue spaces correlates with improved mental health, reduced cardiovascular disease, and greater social cohesion[9]. Yet inequities in access are widespread: marginalized communities often live in neighbourhoods with fewer, lower-quality green spaces, exacerbating health disparities.

Policy consultancy work in Trivandrum, India, highlights these dynamics. Urban expansion has placed pressure on natural habitats, while underserved communities face reduced access to safe and high-quality public green areas. Addressing this requires deliberate planning measures such as setting minimum per-capita green space standards, prioritizing greening in low-income areas, and involving marginalized groups in co-design processes.

The social dimension of Target 12 also extends beyond health to include cultural and spiritual values. Urban biodiversity provides spaces for recreation, education, and cultural expression, reinforcing the connection between people and nature. This "nature connectedness" is critical for cultivating public support for biodiversity action.

2.3 Governance and Planning

Urban biodiversity cannot be realized without governance frameworks that integrate ecological goals into planning and development. Research benchmarking urban nature plans in ten European cities found that while biodiversity is increasingly acknowledged in planning documents, collaborative governance and public participation remain weak[10]. Only four cities performed well across ecological, institutional, and participatory dimensions, and many lacked sustainable financing or monitoring mechanisms.

Governance for Target 12 requires cross-sectoral coordination bringing together environmental, health, housing, transport, and finance departments. It also requires inclusive decision-making, where communities, civil society, and private actors share responsibility for

[9] *Urban Bio-Policy Draft: Section on Health and Equity Co-Benefits of Green/Blue Spaces* (2024) (unpublished draft, on file with author).
[10] I. Mahmoud et al., Collaborative Governance of Biodiversity-Inclusive Urban Planning in 10 European Cities, 28 *Urban Ecosystems* 17 (2025).

urban biodiversity. Mechanisms such as participatory mapping, citizen science, and co-management of urban green spaces offer practical tools to operationalize this vision.

2.4 Monitoring and Knowledge Systems

Achieving Target 12 requires robust monitoring systems to track progress on accessibility, quality, and connectivity of urban green and blue spaces. The Berlin case highlights the importance of frameworks such as Essential Biodiversity Variables (EBVs) in standardizing biodiversity data.

However, data gaps remain: few monitoring programmes capture biodiversity's direct contributions to human health or social equity.

Globally, tools such as the City Biodiversity Index (Singapore Index) and the IUCN Urban Nature Index provide standardized methods for cities to benchmark their performance. Yet uptake remains uneven, and many cities lack institutional capacity or resources to apply these frameworks.[11] Strengthening monitoring therefore requires not only technical solutions but also governance innovations open data platforms, community-led monitoring, and integration of biodiversity indicators into broader sustainability assessments.

2.5 Interlinkages with the SDGs

Target 12 is not isolated but intersects with multiple Sustainable Development Goals (SDGs). It directly contributes to SDG 11 (Sustainable Cities and Communities) by promoting inclusive access to green spaces; SDG 3 (Good Health and Well-being) through health co-benefits; SDG 13 (Climate Action) via urban resilience; and SDG 15 (Life on Land) through biodiversity protection. These interlinkages highlight Target 12 as a nexus target that can catalyze progress across environmental, social, and economic domains.[12]

3. Case Insights from Practice

Target 12 is a global commitment, but its implementation is inherently local, shaped by ecological, political, and social contexts. Examining how cities operationalize biodiversity-

[11] United Nations, *Goal 12: Ensure Sustainable Consumption and Production Patterns*, https://www.un.org/sustainabledevelopment/sustainable-consumption-production/
[12] United Nations. *Goal 11: Sustainable Cities and Communities*. https://globalgoals.org/goals/11-sustainable-cities-and-communities/

inclusive planning provides valuable lessons on opportunities, barriers, and pathways forward. Three case insights are particularly instructive: Berlin's biodiversity monitoring programmes, collaborative governance in European cities, and policy frameworks in developing-country contexts such as India.[13]

3.1 Berlin: Mapping Urban Biodiversity Monitoring Programmes

Berlin represents a unique case of a densely populated yet remarkably green city. Nearly 41% of its area consists of green and blue spaces, including forests, lakes, and allotment gardens[14]. This ecological richness offers potential to advance Target 12. Yet, systematic assessment of biodiversity monitoring reveals strengths and gaps that illuminate broader challenges.

