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Integrating UGI in Dense Urban Areas:

Policy Brief

Picture 1: Showing Oasis Terrace in Singapore

What's happening?

---------- KAI THIRY

Urbanization poses a significant challenge for cities worldwide. By 2050, up to 70% of the global population is projected to reside in urban areas, bringing new challenges for humans and nature. In densely populated areas, limited space and land use conflicts often lead to a prioritization of economic growth, resulting in shortcomings for human and environmental health. Rapid urbanization can exacerbate inequality, health issues, social problems, environmental damage, and habitat loss.

Integrating urban nature in densely populated cities is often hindered by high implementation costs, intensive management requirements, and a general lack of space in conflicted areas. Nonetheless, organizations such as the United Nations and the European Union highlight the importance of natural elements in creating healthy, livable, and sustainable cities.

Guided by the principles of Nature-Based Solutions, initiatives such as the Green Surge, funded by the European Commission, underscore the significance of Urban Green Infrastructures (UGIs) in fostering sustainable development. These initiatives promote social cohesion, support the economy, and enhance the adaptability of cities to a changing climate. Our current challenge lies in innovatively incorporating these green infrastructures into already crowded urban landscapes, ensuring that our cities remain livable, resilient, and ecologically balanced.

Fortunately, there are ways to promote the integration of UGIs in dense urban areas. This policy brief outlines a set of actions that could be implemented in Copenhagen, particularly in the district of Nordhavn, drawing inspiration from one of the leading cities in green integration, Singapore.

Summary

About the policy brief

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This policy brief is based on a recently completed master's thesis from the Department of Geosciences and Natural Resource Management. The thesis involved a comparative case analysis of the district Nordhavn in Copenhagen and Punggol in Singapore. Therefore, the pictures and information are primarily focused on these areas, but the challenges and findings can also be applied to other case studies.

The following pages address the challenges and benefits associated with the integration of Urban Green Infrastructure in densely populated urban environments. The subsequent sections will provide information about the relevance and the critical role of UGI in urban contexts. Additionally, some possible actions and key findings will be mentioned at the end.

Picture 2: Showing volunteers in the gardens of Østergro in Copenhagen

Policy Landscape

Urban Green Infrastructures in Denmark are supported and promoted through a multi-tiered policy landscape, ranging from international frameworks to local strategies, aimed at creating sustainable, resilient, and livable urban environments.

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1. International Level

United Nations Sustainable Development Goals (SDGs)

The SDGs, particularly Goal 11, focus on making cities inclusive, safe, resilient, and sustainable. Specifically, Target 11.7 emphasizes providing universal access to safe, inclusive, and accessible green and public spaces, particularly for women and children, older persons, and persons with disabilities.

2. European Level

The European Green Deal

The European Green Deal encompasses various initiatives and strategies that promote UGI as part of a broader effort to achieve climate neutrality and environmental sustainability by 2050.

- Climate Adaptation Strategy: Highlights the role of UGI in enhancing urban resilience to climate impacts, such as heatwaves and flooding. It encourages the use of nature-based solutions (NBS), including UGI, to improve the capacity of cities to cope with climate change.
- EU Biodiversity Strategy for 2030: Aims to put Europe's biodiversity on a path to recovery by 2030 for the benefit of people, climate, and the planet. The strategy specifically emphasizes the importance of UGI in urban areas to enhance biodiversity and provide ecosystem services.
- Zero Pollution Action Plan: Aims to achieve zero pollution in air, water, and soil by 2050. UGI plays a role in this plan by helping to reduce urban air pollution, manage stormwater to prevent water pollution, and enhance soil quality in urban areas

3. National Level

Danish National Planning Report (2019)

This report outlines Denmark's vision for urban development, which includes integrating green spaces into urban areas to enhance quality of life, support biodiversity, and address climate change challenges.

