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Vertical Gardens for India Social, Architecture Acceptance & Practice

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ABSTRACT: Cities from all around the world are suffering from one major effect of development i.e. pollution. People complain about lack of Green Areas, Pollutions are rising, fresh water level is going down & food crises are coming up. Especially developing countries like India with major economic cities as of Delhi, Mumbai, Bangalore Etc a solution is needed to provide lungs of green space to urban areas or concrete jungles. History of India is quite rich when it comes to culture with nature this ethos needs to be revived among young generation which sees technology as answer and value more of Glass or concrete structure then nature. Earlier times every household in India used to have few edible, holy or medicinal plants which were nurtured by family. So introduction for vertical garden or vertical farming will give old same feeling closer to nature. And with current generation concur to their technological & business minded approach. They are entrepreneurial in nature & consider every initiative as investment & expect better plus secondary returns so Vertical gardens will gain social acceptance & modular approach when offer more practical sustainable use to family other then primarily providing green cover & clean environment.

Keywords: Vertical Gardens; environment; Curb Pollution; Indian ethos; urban farming

I. GENERAL ANALYSIS

Knowing by the record of human development with regards urban context. Industrial age: harnessing steam revolutionized using coal, then later, oil. Combustion engine and turbine followed till date.19th century produced iron & steel in large quantities could be used in building. 20th century industrial methods for making sheet glass, fluorescent lamps, and air conditioning made possible large buildings sealed off from the natural environment like other benefits of industrialization; these buildings cost the environment a lot from construction then continue lifecycle of environmental degradation. Can we create a healthier & less wasteful human habitat? Preserving and updating the existing structures this is one of the basic practices which can be followed- it is not always necessary to build new lavish extravagant building totally out of sync with nature.

In cites from all around world the building walls are empty displaying concrete. In some cites people are complaining about lack of green Area .Pollution is Raising, Food crises are coming up overexploitation of resources resulting in global climatic change.

The solution is needed for cities, urban areas that are concrete jungle.

This paper is a part the introductory phase of my study titled: vertical gardens for India social, architecture acceptance & practice. The research explores what the nature experience could be with society, architecture and how it can lead to responsible living. Nature experience could mean literally nature (e.g. a walk in the garden, gardening with grandparents, watering flowers etc.), but it could also mean an abstract meaning of nature (e.g. changes of light during the day, aesthetic of road planters etc).

Through the research it is aimed to understand the current knowledge of vertical gardens between landscape and urban buildings, and to evaluate it with respect to Indian society and needs.

As in our culture plants are highly regarded they are prayed grown in houses, protected & nurtured with traditions rituals etc (for eg most houses have tulsi plants in their houses which is considered sacred).Idea is to generalize the current knowledge with operational planning methods of vertical garden, and to develop new prototypes/strategy to cope with mess of pollution. Especially concentrating on the situation of Delhi. City which is highly polluted city in world along with Beijing in terms of most polluted city status

II. OBJECTIVE

An idea can be focused in general public for better future with three agendas Example, Motivation, & education working along shoulder to shoulder simultaneously. To introduce vertical Garden as philosophy with respect to Indian ethos & mindset to public & entrepreneurs etc .

Practical implementation of vegetation & benefit for environment easily implemented in household with low maintenance for acceptance by general public.

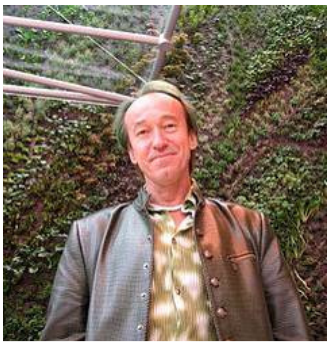
III. INTRODUCTION

One of the gardening world's newest trends, "vertical gardens" that allows plants to grow on walls and other surfaces. They're especially popular for small-space gardening in west where ground is at a premium, or as decoration for outdoor rooms. Putting plants at eye-level gives new appreciation to groundcovers.