A 2025 study identified 89 biodiversity monitoring programmes across Berlin, spanning ten taxonomic groups and five classes of Essential Biodiversity Variables (EBVs)[15]. Arthropods and plants were the most frequently monitored, while microorganisms and ecosystem functioning were absent from datasets. Strikingly, 82% of monitoring focused on species populations, with limited attention to ecosystem structure, traits, or genetic composition.[16]

Equally important, the study revealed reliance on volunteers: nearly 60% of data came from non-funded citizen collectors. While this underscores the power of citizen science, it also raises concerns about sustainability, data consistency, and institutional support. Moreover, most monitoring served regulatory reporting obligations (e.g., EU Fauna-Flora-Habitat Directive), rather than holistic urban biodiversity strategies.

Critically, links between biodiversity and human health central to Target 12 were largely absent from monitoring frameworks. This highlights an urgent need to develop interdisciplinary approaches that capture both ecological and social benefits of urban biodiversity. Berlin thus exemplifies both the progress made in urban biodiversity monitoring and the persistent gaps in aligning data collection with the integrative vision of Target 12.

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[13] Global Species Action Plan (GSAP) Skills, *Target 12: Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity*

[14] Statistik Berlin Brandenburg (2023), quoted in S. Keinath et al., *Mapping Urban Biodiversity Monitoring Programmes – Berlin Case Study*, 28 *Urban Ecosystems* 146 (2025)

[15] S. Keinath et al., *Mapping Urban Biodiversity Monitoring Programmes – Berlin Case Study*, 28 *Urban Ecosystems* 146 (2025).

[16] *Keinath et al. (2025), noting that 82% of datasets were species-population based, with no monitoring for ecosystem functioning EBVs.*

3.2 Collaborative Governance in European Cities

While monitoring is vital, biodiversity-inclusive planning ultimately hinges on governance. A comparative study of ten European cities benchmarked their urban nature plans against 30 criteria across six macro categories: biodiversity goals, collaborative governance, institutional support, public participation, financing, and monitoring[17].

Findings revealed uneven progress. Only four cities scored consistently well across governance and ecological dimensions, while the majority struggled with collaborative governance and financing. Despite EU guidelines promoting co-creation, public participation was often treated as an afterthought, with plans designed largely by municipal authorities. Moreover, seven of the ten cities lacked robust monitoring and evaluation frameworks, undermining accountability and learning.

Nevertheless, some positive examples emerged. Cities such as Ghent and Utrecht integrated public participation early in the planning process, allowing residents to shape green infrastructure projects. Others experimented with financing mechanisms, including EU-funded projects and public-private partnerships, to support long-term greening.

The European experience underscores a crucial lesson: biodiversity-inclusive urban planning is not only a technical issue but a governance challenge. Achieving Target 12 requires inclusive decision-making that spans municipal authorities, communities, civil society, and the private sector. Without participatory governance, urban biodiversity risks being sidelined or reduced to aesthetic greening rather than systemic transformation.

3.3 Policy Consultancy in Trivandrum, India: A Global South Perspective

In rapidly urbanizing regions of the Global South, the stakes of Target 12 are particularly high. Cities face dual pressures: accelerating population growth and the urgent need to safeguard biodiversity amidst development. The case of Trivandrum, India, illustrates both challenges and opportunities in localizing Target 12.[18]

[17] I. Mahmoud et al., *Collaborative Governance of Biodiversity-Inclusive Urban Planning in 10 European Cities*, 28 *Urban Ecosystems* 17 (2025).
[18] Bedur Faleh A. Albalawi, Urbanization and Habitat Loss: An Overview of Rapidly Growing Cities in Saudi Arabia, 7 *Frontiers in Sustainable Cities* (Cities in the Global South) (2025), https://www.frontiersin.org/articles/10.3389/frsc.2025.1636228/full

Policy consultancy efforts in the city emphasized the urgency of protecting habitats as urban areas expand. A review of existing urban biodiversity conservation activities revealed fragmented approaches, often lacking integration into broader planning frameworks. Recommendations therefore focused on mainstreaming biodiversity into state biodiversity strategies and action plans (SBSAPs), while ensuring alignment with climate adaptation, health, and social equity agendas[19].

Stakeholder engagement was highlighted as central to implementation. Consultations with local governments, Indigenous Peoples and Local Communities (IPLCs), civil society, and private developers underscored the need for participatory governance. Citizen science and school-based biodiversity monitoring were proposed as tools to democratize data collection while building awareness.[20]

Equity emerged as a cross-cutting theme. Marginalized communities in Trivandrum often lack access to quality green spaces, exacerbating social and health disparities. Policy recommendations included establishing minimum per-capita green space standards, prioritizing greening in underserved areas, and legally enshrining the right to equitable access to green and blue spaces.

