Chapter 14
Integrating AI in Green and Blue Infrastructure for Sustainable Smart Cities

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ABSTRACT

The future of sustainable smart cities is based on effective collaboration between technology, policy and community engagement, with the integration of artificial intelligence (AI) into urban planning is rapidly transforming the way cities manage their environmental resources. This innovative technology has the potential to improve the functionality of green and blue infrastructure, offering sustainable solutions that address both ecological conservation and urbanization challenges. As cities strive for sustainability, the application of AI enables real-time monitoring and predictive analytics, facilitating more informed decision-making that balances human needs with ecological demands. In conclusion, while the integration of AI

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holds great promise for transforming urban environments, it simultaneously requires a comprehensive framework that prioritizes sustainability, equity, and active citizen participation in shaping the cities of the future.

INTRODUCTION TO GREEN AND BLUE INFRASTRUCTURE

The need for innovative approaches to urban planning has led to an increasing focus on integrating natural ecosystems into urban environments. This concept, commonly referred to as green and blue infrastructure, emphasizes the importance of incorporating natural elements-such as parks, waterways, and green roofs-into city planning and development. These infrastructures serve multiple purposes, such as enhancing biodiversity, improving air and water quality, and providing recreational spaces for residents. Moreover, as urban areas face challenges such as climate change, high population density and resource depletion, the implementation of these infrastructures becomes crucial. Not only do they mitigate the urban heat island effect and manage stormwater runoff, but they also support public health by promoting physical activity and mental well-being, thus contributing to a holistic urban ecosystem that benefits both people and the environment.

The integration of green and blue infrastructure with advanced technologies, such as AI and big data, is transforming urban sustainability. AI optimizes the placement and maintenance of green spaces using predictive analytics, guiding planners to create parks tailored to demographic and environmental needs. Smart irrigation systems enhance water efficiency while minimizing waste. Studies show that incorporating innovative technologies into smart cities fosters cross-sector collaboration, strengthening urban interventions (Suresh et al., 2020). This synergy promotes resilient cities that prioritize environmental and public health. The COVID-19 pandemic underscored the interconnectedness of urban life, nature, and technology, prompting a shift in urban design principles (Mohammadian et al., 2020). Green and blue infrastructures are now central to adaptive, sustainable cities, enhancing livability, economic vitality, and environmental resilience through holistic, tech-enabled approaches.

Definition and Importance of Green Infrastructure

Green infrastructure integrates natural and built environments to deliver ecological, social, and economic benefits. By incorporating vegetation, soil, and natural processes, it enhances biodiversity, air and water quality, and flood mitigation while mimicking natural systems for resilience. Features like green roofs and permeable pavements serve functional purposes, regulating temperatures and managing storm-