A. Origins

The Vertical Garden conceived and realized by the botanist Patrick Blanc (he was awarded an Honorary Fellow of the Royal Institute of British Architects. He is a French botanist, He is the modern innovator of the green wall, or the vertical garden),

The vertical garden depends on plants as they need light, air, suitable temperature, water and required minerals. Contrary to general beliefs, plants can vegetate without soil. This led French botanist Patrick Blanc to create and patented his first green walls called vertical Garden



Vertical garden is the Solution to implement beautiful plant in any location where there are no others places left for plants. The solution rests on the plants ability to develop their roots in a vertical thin layer of acrylic manner. With such ability, it is possible to grow plants on any vertical structure. Basically, the structure used is very light and can be set permanently set on any wall of any buildings.

The watering can provided automatically through a drilled hose running along the top of the Vertical Garden etc. It may be possible to recycle the grey water.

The vertical garden can be of any dimensions. So far, there are roughly 1000+ Vertical Garden in around the world. The largest Vertical Garden is in Paris. It has surface of 300 m^2 And is 30 m high. It can be implemented in any environment (light, wind, Temperature, air humidity, either indoor or outdoor) It is thus possible to implement Vertical Gardens in any city of the world.

B. Current Situation

Without Vertical Garden, there were no possibilities of creating a permanent, sustainable, self maintained society. Vertical garden can be implemented in any city of any climatic part of the world thus Delhi, Mumbai; Hyderabad etc. cities are most appropriate for their implementation.

The only solution to live with plants in cities was to save horizontal surfaces for public gardens.

The Vertical Garden is with the purpose of growing plants in small areas where all the horizontal surfaces were presumably occupied. The first priority was to find a way of growing plants on vertical surfaces.

The second is to set up a technique which allows the Vertical Garden to be watered and fertilized without constant human action.

IV. FORMULATION OF OBJECTIVES AND STRATEGIES

The main objective is to implement many Vertical Gardens in cities in order to improve the quality life of many urban populations by offering beautiful green landscapes for visual & health benefits. In addition, the Vertical Garden is also improving air quality better thanks to the plants photosynthesis and thanks to the air purification ability of this living system. The strategy is now to convince many private and public building owners to convert their naked walls into gardens by conveying all the benefits they could obtain through Vertical Garden implementation.

A. Mobilization of Resources

If a private or public building owner is interested. The implementation is only critical resource is the financial one which can be addressed if implemented in small scales but serving & involvement of larger sections of society. The technical resources are readily available in Indian market but only question is due to lack of demand & special set of requirement their cost are high and quality is also not at Par. Say technicians for the hanging of the Vertical Garden on the building wall or the human resources required are not highly qualified and are easy to hire for the duration of the implementation.(E.g. Many Vertical garden vendors are available on India mart at price range from Rs 1200-1500 Sq.ft) In the case of private buildings, the owner finances all expenses. It must be considered that, depending of the wall orientation, a private owned Vertical Garden can be seen from the street and then by public. In the case of a public building, the owner finances the expenses on his own annual budget is reduced or can share the expenses with some specific public money. Nearly all the financial resources are required for the initial implementation. The maintenance costs are low but consistent small price for better future.

B. Understanding

- As a any new technology, Vertical Garden may face many barriers. The lack of a awareness/enthusiasm is an important handicap. People (outside metropolitan) don't know about the Vertical Garden.

That means that some opportunities to implement Vertical Garden are wasted or not utilized by architects or government.

- The financial problem also exists. Despite the many public benefits of the Vertical Garden there is no government's incentives to support its benefits.
- In the process of implementing Vertical Garden, it is also necessary to fight against false ideas or misconception. For instance, due to the lack of information, many people believe that a Vertical Garden installation will require constant (daily) and costly maintenance. That assertion is wrong thanks to the automation of watering and fertilizing system. Furthermore, thanks to the botanical knowledge of local farmers & gardeners , plant species can be selected in accordance with each environment in order to reduce the maintenance cost & aesthetic either .

