Chapter 7
Breaking Barriers: Integrating Blue–Green Infrastructure for Sustainable Urban Transformation

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ABSTRACT

Integration of Blue-Green Infrastructure could be considered a significant move towards transformation to a sustainable urban society. The present report specifies issues, and controversies relating to UBGI in the context of sustainable transformation along with solutions and recommendations relating to the same. It has been assessed that efficient utilization of urban space and sustainable development can be done only through compliance with BGI development. The main challenge assessed includes maintaining coordination and transparency between the stakeholders involved. Even various financial, economic and social constraints are dealt with for accomplishing specified projects. Real case studies have been discussed to evaluate the impact as well as the challenges faced while incorporating a specified framework. To reach an advanced level in context with transformation towards sustainable urban infrastructure it is necessary to explore integrated design approaches like Blue Green Architecture and interdisciplinary collaboration of engineering and ecological perspectives in future.

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INTRODUCTION

Blue-green infrastructure (BGI) is considered the core base of urban environment management, climate change adaptations as well as disaster risk mitigation (Parker and Zingoni, 2019). There has been growing consensus and advancement in context with the conceptualization, research, implementation, and development of BGI in urban policy planning to promote urban resilience due to enhanced disaster risks and climate change. The specified approach aims to address urban challenges such as climate change, flooding, and biodiversity loss by integrating natural elements into city planning and development. The present study highlights the issues, and controversies relating to BGI in the context of sustainable transformation along with solutions and recommendations relating to same (Mell & Scott, 2023). Even real-world case studies and best practices have been discussed in detail which have effectively integrated BGI to address urban challenges. The last part of study specifies tools and methods of evaluating impact of BGI as well as future research directions to enhance the understanding and implementation of BGI (Abdallah et. al., 2023).

BACKGROUND

Blue-Green Infrastructure (BGI) is an innovative approach to urban planning that integrates natural water management (blue) and vegetation (green) systems to create sustainable and resilient urban environments. The concept emerged as a response to the growing challenges of urbanization, climate change, and environmental degradation. The core elements or vital parts of BGI are Green spaces (parks, urban forests, green roofs), integration and synergy (adaption of blue and green elements to develop synergy which can enhance urban resilience) and water management (improvement of water quality, permeable pavements, stormwater management solution etc. (Pauleit et al, 2019). The concept of BGI has evolved over the past few decades, influenced by various environmental and urban planning movements. It draws from principles of sustainable development, ecological urbanism, and landscape urbanism. Various cities around the world, including Copenhagen, Singapore, and New York, have applied the concept of BGI to address their unique urban challenges (Almaaitah et al,2021). The main benefit of BGI includes enhanced urban resilience i.e. management of water naturally which increases green areas as well as withstand extreme weather scenarios in a better manner. It also supports urban biodiversity by creating habitats for various species. Even costs relating to stormwater management and energy consumption could be reduced to a significant extent with its assistance (Abdallah & Ismail, 2024).