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GREEN SPACE AND URBAN HORTICULTURE FOR LANDSCAPING: A REVIEW

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ABSTRACT

As urban populations approach 60% by 2030, urban green spaces (UGS) have evolved from aesthetic luxuries into essential infrastructure. This study employs a multidisciplinary framework integrating ecology, psychology, and urban planning to evaluate diverse UGS typologies, from expansive parks to vertical greenery. Findings characterise UGS as “natural tranquillisers” that significantly bolster mental health and social cohesion. Beyond psychological benefits, the research examines critical ecosystem services, including Carbon Sequestration, noise reduction, and the mitigation of the Urban Heat Island (UHI) effect. By synthesising current data, this article argues that strategic green design is a primary driver for ecological resilience and public health. Ultimately, UGS integration is presented as a fundamental requirement for achieving long-term sustainability in the post-pandemic era.

Key words: Green Infrastructure, Urban Heat Island (UHI), Ecosystem Services, Sustainable Urban Planning, Urban Resilience.

Introduction

Urbanisation is a global phenomenon, particularly in developing nations like India (Cohen, 2006; Avtar *et al.*, 2019; Kumar *et al.*, 2019). By 2030, almost 60% of people on Earth will reside in cities (USAID, 2017). According to ecologists, economists, social scientists, and planners, urban green spaces are public and private open spaces in urban areas that are mostly covered by vegetation, and that can be used directly (for example, for active or passive recreation) or indirectly (for example, by having a positive impact on the urban environment) (Tuzin *et al.*, 2002). According to certain theories, green areas improve mental health (Kaplan, 2001) and provide resources for physical activity (Bjork *et al.*, 2008). A previous assessment (Lee and Maheswaran, 2011) included a broad summary of the connections between urban green space and health. In metropolitan regions, where stress is an all too regular component of daily life, natural elements' capacity to act as natural tranquillisers may be especially helpful (Berg *et al.*, 1998). Spending time in a park can lower stress (Ulrich, 1981), promote

introspection, revitalise city dwellers, and offer a sense of calm and serenity (Kaplan, 1983). Public health objectives are increasingly being addressed by urban planning and place-based efforts in addition to economic and environmental issues (Branas and Macdonald, 2014). Member states of the WHO European Region pledged in 2010 at the Fifth Ministerial Conference on Environment and Health in Parma, Italy, to provide each child by 2020 with access to healthy and safe environments and settings of daily life in which they can walk and cycle to kindergartens and schools, and to green spaces in which to play and undertake physical activity. These evaluations have addressed a number of subjects, such as violence (Bogar and Beyer, 2015), mental health (Gascon *et al.*, 2015), and children (Chawla, 2015). According to Jongman (1995), urban green spaces are important elements of urban sustainability and a potential first step toward creating sustainable urban settings.

Green space

Urban green spaces are urban areas formed when natural or semi-natural ecosystems are transformed into

urban environments through human influence. These green spaces connect the city with the countryside by reflecting the natural or near-natural landscapes surrounding urban areas. They act as an extension of the landscapes around the city and provide numerous ecological benefits that are essential for the well-being of urban populations. Green spaces need to be uniformly distributed throughout the city area, and the total area occupied by green spaces in the city should be large enough to accommodate the city population needs (Haq, 2011).

Urban horticulture

Urban horticulture is an innovative and evolving field that incorporates agriculture into urban areas. It focuses on the cultivation of different crops and plants within densely populated regions such as cities and towns, thereby transforming the connection between urban environments and food production. With the world witnessing rapid urbanization and an increasing awareness of environmental sustainability, urban horticulture has emerged as a promising solution to address pressing challenges in modern societies (Congreves, 2022).

Urban landscape

The art of visually and structurally integrating a collection of structures, roadways, and locations that make up the urban environment is known as urban landscape design. It is the skill of tying together many elements of the city's physics (Cullen, 2013). The portion of an urban area that is open and covered with both naturally occurring and artificially cultivated trees, shrubs, flowers, and grass is known as the urban landscape. Additionally, there are additional plants that have been safeguarded due to human administration and control, taking into account legislation and relevant abilities to better the lives of citizens. The distribution and placement of those green areas across the city have an equal impact on their usefulness (Herzel and Wiedeman, 2003)

Landscaping Concept and Scope

Landscaping is the art and science of planning, designing, developing and managing outdoor spaces. It involves integrating plants, landforms, water features, structures, and other natural and built elements to create attractive, functional and sustainable environments. It is a combination of horticultural, architectural, ecological, environmental and aesthetic principles.

Landscaping is more than just planting trees and ornamental plants. It means the proper placement of soft scape elements such as trees, shrubs, lawn, climbers and flowering plants and hardscape elements such as pathways, walls, seating areas, pergolas, fountains and other structures. Good landscaping is about balancing

beauty with function, the environment, and the well-being of people.

