

## Green Cities: Horticulture's Role in Urban Resilience

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### Introduction

As cities worldwide grapple with the mounting challenges of climate change, population growth, and urbanization, green cities have emerged as a beacon of hope. At the heart of this vision is horticulture, a field that transcends traditional gardening to become a cornerstone of urban resilience.

From rooftop gardens to vertical forests, horticulture redefines cityscapes and fortifies urban environments against environmental and social stressors. This article explores how horticulture is transforming cities into sustainable, resilient ecosystems, touching on its environmental, social, and economic impacts.



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## Need for Green Cities

Urban areas host more than half of the global population. This figure is likely to increase rapidly by 2050. The fast-growing urbanization brings about a set of challenges, such as:

- ⇒ **Air and water pollution:** Industrialization and vehicular emissions degrade the air quality in urban areas. Impervious surfaces aggravate water pollution.
- ⇒ **Heat island effect:** The temperature in urban areas is much higher than in rural areas because of concrete, asphalt, and low vegetation cover.
- ⇒ **Less biodiversity:** The expansion of cityscapes leads to the occupation of natural habitats, thus displacing the flora and fauna.
- ⇒ **Climate vulnerabilities:** Flooding, extreme heat, and unpredictable weather patterns disproportionately affect densely populated cities.

In this backdrop, horticulture integration in urban design is becoming a game-changer with multifaceted solutions.

## Horticulture and Urban Resilience

Horticulture is the science and art of cultivating plants and plays a key role in creating green cities. Its applications range beyond beautification, with actual engagement in environmental challenges that enhance the quality of life.

## 1. Mitigating Urban Heat

Green roofs, urban forests, and community gardens are not just aesthetic features. Natural air conditioners absorb sunlight and cool the air through evapotranspiration. Cities like Singapore have successfully incorporated "supertrees" into their urban landscape, lowering temperatures and creating shaded pedestrian walkways.

## 2. Managing Stormwater and Reducing Flood Risk

Impermeable surfaces, predominantly the faces of cities, cause water runoff and, thus, floods. Horticultural measures such as rain gardens or permeable green spaces have also enhanced infiltration and eased burdens on drainage systems. City Copenhagen has applied this kind of flooding mitigation approach.

## 3. Reduction of Air Pollution

Plants are natural air purifiers. Urban greenery absorbs pollutants such as carbon dioxide, sulfur dioxide, and nitrogen oxides while filtering particulate matter. Vertical gardens on building facades, like those in Mexico City, act as living air filters, improving air quality for city dwellers.

## 4. Promoting Biodiversity

Urban horticulture is a habitat for birds, bees, and other pollinators, supporting biodiversity. Rooftop gardens, wildflower corridors, and urban parks attract diverse

species, strengthening ecological networks within cities.

## 5. Food Security and Community Well-being

Urban horticulture also provides food security, as people can produce local food. Community gardens, hydroponic systems, and vertical farms are helping to provide fresh produce in urban areas with less reliance on imported items. In addition, gardening tends to build community relationships and mental wellness, especially in lower-income neighborhoods.

### Horticultural Innovations in Green Cities

Modern horticulture is leveraging technology and innovation to maximize its impact on urban resilience.

#### 1. Vertical Forests

Architectural projects like Stefano Boeri's Bosco Verticale in Milan incorporate trees and shrubs into building designs. These vertical forests reduce energy consumption, absorb carbon dioxide, and improve biodiversity while transforming urban aesthetics.

#### 2. Smart Irrigation Systems

Smart irrigation systems use sensors to measure soil moisture, optimize water use, and ensure plant health. This system is crucial in maintaining urban green spaces, especially in arid regions.

#### 3. Hydroponics and Aeroponics

Soilless cultivation techniques have brought about a revolution in the concept of urban agriculture, thus facilitating high-yielding plant growth in limited spaces. Be it small-scale home gardens or commercial urban farms, hydroponics and aeroponics have emerged as sustainable food solutions.

#### 4. Biophilic Design

This approach incorporates the elements of nature into urban construction—from indoor gardens to rooftop jungles, so people and the environment are brought into harmony. This is shown in biophilic buildings, like the Oasia Hotel in Singapore, through how horticulture is effortlessly integrated into urban construction.

### Economic and Social Advantages

#### 1. Green Economy Boosters

Green cities create employment opportunities in urban farming, landscaping, and horticulture. They also decrease food miles, lowering costs and carbon footprint.

#### 2. Increased Value of Properties

Being near green areas has been proven to increase the value of properties. Cities with high greenery cover like Vancouver have higher residence demand near urban parks and gardens.

#### 3. Mental and Physical Health Benefits

Exposure to greenery has been associated with reduced stress, improved mental health, and increased physical activity.

Urban parks, community gardens, and tree-lined streets encourage outdoor activities, promoting healthier lifestyles.

### Challenges and Considerations

Despite its benefits in building urban resilience, challenges prevail.

- ⇒ **Cost:** Creating green infrastructure in such areas is expensive in terms of maintenance.
- ⇒ **Space:** Most densely inhabited areas have a constrained area that needs innovational vertical solutions.
- ⇒ **Maintenance:** Green spaces require daily, weekly, monthly upkeep activities, water management systems, and pest control operations
- ⇒ **Equity:** Affords equal access to various social classes to avoid different forms of disparities.

### Future Outlook: Scaling Up Urban Horticulture

Cities are rapidly shifting towards making their economies sustainable, and horticulture will be front and center in the evolution of resilience in cities. Further, this green infrastructure will gain increased acceptance with advancing technology and societal involvement. However, government machinery and urban designers must integrate horticulture within city master plans for future development into the urban fabric.

### Conclusion

Horticulture in the urban area is no longer a luxury but a necessity to make green cities, fuelled by horticultural innovation, possible in the context of a sustainable, resilient, and equitable future. Mitigating environmental challenges, fostering social cohesion, and bolstering economies through horticulture help cities adapt to the pressures of the modern age.

As the planet continues to urbanize in every corner, the future of concrete jungles requires their transformation into vibrant, greener ecosystems. Let us start embracing this green revolution and returning our cities to living sanctuaries of strength and sustainability.