

An Urban Landscape

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Introduction:

India is a nation with a severe problem of population explosion. With increasing population and urbanization, the area under forest have decreased tremendously in the last decades. Deforestation has several long term and short term consequences. Our ecosystem is on the verge of destruction mainly because of disrupting anthropogenic activities. Phenomenon such as global warming, climate change, melting of ice caps, glacial breakdown is very common, To compensate these losses due to deforestation, it is needed to be ensured that at least the O₂:CO₂ ratio is maintained. In India, it could be expected that by the end of 2050, more than 60 percent population will live in urban area. Rapid urbanization along with its population pressure on food, fiber and fuel is a major concern to livelihood security as well as environmental security. Owing to the challenges, different strategies, policies on urban and peri-urban horticulture have been initiated and sprouted throughout the world by vertical greening system. Vertical Gardens are special kind of urban gardens where suitable plants species are accommodated in a vertical manner to small spaces, particularly for decorating the walls and roofs in various styles. The main concept of vertical gardening is space management. The approaches may include development and maintenance of greenery within & around someone's house, around area & township. For the domestic requirement of water in urban horticulture & human needs, sufficient water bodies must be created and properly maintained. Conservation of soil and soil health beside maintenance and augmentation of vegetation.

History of vertical garden

The Green walls concept was proposed for the 1st time in Babylon about 2500 - 2600years ago by King Nebuchadnezzar II. He was the one towho built the Hanging Gardens of Babylon is the ancestor of modern green. Between 3rd BC and 17th AD Romans trained grape on garden trellis and on villa walls. (Timur, B. O. and Karaca, E., 2013).

Types of vertical greening system:

- ✚ **Living walls:** A typical living walls consist of an integrated fabric system which are the pre vegetated panels. These panels are composed of plastic. Plastics include synthetic fabrics, expanded polystyrene, metal, clay, and concrete. The construction of living walls or vertical garden is advocated to be done both in interior and also in the exterior of buildings. Any kind of area can be used at its maximum capacity by this technology (Dumitras et al., 2010).
- ✚ **Green Walls:** Green walls have potential to absorb polluted air which is being released due to anthropogenic activities. Green walls are known to lower both indoor and outdoor temperature, providing a quality indoor air as well as a more beautiful space. They hold rain water and slow it down. This system also provides food and shelter to wildlife. Green skins (living architectures) are therefore a new approach for a sustainable and dynamic urban biophilia. Vertical garden or living wall can also be built using the ecological design principles of built wetlands (Revell, G. and Anda, M., 2014).
- ✚ **Green facades:** Green facades allow additional surfaces with vegetation and contribute to the enhancement of the thermal performance of any buildings or multistoried constructions. In this particular system, a simple array of climbing plants at the base of the façade occur (Perini, K. and Ottele, M., 2014). Three green facade systems are used for vertical garden; these are modular grid system, trellis panel and wire/rope net system.
- ✚ **Vegetated mat walls:** This technique innovated by Patrick Blanc. These walls are prepared by using a dual layer of synthetic fabric. The fabric walls are well reinforced by a frame and supported by a waterproof membrane. The building wall is needed to be moisture guarded because of high moisture content of the irrigation system of the wall.
- ✚ **Landscape walls:** Landscape walls are usually sloped in nature unlike vertical gardening. The primary function of landscape walls are noise reduction and slope stabilization. They usually are constructed from some form of stacking material. These staking materials are made of plastic or concrete with room for growing media and plants (Green Roof Organization 2008).

Plants suitable for vertical gardens (Vegetable plants):

- ✚ **Climbing plants** - Cucumber, squash, tomato, green beans, peas and lima Beans.
- ✚ **Non climbing plants** - Peppers, Lettuce, Radishes, Onions, Potato, Parsley, Eggplant.
- ✚ **Outdoor plants (Flower plants):** *Syngoniums, Philodendron, Peperomia, Epipremnum, Begonia, Anthuriums, Nephrolepis, Chlorophytum, Lantana, Pilea, Rheodiscolor, Cuphea, Fittonia, Schefflera, Spathiphyllum,*
- ✚ **Indoor Green walls:** *Syngoniums, Peperomia, Spathiphyllum, Epipremnum, Philodendron, Begonia, Anthuriums, , Pilea, Rheodiscolor, Fittonia, Chlorophytum, Schefflera, Ficus spp.*
- ✚ **Exterior Green walls:** *Asparagus spp., Alternanthera, Mentha spp, Pilea microphylla, Sedums, Jade plant, Dusty miller, Portulaca, Cuphea, Baby's tear, Ophiophogon, Callisarepens, Dianella tasmanica.*

Benefits of vertical gardening

- ✚ **Add aesthetic, beautification and visual value**– According to Perpeet, M. (1994), the visual and other sensory elements influence perception of landscape. The ecological factors should be considered in dealing with different types of landscaping situations. Yazgan, M.E. and Khabbaz, P. A., 2013 reported that, vertical gardening is established with recreational, aesthetic and ecological goal.
- ✚ **Decrease noise pollution** – Plants grown in vertical gardens are very useful to absorb extra noise which are produce in different urban cities. Vertical garden improves energy saving, only add oxygen and remove carbon dioxide, when plants are kept in airborne particles, they can accumulate metals in their edible portions through root or foliar transfer. Lettuce, radish, and parsley were used to recycle atmospheric pollutants like Pb and Cd. Holds rain water, providing extra income - Green spaces reduce rainwater runoff providing more percolation into aquifers and also reducing potential flooding in cities. Moustier, P. 1994 reduction of pollution, noise and CO₂ release and oxygenation (Urrestarazu, M. and Bures, S. 2009).
- ✚ **Reduce CO₂ levels and increases oxygen and improved air quality through photosynthesis**- Air quality in urban cities cause bad effects of people's health and performance directly. But green wall increases the biodiversity and ecological value, mitigation of urban heat island effect, outdoor and indoor comfort, insulating properties,

improvement of air quality and of the social and psychological well - being of city dwellers (Zia, A., Zia, K. and Larki, A N, 2013).

- ✚ **Prevent from harmful pollutant**– Xiong T. et. al., 2014, proposed that, plants in garden not studied that, Vertical and market gardening is an important and traditional form of income, requiring little capital but lots of labour.
- ✚ **Improved Energy Efficiency:** Vertical gardening enhance the sustainability of the urban environment by providing energy efficiency and insulation to buildings and increasing biodiversity (Bures, S. 2013)

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