Scope of Landscaping

The scope of landscaping is broad and includes:

- Residential Landscaping-Private outdoor spaces, gardens, home lawns.
- Urban Landscaping-Parks, Green Belts, Avenue Plantations, Traffic Islands and Public Gardens.
- Institutional Landscaping-Landscapes in Schools, Colleges, Hospitals and Government Buildings
- Commercial & Corporate Landscaping -IT Parks, Offices, Hotels, Resorts & Business Complexes.
- Recreational landscaping theme parks, botanical gardens, playgrounds, and recreational areas.
- Industrial Landscaping-Creating green buffer zones and attractive surroundings for industrial areas.
- Environmental Landscaping-Rehabilitation of degraded lands, conservation of soils, promotion of biodiversity and management of ecosystems.
- Specialized Landscaping-Riverfronts, Canals, Airports, Highways, Rooftop Gardens, Vertical Gardens and Therapeutic Gardens.

Types of Urban LandscapeUrban park space

The visual appeal of cities enhances urban parks, improving the general well-being of inhabitants and making urban environments more desirable (Zabelskyte, Kabisch, & Stasiskiene, 2022), promoting the usage of outdoor areas, which improves neighbour interaction and social integration (Coley *et al.*, 1997). According to Lipton (2002), public space is our open-air living room, our outdoor leisure centre. They improve physical, mental, and social health by laying the foundation for physical activity, stress reduction, and leisure (Kabisch *et al.*, 2021). This entails a detailed examination of a wide range of variables related to social, mental, and physical well-being (Kwak *et al.*, 2022).

Urban Gardens space

People were able to spend time with their families, decompress, and interact securely outside thanks to the neighbourhood's green areas, particularly the gardens (Luo *et al.*, 2021). Urban gardening techniques are places of leisure, employment, health, education, and even resistance (Dutta, 2024). The COVID-19 pandemic's recent difficulties emphasise the necessity of more easily accessible urban green areas, such as urban gardens (Lin *et al.*, 2021).

Avenue trees

Street trees and other urban trees considerably lower urban temperatures and mitigate the intensity of urban heat island effects (Chow and Roth, 2006). It has long been acknowledged that trees are an essential part of streetscape design and are often associated with bettering urban living conditions (Lawrence, 2006; John and Dover, 2014). Street trees are vital to maintaining healthy urban areas and have a significant social impact by improving human health (Donovan *et al.*, 2013). Le Roux *et al.* (2018) state that trees and other vegetation serve as the primary habitats for wildlife in urban areas. Street trees' capacity to provide ecosystem services locally, such as microhabitat cooling and shading (Salmond *et al.*, 2016).

Green roofs

The uppermost part of the rooftop, known as the "green roof," could be considered an additional story of the structure. It can also be called a "living" structure due to the plants and growing substrates (Lin, B.S., and Lin, Y.J, 2015). A green roof could offer a peaceful haven in the middle of an urban setting with reduced noise and pollution, improving people's mental, physical, and general well-being (Espinosa, 2020). Green roofs can provide important ecosystem advantages for urban sustainability, mostly associated with an increase in biodiversity and city rejuvenation (Cristiano *et al.*, 2020; Pauleit *et al.*, 2019). A green roof can reduce air pollution (Baniraz Motlagh *et al.*, 2021).

Vertical Greenery

Plants grown on a vertical profile are referred to as vertical greenery, also called vertical greenery system, vertical greenery, vertical garden, green wall, vertical landscaping, and bio-shader (M. Manso *et al.*, 2015). One strategy to lower the city's ambient temperature is to add additional greenery, such as rooftop gardens and vertical greenery systems in buildings (E. Alexandri *et al.*, 2008). Vertical greenery systems can enhance urban living on both a qualitative and quantitative level (Loh, 2008). Among the qualitative benefits are increased

Types of Urban Landscape	Urban park space	Promote physical, mental and social well-being by providing spaces for recreation, stress reduction and social interaction.
	Urban Gardens space	Provide spaces for recreation, employment, health, education and community engagement.
	Avenue trees	Reduce the urban heat island effect, improve air quality, provide shade, support biodiversity, enhance streetscapes and promote human health.
	Green roofs	Improve mental and physical well-being, reduce noise and pollution, increase biodiversity and help reduce air pollution.
	Vertical Greenery	Improves building efficiency and indoor air quality, provides insulation, reduces noise, and increases property value while lowering ambient temperature.

Fig. 1: Types of Urban Land Scape.

exterior protection, improved building energy efficiency, enhanced indoor environmental quality, improved indoor air quality, oxygenation and air filtration, and reduced interior noise. The quantitative benefits are often associated with financial gains and increased property values (Wood *et al.*, 2014).

