



“TERRACE GARDENS” UTILIZATION OF TERRACES FOR GREEN FUTURE: A REVIEW

Id. PRIYA KANDALKAR

Assistant Professor

Department of Interior Design

College of Non-conventional Vocational Courses for Women,
Kolhapur [MS] INDIA

ABSTRACT

In today's urban environment high rise buildings, parking areas, network of roads have acquired major urban land. In such congested environment rooftop and terrace of buildings provide a valuable potential source of outdoor space accessible to users of building. (A. Patel, R. Yadav, B. Singh,2019)The purpose of this study is to give an insight into what motivates middle-class citizens to engage in gardening. The Indian middle classes are described as well educated with busy, stressful lives and with a high resource use due to consumption, however, also with increasing awareness and practices of pro-environmental behaviour. (Mathur 2010) Balcony and terrace gardens give pleasure to city dwellers and provide an opportunity for enhancing creativity as well psychological benefits. In addition, they change the visual appearance of the building, screening from neighbors, and conceal unwanted pipeline and unappealing scenery (Green,2004). The findings of this article are based on literature review. The study concludes that, regardless of the type of home, both Individual house and apartment respondents prefer a terrace Gardening for the purpose of relaxation and decreases recorded in global Warming is the greatest benefit.

Keywords: Roof garden, Sustainability, Roof Top Gardening, eco-design, Urban Gardening, Benefits of Terrace Garden

INTRODUCTION

Urbanization is not an option but a compulsion. People residing in the city, finds this life very hectic as there is a very rare chance to feel the nature. So, in order to enjoy the country side

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within the city, many people have started their own green environment either in the roof or balconies or any unused places. Moreover, the forgotten places or the ones that are left barren due to some causes are utilized to grow edible foods. These have helped in reducing the ecological footprints in the houses or in the industries and a healthy community to live in. (*Pratistha Mishra, 2013*) Terrace gardening is a living work of art in which the plants are arranged on a terrace. It also consists of indoor or outdoor plants. Many cities have implemented measures to ensure that new buildings have green roofs, but older buildings have been more widely ignored. In many different nations and in different climates, green roof technology has its roots. A building protected by a plant ensures adequate protection against hot or cold weather. In sustainable architecture, green roofs have become an essential feature. In reality, green roofs are expanding globally. The trend of terrace garden is not new, for centuries it has been common to use rooftops as a living space/Recreational space. (*A. Patel, R. Yadav, B. Singh, 2019*) Another advantage of green roofs is the possible transformation of roofs in high urban density neighborhoods into recreation areas, private as well as semi-public or even fully public. (*Manfred Kohler, Michael Laar, Marco Schmidt, 2004*) Green roofs can be divided into three categories:

1. Spontaneous green roofs
2. Extensive green light weight roofs with low maintenance, without additional irrigation and fertilizing.
3. Intensive green roofs = roof gardens.

Extensive roofs are those that require little maintenance, are established over the majority of the roof area and generally contain low-growing, drought- and extreme weather-tolerant plants; Intensive roofs require high maintenance, may or may not cover the majority of the roof and usually contain a variety of plants, such as small trees or shrubs. The term rooftop gardens (RTGs) will be used for gardens built on a roof that has the same material constituents as a backyard garden planted with small-scale crops. (*Lisa Barreiro, 2012*)

The environmental benefits observed include storm-water runoff management, energy conservation through temperature stabilization, and urban habitat preservation, although other benefits such as aesthetic value and biodiversity have also been noted. (*Lisa Barreiro, 2012*)

The factors which make roof gardens important part of architecture throughout the world is:-

1. Full use of terrace, which is normally a discarded area in crowded cities. Maximum meaningful use of minimum available space.