Climate Adaptation Plans

Many Danish municipalities, including Copenhagen, have developed climate adaptation plans that incorporate green infrastructure to manage stormwater, reduce heat island effects, and improve urban livability.

4. Local Level

Urban Nature Strategy Plan for Copenhagen

The Urban Nature Strategy Plan for Copenhagen is a comprehensive framework aimed at enhancing and integrating green infrastructure within the city to create a more sustainable, resilient, and livable urban environment.

Municipal Plan for Copenhagen (Kommuneplan):

This overarching plan outlines the city's land use and development strategy. It emphasizes the importance of green spaces and the integration of UGI in urban development to enhance liveability and environmental quality.

Picture 3: Showing the walk around Christiania in Copenhagen

The story of UGI

Urban Green Infrastructure is an integral component of Nature-Based Solutions, leveraging natural processes and ecosystems to address urban and environmental challenges. According to the European Commission, UGI is defined as "a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services." This concept originated from efforts to integrate environmental sustainability into urban planning and development, recognizing the importance of green spaces in enhancing urban resilience, improving biodiversity, and providing vital ecosystem services like air and water purification, temperature regulation, and flood mitigation.

The Services of UGI

UGI is diverse, influenced by ownership, size, use, and management. Its scale ranges from small-scale features like street trees and green roofs to larger elements such as parks, woodlands, and waterways. Essentially, UGI encompasses green spaces of all sizes, from individual buildings to entire neighborhoods and beyond.
Urban Green Infrastructures provide numerous benefits, categorized into several key areas:

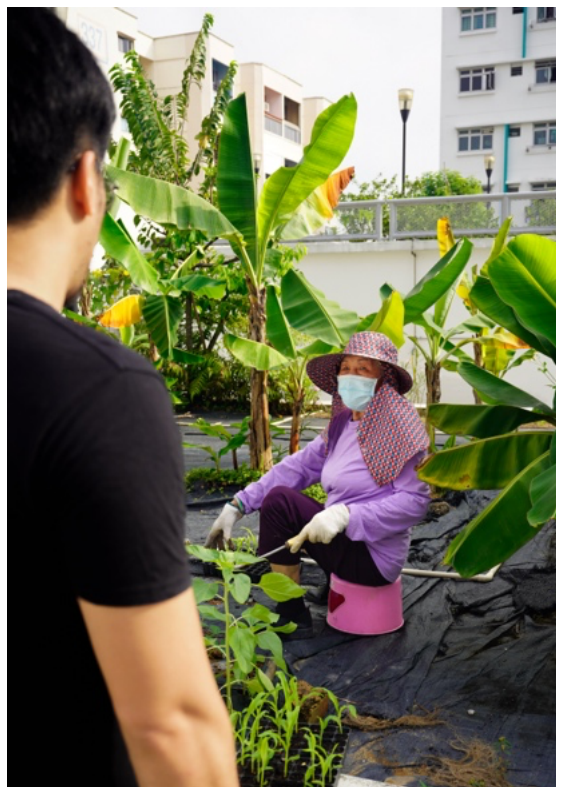
1. Regulating Services: UGI helps manage stormwater, reduce urban heat island effects, improve air and water quality, and mitigate climate change impacts.

2. Social and Cultural Services: Green spaces enhance the quality of life by offering recreational opportunities, improving mental and physical health, fostering social cohesion, and creating aesthetically pleasing environments

3. Habitat and Supporting Services: UGI supports biodiversity by providing habitats for various species, enhancing ecological connectivity, and promoting pollination and soil formation.
4. Economic Services: UGI can increase property values, attract tourism, reduce energy costs through natural cooling, and create jobs in green construction and maintenance.