Positive impacts of green space

Urban green spaces are crucial to raising the standard of living in cities because they provide ecological, social, cultural, and environmental benefits. They promote healthier and more sustainable urban settings through improved air quality, climate management, biodiversity preservation, and recreational activities. The benefits of urban green spaces can be broadly classified into four categories: ecosystem protection, cultural and amenity values, health benefits, and environmental contribution, all of which enhance both human and environmental well-being.

Environment contribution:

In order to effectively manage urban green spaces, cities in rapidly urbanizing and expanding economies like India should consider the dynamic form of urban expansion. This will help reduce overall CO₂ by maintaining or even increasing the capacity of CO₂ absorption via natural ecosystems (Huang *et al.*, 2009; Mexia *et al.*, 2018). Green spaces are essential for maintaining healthy air quality and promoting physical activity (Boone, 2018). This is demonstrated by the regulatory role of microclimate management (Bartesaghi-Koc *et al.*, 2019), green space noise reduction (Paulin *et al.*, 2020; Van Eck and Waltman, 2020, and Arkhavani *et al.*, (2020).

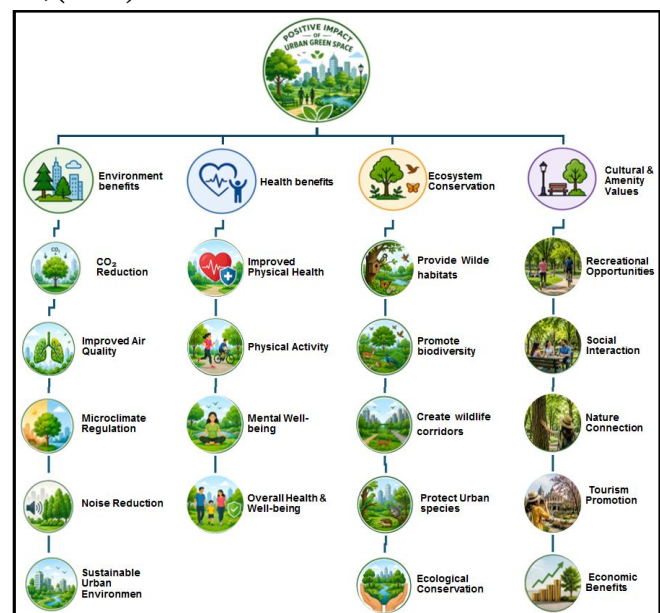


Fig. 2: Benefits of Urban Green Space.

Health benefits

Some people think that the sense of challenge and adventure that kids get from being outside is good for their growth (Cornell and Hadley, 2001). Carrus *et al.*, (2015) conducted one of the few studies that looked at how different types of urban green spaces affect health. They discovered that these spaces are more strongly associated with positive health outcomes, such as fewer heart problems, better birth outcomes, and lower death rates. Parks have things to do, like biking, running, walking, and other activities that make people want to exercise on a regular basis. Additionally, urban parks' vegetation and greenery can improve air quality by lowering pollutants and increasing oxygen generation (Devarajan *et al.*, 2020; Kim *et al.*, 2021). The therapeutic benefits of nature contact contribute significantly to psychological resilience, offering both direct restorative effects on well-being and a protective barrier against daily stressors (Hartig *et al.*, 2011; Van den Berg *et al.*, 2010).

Ecosystem Conservation

Green spaces contribute to ecological preservation by fostering biodiversity and providing habitats for beneficial organisms like insects and birds. Urban forests and wildlife corridors within interconnected green infrastructures can prevent the loss of biodiversity by supporting species that typically struggle to survive in highly developed areas (Haq, 2011; Byrne & Sipe, 2010).

Cultural & Amenity Values

As a result, the visual and recreational benefits of trees make the city more appealing and encourage tourism, which in turn creates jobs and income (Chiesura, 2004). In ways that are not feasible in concrete structures or other urban settings, urban green spaces give locals the chance to walk outside, engage with nature, and socialise with others (Jennings and Bamkole, 2019; Colley *et al.*, 2022).

Prospects for the Future

In order to improve space utilization, cooling, air quality, and biodiversity, green spaces and urban horticulture including vertical gardens, green roofs, terrace gardens, urban forests, and avenue plantations will become more crucial as urbanization and environmental issues accelerate. Water conservation, food production, community involvement, and effective maintenance will all be enhanced by smart irrigation, community gardens, urban farms, and technology-based management utilizing sensors, automation, and GIS. Urban horticulture will thereby promote healthy, climate-resilient, and sustainable cities.

Conclusion

Integrating green infrastructure from expansive urban parks to innovative vertical greenery is no longer a luxury but a fundamental urban necessity. By weaving nature into our streets and buildings, we create environments that are ecologically resilient, economically valuable, and restorative for the human spirit. Ultimately, these designs transform concrete jungles into thriving, “living” ecosystems that foster health, community, and sustainability.

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