This case highlights the importance of contextualizing Target 12 in developing countries, where biodiversity action must be linked to broader development priorities. Unlike wealthier European cities, financing and institutional capacity constraints remain major barriers, requiring innovative partnerships and external support.

3.4 Cross-Case Lessons

Together, these cases reveal both diversity and convergence in approaches to Target 12. Berlin demonstrates the importance of robust monitoring systems but shows the need to bridge ecological and social dimensions. European cities highlight governance challenges, particularly around participation, financing, and accountability. Trivandrum emphasizes equity, localization, and cross-sectoral coherence in biodiversity policy.[21]

[19]Women4Biodiversity, *Target 12: Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity*,
[20] Convention on Biological Diversity, *Target 12: Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity*
[21] Kerala State Biodiversity Board, *Kerala State Biodiversity Strategy and Action Plan 2022–2032* (2023),

Across contexts, three insights stand out:

1. Monitoring must evolve beyond species counts to capture ecosystem functions and human well-being.
2. Governance must be collaborative, integrating communities, governments, and private actors in planning and implementation.
3. Equity must be central, ensuring that green and blue spaces benefit all, particularly marginalized populations.

These insights collectively point to the need for systemic approaches that move beyond piecemeal greening to embed biodiversity in the very fabric of urban development.

4. Integrating Biodiversity into Urban Green Space Planning

Integrating biodiversity into urban green space planning requires moving beyond decorative greening toward systemic approaches that embed ecological integrity, equity, and resilience in city design. Target 12 provides the normative framework, but operationalizing it calls for concrete strategies that address ecological, social, and governance dimensions simultaneously.[22]

4.1 Mainstreaming Biodiversity in Planning and Land Use

Urban planning has historically treated biodiversity as a peripheral concern, often overshadowed by housing, transport, and infrastructure priorities. To achieve Target 12, biodiversity must be mainstreamed into the very fabric of planning processes. This entails incorporating ecological considerations into zoning, building codes, environmental impact assessments, and development permits.

For example, Berlin's biodiversity monitoring programmes highlight how fragmented data and uneven coverage across taxonomic groups risk obscuring biodiversity priorities. By integrating biodiversity data including Essential Biodiversity Variables (EBVs) into spatial planning tools, cities can make informed decisions about where to allocate green and blue spaces. Such mainstreaming ensures that biodiversity outcomes are not afterthoughts but embedded in urban growth trajectories.

[22] Himanshu Panwar et al., *Urban Biodiversity: Training Manual*, Climate Centre for Cities, National Institute of Urban Affairs (2021)

Mainstreaming also requires reframing biodiversity as infrastructure. Just as roads or water pipes are essential to cities, so too are ecological corridors, wetlands, and tree networks. This approach, often termed green infrastructure planning, recognizes ecosystems as critical providers of services such as flood regulation, climate mitigation, and recreation.

4.2 Nature-Based Solutions as Pathways to Biodiversity Integration

Nature-based solutions (NBS) have emerged as practical interventions for simultaneously advancing biodiversity, climate adaptation, and human well-being. Examples include green roofs, urban wetlands, pocket parks, and ecological corridors. These solutions address environmental challenges while enhancing native biodiversity.

European cities provide promising cases. Ghent's deployment of rain gardens and Utrecht's green roof incentives illustrate how NBS can be mainstreamed into housing and infrastructure policies[23]. However, as Mahmoud et al. (2025) note, the challenge lies not in technical feasibility but in governance: cities often lack sustained financing and monitoring mechanisms to scale these innovations.

In the Global South, NBS are equally critical but face unique constraints. In Trivandrum, India, policy consultancy highlighted the need to align NBS with pressing challenges such as heat stress, flooding, and social inequity. Low-cost, community-driven NBS such as urban ponds restored by resident associations were identified as scalable strategies that deliver both ecological and social benefits.

By anchoring biodiversity in NBS, cities can transform fragmented greening efforts into multifunctional, resilient ecosystems that advance Target 12.

4.3 Equity and Inclusive Access to Green and Blue Spaces

Target 12 explicitly calls for equitable access to green and blue spaces. This is a recognition that biodiversity benefits are not shared equally: wealthier neighbourhoods often enjoy abundant parks and tree cover, while marginalized communities live in "grey zones" of concrete and pollution.

[23] Mahmoud et al., *Collaborative Governance of Biodiversity-Inclusive Urban Planning in 10 European Cities*, 28 *Urban Ecosystems* 17 (2025).

