



SKY HIGH GARDENING

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Introduction

Sky high gardening, also known as vertical greenery, is a unique concept that incorporates lush flora into urban environments, especially high-rise structures. With the fast urbanization process, the examination of environmental sustainability is a vital topic in encouraging sustainable social development. Since public spaces have been significantly decreasing in recent decades, their availability and accessibility are essential for fostering sustainability in densely populated areas. Urban sustainability contains various aspects. It is essential in today's world since it is the only solution to the numerous problems that urban people face as a result of urbanization, including the urban heat island effect, environmental, economic, and physiological challenges.

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Vertical Greenery Systems:

These systems transform buildings into living ecosystems by accommodating

plants both vertically and horizontally. They include:

1. Green Roofs: Rooftops adorned with greenery.
2. Vertical Green Walls: Living walls covered in plants.
3. Green Terraces: Terraced levels with greenery.
4. Elevated Forests: Trees growing in sheltered horizontal spaces, creating a forest in the sky.
5. Vertical Forests: High-rise buildings with trees growing on balconies.

Architects, structural engineers, and botanists are need to be considered by factors like plant characteristics and environmental conditions when designing these living architectures. Hardwood species are often chosen for vertical greenery due to their ability to regulate solar radiation during cooling and heating periods.

1.Green roofs

Living roofs, sometimes referred to as green roofs, are intriguing architectural elements that combine the natural world with urban settings. A building with a green roof is one that has growing plants and a growing media planted over a waterproofing membrane, covering all or part of the roof. Additional layers like a root barrier, drainage systems, irrigation systems, and plants could also be included.

Benefits of Green Roofs:

Public Benefits:

- **Aesthetic Improvements:** Urban greening enhances the beauty of the built environment and attracts investment.
- **Waste Diversion:** Green roofs prolong the life of waterproofing membranes, reduce waste, and use recycled materials in the growing medium.
- **Stormwater Management:** They store water, which is then taken up by plants and returned to the atmosphere through transpiration and evaporation. In summer, green roofs can retain 70-90% of precipitation, and in winter, they can retain 25-40%.

Private Benefits:

- **Insulation:** Green roofs provide thermal insulation, reducing energy consumption for heating and cooling.
- **Urban Heat Island Mitigation:** They remove heat from the air, reducing temperatures on the roof surface and surrounding areas.
- **Air Quality Improvement:** Vegetation filters pollutants and improves air quality.
- **Noise Reduction:** Green roofs absorb sound, creating a quieter environment.

Design-Based Benefits:

- **Habitat Creation:** Green roofs offer habitats for birds, insects, and other wildlife.
- **Carbon Sequestration:** They help as sequester for carbon dioxide.
- **Additional Space:** Rooftop gardens can serve as amenity spaces or even agricultural areas.

Global Adoption:

In Europe, green roof technologies are well-established due to government support

and legislation. Countries like Germany, France, Austria, and Switzerland have vibrant green roof markets. In North America, the benefits are still being understood, but the market is maturing thanks to industry leaders effort.



Vertical green walls

Green wall is a vertically constructed structure that is purposefully covered in vegetation. It consists of a growing medium (such as soil, substitute substrate, or hydroculture felt) and an integrated hydration and fertigation delivery system. Because of their vibrant plant life, these walls are also called living walls, are captivating features that bring nature into our urban spaces.

Types of Vertical Green Walls:

- **Modular Panels:** These panels hold the growing medium and can be categorized based on the type of growth media used:
- **Loose Media:** Soil-based systems.
- **Mat Media:** Utilize mats for plant growth.
- **Structural Media:** Incorporate structural elements for support.
- **Media-Free Walls:** Some designs use air plants without any growth medium, creating a striking visual effect.

Origins and Popularity:

The popularization of green walls is often credited to Patrick Blanc, a French botanist specializing in tropical forest undergrowth.

In 1986, Blanc collaborated with architect Adrien Fainsilber and engineer Peter Rice to create the first successful large indoor green wall (known as Mur Végétal) at the Cité des Sciences et de l'Industrie in Paris. Since then, green walls have gained popularity worldwide, with both outdoor and indoor installations capturing attention. Notably, the largest green wall, covering 2,700 square meters, graces the Los Cabos International Convention Centre in Mexico, designed by architect Fernando Romero.

Benefits of Vertical Green Walls:

- **Aesthetic Appeal:** They enhance the beauty of buildings and public spaces.
- **Urban Heat Island Mitigation:** By removing heat from the air, they cool roof surfaces and surrounding areas.
- **Air Quality Improvement:** Vegetation filters pollutants, contributing to cleaner air.
- **Insulation:** Green walls provide thermal insulation, reducing energy consumption.
- **Habitat Creation:** These walls offer homes for birds, insects, and other wildlife.
- **Carbon Sequestration:** They help sequester carbon dioxide.
- **Noise Reduction:** Absorbing sound, they create a quieter environment.
- **Stormwater Management:** Green walls store and manage water, benefiting the ecosystem.