2. An economical way of balancing green space with uncontrolled growth of cement structure in urban areas. (*A. Patel, R. Yadav, B. Singh, 2019*)

Statement of Problem:

The first problem we have is the high cost of living in limited space. And also in order to minimize pollution and noise, CO₂ emission absorption and urban heat control, it is important to contribute to the enhancement of biodiversity in the urban environment and to resolve the lack of vacant land for cultivation. The Rooftop Gardening concept is the only successful measure that has been proven to be practiced and established day by day throughout the world. For many years, the construction of the roof garden has been without a standard model and a standard process, exposing many defects and shortcomings. For example: cannot prevent leakage, loss of soil and water, the serious pollution, the unreasonable arrangement of plants, the exceeds of load, the exceeds of the construction cost. Especially old building, because of the lacking consideration, the roof in the old building was not suitable for the construction of the roof garden. Due to the original design without considering the load and roof garden drainage, makes the structure safety reserve is insufficient, drainage pipe diameter is not enough, the design difficulty is greater. Once these problems are solved, the construction of roof garden in our country will be developed rapidly. (*Wenjun Wang, 2018*)

Objectives

1. To know the factors inspired for terrace gardening.
2. To delineate a general feature of rooftop gardening.

Scope:

The purpose of this study is to give an insight into what motivates middle-class citizens to engage in gardening. The Indian middle classes are described as well educated with busy, stressful lives and with a high resource use due to consumption, however, also with increasing awareness and practices of pro-environmental behaviour. (*Mathur 2010*) Serious environmental problems have become obstacles to the development of the city, how to expand the green area, reduce the pollution of the environment to improve the urban ecological environment, promote the sustainable development of the city, has become a top priority in the construction of cities today.

Methods:



The findings of this article are based on literature review. The literature reviewed is a mix of articles and papers about the study of design of terrace garden, basic study of plant materials, structural implication and Construction techniques.

History of Roof Top Gardening Concept: The earliest dominated rooftop gardens ensure were the hanging gardens of Semiramis in what is now Syria, considered one of the seven wonders of the ancient world. The tribal or local habitants are use to cultivate by the way of “Jhum Chas” in the hilly region lack of cultivated land from the ancient era beneath which sometimes caves a found. Humans have grown plants atop structures since antiquely. The Ziggurats of ancient Mesopotamia (4th millennium BC – 600 BC) had a planting of trees and shrubs on aboveground terraces. The modern Roof Top Gardening concept developing every day based on ancient roots. *.(Sankar Kumar Acharya,2009)*

Terrace gardens:-

A terrace garden is a garden which is established on a terrace, roof, or patio, usually in a house where there is limited gardening space. Terrace gardening is a home gardening practice, and characteristics of home gardens are that they are privately managed by a family *(Guitart 2012)*. These types of terrace gardens are especially popular in urban areas. Green roof tops with living vegetation provide green spaces, mitigation urban heat island, energy conservation, improving the air quality and increases biodiversity *(Getter and Rowe, 2006; Snodgrass and Snodgrass, 2006; Luckett, 2009)*. Balcony and terrace gardens give pleasure to city dwellers and provide an opportunity for enhancing creativity as well psychological benefits. In addition, they change the visual appearance of the building, screening from neighbors, and conceal unwanted pipeline and unappealing scenery *(Green,2004)*. Terrace and balcony gardens are highly popular in urban middle and upper class families in MMR and were found as a sort of leisure activity for some people. Suspicion about the quality of vegetables available in urban markets and recycling of household waste is the main motivation for these farming *(Vazhacharickal and Buerkert, 2011)*.

Across the world, the Rooftop Gardens are a common feature of the modern city. To reduce pollution and noise, the absorption of CO₂ emissions and controlling the urban heat, need to contribute to the biodiversity enhancement in the urban environment, meeting the scarcity of vacant land for cultivation. The idea of Rooftop Gardening is the only proven an effective measure being practiced and developing day by day throughout the Globe. The concept of ecological citizenship uses the metaphor of “ecological footprint”. In a different part of the world when, at the turn of the 20th-century, gardens were installed on roofs counteract the damage of solar destruction on roof structures with environmental policies and technologies on storm-water management, energy, conservation, and urban habitat provision. Productive green roofs combine food production with ecological benefits, such as reduced rainwater run-

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off, temperature benefits such as potential reduction of heating and cooling requirements, biodiversity, improved aesthetic value, and air quality. Rooftop Gardening can be placed on individual homes, institutional and office buildings and roofs of restaurants and serve either home consumption, use of fresh produce in restaurants or institutional kitchens or commercial production. Overheating cities of due to the dense concentration of asphalt (including rooftop and pavements) and global warming that absorbs solar radiation. Rooftop Gardening is undoubtedly is much more essential and viable method especially for the cities overcrowded. To utilize unused space at rooftop, to consume fresh organic food, to utilize leisure and idle time, to save roof from damage, to make the environment cooler, to beautify and decorate the atmosphere' to get fresh food without much effort or waste of time, to convert organic waste into organic manures' to help the nation enrich.(*Sankar Kumar Acharya,2009*)