The Trivandrum policy draft underscores this inequity, noting that underserved communities lack minimum per-capita green space, with significant implications for health and quality of life. Addressing this requires deliberate interventions, such as prioritizing greening in low-income neighbourhoods, setting equity-based planning standards, and ensuring accessibility for all age groups and abilities.

Equity also involves cultural recognition. Urban biodiversity holds spiritual and cultural meaning for Indigenous Peoples and Local Communities (IPLCs). Planning must therefore go beyond physical access to incorporate cultural landscapes, traditional knowledge, and local stewardship practices.

Without equity, biodiversity-inclusive planning risks reinforcing social divides rather than healing them. By contrast, inclusive access strengthens both ecological resilience and public support for biodiversity policies.

4.4 Governance, Participation, and Monitoring

Integrating biodiversity requires governance systems that enable cross-sectoral coordination, stakeholder engagement, and robust monitoring. Research on European cities shows that biodiversity-inclusive planning often fails not because of lack of ecological knowledge but due to weak governance and fragmented institutional arrangements.

Collaborative governance models where municipal authorities, communities, NGOs, and private actors co-create urban nature plans have shown promise. For instance, Ghent's participatory greening projects allowed residents to design and manage local green spaces, fostering ownership and stewardship. In Berlin, citizen scientists already play a major role in biodiversity monitoring, but greater institutional support is needed to sustain and standardize their contributions.

Monitoring systems are essential to track progress on Target 12. Tools such as the City Biodiversity Index and the IUCN Urban Nature Index provide standardized frameworks, but local adaptation is necessary. EBVs offer an opportunity to harmonize ecological data while linking it to social outcomes such as health benefits or access measures.[24]

[24] United Nations Economic Commission for Europe, *Guidelines for Developing National Biodiversity Monitoring Systems*, ECE/CEP/198 (2023)

Integrating governance and monitoring ensures accountability, builds legitimacy, and fosters adaptive learning. Without these systems, biodiversity-inclusive planning risks being aspirational rather than transformative.[25]

4.5 Toward Systemic Integration

The integration of biodiversity into urban green space planning must be systemic: linking ecological goals with social equity and governance reforms. Piecemeal interventions a park here, a green roof there are insufficient. Instead, cities must embed biodiversity into their long-term visions, policy frameworks, and financial strategies.

Such integration positions cities not merely as sites of biodiversity loss but as laboratories of innovation for biodiversity restoration. By doing so, urban areas can become critical contributors to the global ambition of a nature-positive future by 2030.

5. Policy and Practice Recommendations

To operationalize Target 12, cities must adopt integrated strategies that align ecological, social, and governance dimensions. The following recommendations, derived from case studies and policy analysis, provide a roadmap for action.

5.1 Embed Target 12 into National and Local Policy Frameworks

For Target 12 to be effective, it must be institutionalized within urban planning laws, national biodiversity strategies, and local development plans. Many cities treat biodiversity as an optional or peripheral objective rather than a statutory requirement. Embedding biodiversity-inclusive planning into State Biodiversity Strategies and Action Plans (SBSAPs), as highlighted in the Trivandrum case, ensures alignment with national and international commitments.

Legal mandates should require biodiversity impact assessments for major urban projects, while zoning regulations can safeguard ecological corridors and blue spaces. Integrating Target 12 into policy frameworks provides cities with both legitimacy and accountability.

[25] Sara J. Scherr & Jeffrey A. McNeely, *Biodiversity Conservation and Agricultural Sustainability: Towards a New Paradigm of 'Ecoagriculture' Landscapes*, 363 *Philosophical Transactions of the Royal Society B: Biological Sciences* 477 (2008), https://pmc.ncbi.nlm.nih.gov/articles/PMC2610165/

5.2 Strengthen Governance through Collaborative Models

Governance challenges remain a major barrier to implementation. Evidence from European cities shows that collaborative governance where municipal authorities, civil society, private actors, and communities co-create plans significantly improves inclusivity and outcomes[26].

To advance this, cities should institutionalize participatory planning processes, such as citizen assemblies, participatory mapping, and co-management of parks. Strengthening the role of citizen science, as seen in Berlin's monitoring programmes, can both expand data collection and foster public ownership[27]. Municipalities should also establish cross-sectoral task forces, bridging environment, health, housing, and finance departments, to mainstream biodiversity across agendas.

5.3 Secure Sustainable Financing for Urban Biodiversity

Financial constraints are a recurring challenge, especially in the Global South. Many biodiversity projects remain dependent on short-term external grants, undermining continuity. To secure long-term financing, cities can diversify mechanisms:

- Green bonds for urban ecological restoration projects.
- Public-private partnerships with developers to integrate green infrastructure.
- Payment for ecosystem services (PES) schemes to incentivize stewardship.