C. Inferences, lessons from Research

- To improve the life of the public, the Vertical Garden realisations should be large, To achieve lower pollution levels within few years ,
- the global awareness about Vertical Garden should be increased with knowledge & campaign. financial incentives (from the governments or from cities) should appear as the results of the many public benefits of the Vertical Garden
- A very large realisation on a public buildings of a major city of India would be a good way to increase the local awareness on pan India basis. That realisation should be very large and implemented in an emblematic place like Delhi.
- The communication about that major public benefits of these Gardens should improve. So far the communication about the Vertical Garden rely only on its aesthetic value.
- Very crucial details deals with the others public benefits such as air quality improvement, temperature regulation, Noise pollution reduction and biodiversity preservation.
- Once all the public benefits of the Vertical Garden will be widely recognized, a lot of people will want to take advantage of these benefits. Apart from aesthetic project can lead to urban farming giving way to edibles to be grown.
- This situation will initiate a public pressure towards governments. They could then take it consideration, through legislation, research & incentive to fit new buildings with Vertical Garden.
- So far, most of the Vertical Garden realisations have taken place in Few western cities. That geographic limitation is only due to the fact that the Vertical gardens are not widely advertised here in India

Before After

V. EXECUTABLE STRATEGIES

An idea can be focused in general public for better future with three agendas Example, Motivation, & educations working along shoulder to shoulder simultaneously. This can lead to acceptability for Vertical garden among public & credible market for entrepreneur .which in turns generate income as well as clean environment.

A. Example-

Bangalore metro rail to have vertical gardens on the pillars which will help to ease pollution in city to some extent & enhance the aesthetic of the city.
Mexico metro rail already started to incorporate vertical gardens on metro pillars & are being watered twice a week. The program is running successfully since Last year.

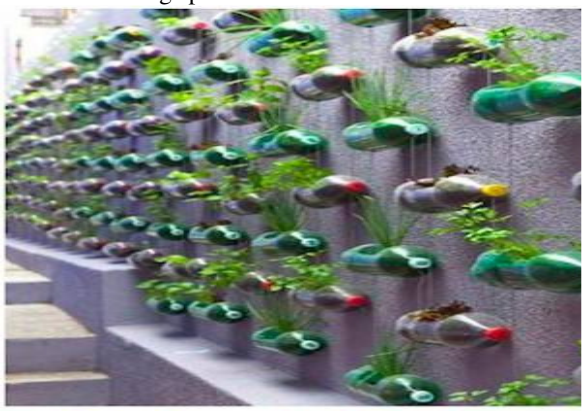
Such large scale initiative can be introduced in Delhi metro with sustainable approach to generate employment and curb pollution.
On large scale we can implement Vertical garden or urban farms on public buildings like railway station, bus station, museum, stadiums etc this activity also generate employment. Plus poor farmers can feel proud at what they do & should not be considered as illiterate. Such bonding with urban context will initiate positive vibes in metropolitans mind that farming is also skilled / highly respected/ ecofriendly job like any other job.

B. Motivation-

- With Indian context especially in Delhi, NCR area small incentive for developer can be put forward for encourage them to provide Vertical Gardens & its services. The incentive could be in terms of 5% extra F.A.R (floor area ratio) for their building which is progressed it can be based on same incentive program run by Leeds /EGBC for fulfilling their sustainability conditions for platinum rating.
- Public gardens, parks or Jogging tracks can introduce small scale free standing vertical gardens which enhance visual perception during activity among joggers, also children in parks as they perceive it as something unusual or similar to some fiction which motivates them encourages them to have something similar in home as well.
- For public to inspire creating visual library of vertical gardens in normal parks on small scale , metro pillars, School Building ,amusement parks, Cineplex etc. Will boost the effort as Children picks up hobby fast with good motivation and inspiration.
- Also such parks will employ full time Gardner & farmers etc.

C. Education-

College level. Introduction to vertical garden, like bottle plants etc, which will create interest in students .Also incentive for College or funding to have such Vertical Gardens in college premises.