Green terraces

Green terraces are captivating features that blend nature with urban living. Green terraces refer to the roof or terrace of a

building that is intentionally covered with vegetation. These terraces serve as platforms for plants to thrive, benefiting from direct sunlight and rainfall. They transform otherwise unused spaces into lush, green havens.

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Examples of Green Terraces:

The Green Terraces in Electronic City, Bangalore: Developed by Keya Homes, this residential project integrates green terraces within the strategic location of Electronic City. It offers amenities like a swimming pool, jogging track, and outdoor tennis courts.

Other Locations: Green terraces can be found in various cities, transforming rooftops into vibrant, eco-friendly spaces



Elevated forest

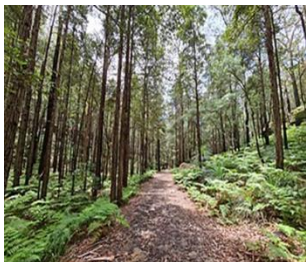
An elevated forest typically refers to a type of forest that grows at higher altitudes or on elevated terrain.

High Forest:

Large, mature trees with a closed canopy define a high forest. Most of the time, seeds or planted seedlings are the source of these forests. High woods have towering, established trees, in contrast to low forests, often called coppice forests, which are made up of smaller, regenerating trees. High forests can develop and be maintained by human activity, but they can also happen naturally. High woods can be unevenly aged (having three or more age classes) or even-aged (having one or two successional age classes), and they show genetic variation. A high forest's understory can range in density and species richness from open and parklike to dense and varied.

Forest Basics:

Forests thrive in regions where temperatures rise above 10°C (50°F) during the warmest months, and annual precipitation exceeds 200 mm (8 inches). The type of soil, plant life, and animal species in a forest depend on the specific environmental conditions within these climatic limits.



Forest Fragmentation:

Forest fragmentation occurs when forests are broken up into smaller patches due to land-use changes. Elevated forests can be

impacted by deforestation and the effects of remaining forest fragments near non-forest edges.

Vertical forests

Vertical forests are a fascinating concept that merges architecture with nature, transforming skyscrapers into lush green havens. These innovative structures incorporate vegetation, with trees and plants growing on every surface. Vertical forests are skyscrapers that integrate greenery and different plant species into their design. Unlike traditional buildings, these structures are green to the extreme, with vegetation covering their facades and balconies. The idea behind vertical forests is to create a symbiotic relationship between humans and nature, mimicking the benefits of natural forests. These living towers not only enhance aesthetics but also contribute to environmental well-being by filtering air, absorbing carbon dioxide, and providing habitat for birds and insects.

The Iconic Bosco Verticale (Vertical Forest) in Milan:

Designed by Stefano Boeri Architects, the Bosco Verticale in Milan, Italy, stands as a testament to vertical forest innovation. Completed in 2014, it consists of two towers spanning 44 stories, soaring to heights of 116 meters and 85 meters. The Bosco Verticale features an astounding 20,000 different shrubs, plants, and 700 trees of various species. These towers are primarily self-sufficient, incorporating solar panels, geothermal heating, and a greywater irrigation system for the plants.

The environmental benefits are remarkable:

- It moderates temperatures in both summer and winter.

- It absorbs approximately 30 tonnes of CO2 annually—equivalent to about 3 hectares of forest.
- It acts as a filter for dust particles and shields residents from noise pollution.
- It provides a thriving urban habitat for bumblebees, wild hermit bees, hoverflies, and over 20 bird species.

A Symbol of Hope:

Vertical forests symbolize our ability to create sustainable and livable cities for the future. Inspired by the rainforests of Borneo, where nature filters air and produces oxygen, these architectural marvels remind us of our responsibility to harmonize with the natural world. As they become more common in large cities, vertical forests offer hope for a greener, healthier urban landscape



Sky Gardens Around the World:

Sky Garden in London: Atop the 37-story Walkie Talkie building, it offers panoramic views and lush foliage.



Conclusion:

The practices such as rooftop farming or vertical gardens enhance urban living by providing fresh produce, promoting sustainability, and creating green spaces in the concrete jungle. These innovative gardening

techniques contribute to a healthier environment and a more resilient urban community. Sky-high gardens benefit from ornamental plants, adding beauty and enhancing the environment. It generates employment opportunities and contributes to foreign exchange earnings through exports of flowers and related products.