European cities experimenting with EU-funded programmes illustrate that sustainable financing requires a mix of municipal commitment and external support[28]. Embedding biodiversity budgets in municipal financial planning is critical for continuity.

5.4 Prioritize Equity and Inclusive Access

Ensuring equitable access to green and blue spaces must remain a central priority. Trivandrum's policy recommendations highlight the importance of minimum per-capita green space standards and prioritizing interventions in underserved neighbourhoods. Cities should also adopt accessibility audits to ensure green spaces meet the needs of children, the elderly, and persons with disabilities.

[26] I. Mahmoud et al., *Collaborative Governance of Biodiversity-Inclusive Urban Planning in 10 European Cities*, 28 *Urban Ecosystems* 17 (2025).
[27] S. Keinath et al., *Mapping Urban Biodiversity Monitoring Programmes – Berlin Case Study*, 28 *Urban Ecosystems* 146 (2025).
[28] I. Mahmoud et al., *Id.*, findings on financing challenges and EU-funded biodiversity projects.

Equity measures must also integrate cultural recognition. Engaging Indigenous Peoples and Local Communities (IPLCs) in design and stewardship helps preserve cultural landscapes while expanding biodiversity outcomes. Equity not only addresses social justice but also strengthens biodiversity governance by mobilizing broader constituencies.

5.5 Develop Robust Monitoring and Evaluation Frameworks

Monitoring progress is essential for accountability and adaptive management. The Berlin study demonstrates the richness of existing biodiversity monitoring, but also its fragmentation and lack of integration with human health outcomes[29]. To address this, cities should adopt standardized frameworks such as the City Biodiversity Index or the IUCN Urban Nature Index, tailored to local contexts.[30]

Incorporating Essential Biodiversity Variables (EBVs) can harmonize ecological data, while integrating health and equity indicators ensures that biodiversity is measured not only by species counts but also by contributions to human well-being. Open-access data platforms can democratize monitoring, enabling citizen scientists, researchers, and policymakers to share knowledge.

5.6 Foster International Cooperation and Knowledge Exchange

Finally, cities can benefit from learning networks and platforms that facilitate knowledge exchange. Initiatives such as the ICLEI Cities Biodiversity Center and the Edinburgh Process provide frameworks for municipalities to share experiences and best practices on Target 12 implementation. Strengthening such networks, particularly with participation from Global South cities, ensures that solutions are adaptable, scalable, and inclusive.

6. Conclusion

The adoption of the Kunming-Montreal Global Biodiversity Framework has elevated the role of cities as essential actors in halting and reversing biodiversity loss. Within this framework, Target 12 stands out as a transformative agenda: it connects ecological integrity with social well-being, and it embeds biodiversity within the daily lives of urban residents. Unlike earlier

[29] S. Keinath et al., *Mapping Urban Biodiversity Monitoring Programmes – Berlin Case Study*, 28 *Urban Ecosystems* 146 (2025).
[30] *Chan et al., Handbook on the Singapore Index on Cities' Biodiversity (City Biodiversity Index), Secretariat of the Convention on Biological Diversity, 2021.*

biodiversity goals that focused largely on protected areas or rural landscapes, Target 12 situates biodiversity action at the very heart of human settlements.

The cases of Berlin, European cities, and Trivandrum demonstrate both the diversity of urban contexts and the convergence of challenges. Monitoring in Berlin illustrates the scientific and citizen-led potential for tracking biodiversity, but also the persistent fragmentation of data and the lack of integration with social outcomes. European cities reveal progress in incorporating biodiversity into planning but highlight weak governance and financing structures that limit implementation. Trivandrum and similar Global South contexts remind us that biodiversity planning cannot be divorced from equity, development priorities, and resource constraints. Together, these insights confirm that operationalizing Target 12 is as much governance and justice challenge as it is an ecological one.

Looking forward, cities must recognize biodiversity as infrastructure as fundamental to resilience and human health as roads or hospitals. Achieving this requires systemic approaches: mainstreaming biodiversity into urban design, securing sustainable financing, institutionalizing equity, and building robust monitoring frameworks. Success will not depend on isolated greening projects, but on embedding biodiversity into the structural logic of urban development.

Ultimately, Target 12 is not only about expanding green and blue spaces; it is about reimagining cities as nature-positive systems that restore ecological integrity while advancing human dignity. If cities embrace this challenge, they can become laboratories for global transformation, proving that biodiversity and urbanization need not be opposing forces but can coexist in ways that benefit both people and the planet.