Picture 4: Showing a community garden in Singapore

Picture 5: Showing a volunteer working in compost



Picture 6: Showing a volunteer working in a rooftop garden

Core challenges with the implementation of UGI

Implementing Urban Green Infrastructure in dense urban areas presents several significant challenges, particularly in balancing the demands of urban development with the need to integrate and preserve green spaces. A multitude of frameworks, policies, and research initiatives, such as the European Commission's Green Surge Project,have identified key challenges associated with UGI:

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1. Urbanization Pressures:

As cities grow, the demand for land increases, often at the expense of existing green spaces. Urbanization pressures make it difficult to preserve and expand green infrastructure in densely populated areas, where land is a scarce and highly valuable resource. The challenge lies in balancing urban growth with the need to integrate green spaces, which are essential for maintaining environmental quality and providing residents with access to nature.

2. Biodiversity Loss:

Dense urban areas often suffer from a significant loss of biodiversity due to habitat destruction, pollution, and the introduction of invasive species. The challenge is not only to halt further biodiversity loss but also to enhance and restore habitats within the urban environment. Implementing UGI in such areas requires innovative approaches to create habitats that support a diverse range of species.

3. Climate Change

Urban areas are particularly vulnerable to the impacts of climate change, such as increased temperatures, flooding, and extreme weather events. Implementing UGI is seen as a key strategy to mitigate and adapt to these impacts, yet the challenge lies in integrating these solutions into the existing urban fabric.

4. Social Inequality:

Ensuring equitable access to green spaces is a critical challenge in dense urban areas, where social inequality often manifests in uneven distribution of and access to green infrastructure. In many cities, wealthier neighborhoods tend to have more and better-maintained green spaces, while disadvantaged areas may lack adequate parks or green amenities.

5. Economic Constraints:

Securing the necessary funding for both the initial development and long-term maintenance of UGI can be difficult, especially in cities where land costs are high and municipal budgets are stretched. Additionally, the economic viability of UGI is sometimes overlooked, as stakeholders may prioritize short-term financial gains from traditional development projects over the long-term benefits of green infrastructure.

6. Institutional and Policy Barriers:

The successful implementation of UGI frequently requires the coordination of multiple stakeholders, including local governments, private developers, and community organizations. However, fragmented governance and conflicting interests can create barriers to effective collaboration, leading to inconsistent policies and delays in project execution. Furthermore, existing zoning laws and urban planning regulations may not be designed to accommodate the integration of green infrastructure, posing additional regulatory challenges that hinder the creation and expansion of green spaces.

Picture 7: Showing gardens by the bay in Singapore

Picture 8: Showing UGI integration on buildings

Actions & Outcomes

WHAT CAN WE LEARN?

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1. Make it affordable and attractive – meaning make it affordable for companies and designers to integrate UGI into their building process. In Singapore they work with special finacnement schemes such as the Lush or Skyrise greenery framework where the government pays for up to 50% for provide up to 50% of the installation costs for rooftop greenery and vertical greenery projects on existing building. Other cities, such as Vancouver, are using a similar approach under the so-called “height bonus”, developers are allowed to build higher if they integrate green features into their structures, making UGI affordable and even beneficial

2. Make it binding! Singapore mandates developers to incorporate greenery by measuring the required amount based on building usage (Green Plot Ratio) and replacing greenery lost during construction with equivalent green spaces within or around the building.

3. Improve the quality of existing UGI: Many urban areas already incorporate small-scale green infrastructure elements like pocket parks, green strips, and grassy areas. However, these spaces often underperform as UGI due to low quality, biodiversity, and connectivity. To maximize the potential of existing green spaces, targeted improvements are necessary to enhance their ecological value and contribution to urban sustainability.

4. Incorporate people and biodiversity into the planning of Urban Green Infrastructure. Frequently, urban development prioritizes economic growth, resulting in environmental degradation, reduced ecosystem services, and social inequity. This approach is inconsistent with the contemporary concept of sustainability, which necessitates the integration of environmental, social, and economic pillars to create a sustainable system. Consequently, UGI implementation must adhere to these principles, as emphasized in the core guidelines of the Green Surge initiative by the European Union.