Benefits of Roof Gardens

1. **Ecological Benefits**-It is very rare that one gets a chance to return what environment has given to us. One of the first ecological benefits is that the plants absorb pollutants that rainwater brings with it. This way the heavy metals and nutrients are absorbed by soil instead of wasting away. Similarly, Greenrooms are very beneficial in reducing air temperatures. These also increases humidity levels in the surrounding areas. (*Pratistha Mishra, 2013*)
2. **Economic Benefits**-The use of wasted space can be one of the benefits. As it can be costly when needing a garden at ground level, unused roof tops can save that cost. Similarly, the building is beautified which can increase the number of people interested in the building. As the food is produced within the community, one can buy food from the lo-cals. The result is transportation costs and time are saved. Also, one can enjoy the fresh food. (*Pratistha Mishra, 2013*)
3. **Aesthetic Benefits**-Like ecological and economic, there are also aesthetic benefits of roof gardens. With the green surrounding, it is easier to forget the crowd of the city. The greenery brings the countryside memories or feelings alive. Similarly, fresh air can give a positive energy. (*Pratistha Mishra, 2013*)

Construction of Terrace Garden-

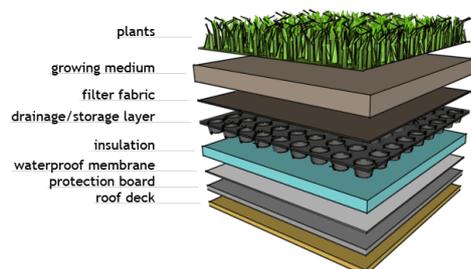
There are three distinct layers in a green roof from the bottom, namely:

1. Structural layer
2. Growing media

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3. Vegetative layer



Roof Deck - The most important layer on a green roof is its decking, which can be concrete, wood, metal, plastic, gypsum or composite as it determines whether the structure is capable of taking the load of the green roof.

Waterproofing - The primary purpose of waterproofing is to keep the unwanted moisture from rain and condensation away from the structure below.

Insulation- The roof is the primary location for heat transfer and the insulation restricts the transfer of heat energy through the roof by creating a barrier between spaces of different temperature.

Protection Layer - As green roofs contain living and growing materials, a protection layer and a root barrier are one of the most important elements of the assembly . -As roots grow they can penetrate the waterproofing membrane and create leak locations. The root barrier placed above the membrane ensures that no roots pass through and harm the membrane . -A protection layer shields the waterproofing membrane from damage after it has been installed.

Drainage and retention Layer – A drainage course allows moisture to move laterally through the green roof system. It prevents oversaturation, ensures root ventilation and provides additional space for the roots to grow . -It is a porous, continuous layer over the entire roof surface just above the concrete slab.

Root Permeable filter Layer – This layer separates the growing medium from the drainage layer and protects the medium from shifting and washing away. -It restricts the flow of fine soil particles and other contaminants while allowing water to pass through freely to avoid clogging.

(Akash Patel, Rohit Yadav and Bhagirathi Singh,2019)

Cost Factors:-

One of the biggest factors in retrofitting an existing roof into a green roof is cost, with many researchers concluding that intensive roofs are more expensive than extensive roofs (*Rowe*



2010), (*Carter and Keeler 2008*). Some of these costs can be reduced by factoring in the return on investment of the roofing system as a vegetated roof increases the lifespan of the roofing membrane due to a more stable temperature over the course of any given year (*Liu and Baskaran 2005; Carter and Keeler 2008*). By utilizing reused or recycled materials or by innovative design, other costs can be minimized or eliminated.

CONCLUSION:

Now is the time of age when more attention should be given to conservation than consumption. The main theory behind this project was sustainability. The main motto of this project is to build a place where all people can meet and improve social contact, where healthy food is grown that teaches individuals to learn healthy decisions and to teach them to save the world for another generation. The study concludes that, regardless of the type of home, both Individual house and apartment respondents prefer a terrace Gardening for the purpose of relaxation and decreases recorded in global Warming is the greatest benefit.

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