Indian ethos, our ancestor /grandparents used to have small urban farms in their back yards eg. Tulsi, pepper, grape tomato etc. they already have close nature environment & they value plants & trees .

D. Strategies on broader urban context

Vertical gardens for apartment owners is easy small & acceptable limits which will be beneficial for environment as well as ease their spending as it provide certain supplies of food . Also make the family sensitive & caring. Study shows those families or individuals who take care of pets or plants are more caring & content in nature. This sound very insignificant but in larger context its main issue ,in today's environment everyone is so busy so rude & selfish which generate violence in streets E.g. Delhi Many survey/ News show simple traffic jam or quarrel leads to major crime like assault, rape ,murder, road rage etc.

Good habits lead to good morale. Family that grows own food tend to eat more healthy fruits, vegetable & eat together this can lead to healthy lifestyle for our degrading urban cities.

Chandigarh has the capacity to grow as world class city by little bit diluting its brutalism phenomenon by adding green for all good of the city.

Problem of pollution in Delhi arising a lot may be due to satellite cites like gurgaon, faridabad, noida okhla etc.

China is adopting Vertical garden/ urban green on large scale as they have reached to saturation point of problem caused by pollution & needs immediate action. India should follow the suit. Small initiative for green society clean society.

VI. LIMITATION & FURTHER RESEARCH NEEDED

There are many example for easy vertical garden but with consistence approach / caring it's easy to handle & maintain. But metaphorically every challenge is an opportunity & every opportunity poses some challenge.

The issue of grey water reusability or mosquitoes in Indian context needs to be addressed may be with the help of more brainstorming from other renowned architects as well as research to make this effort successful

There are limitation to this noble cause as well Foul Smell, during autumn, Mosquitoes & weekly services like watering etc.

Adequate water supply in terms of quality and quantity may also a challenging task. In India where rapid urbanization and population growth has increased the stress on water bodies also increased. Across the country there is a strong variation in the water available for users per person per day .This has forced many municipalities to develop laws around for recycling and somewhat reuse of wastewater. So on grandeur scale to convince government for vertical garden is huge task as they might pose some reservation to it based on water distribution scale.

Credible /detailed plan, strategies, execution & timeline needs to be investigated to convince government/legislator to invest in Vertical Gardens. Because in mixed economy the market or investors economics are loosely based on government actions /legislation.

VII. POTENTIAL OF VERTICAL GARDENS

For Architectural Green in city the analysis of the examples will initiate a discussion about the potentials of vertical garden in the city.eg metro rail pillars, parks, school etc. along with urban farming recommendations.

There's a research on the potential of vertical gardens on air quality which was conducted in United Kingdom near the Edgware Road underground station in recent past and their calculation showed that air pollution is deposited more easily onto plants than hard surfaces (by Tom Pugh at Lancaster University).

VIII. PROMINENT CASE STUDIES

A. Architecture studio Vo Trong Nghia.

Architects designed a unique sustainable house with a vertical garden as facade in Ho Chi Minh City, Vietnam.

The front and the back of the building consist of concrete planters that can be watered through an automatic system, which collects rainwater.

Additionally, the facade helps to regulate sunlight, noise and pollution in the city's tropical climate.

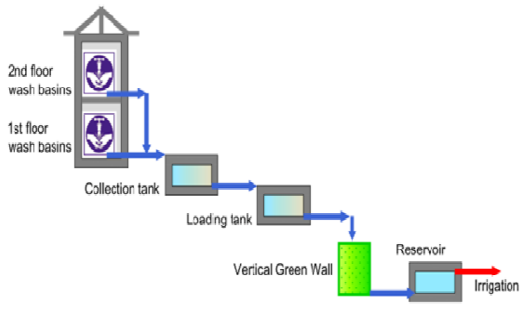
B. Gherkin Building, London

London's Gherkin Tower, has recently begun testing(2016 onwards) an innovative vegetated facade panel which promises to change the face of building design forever.

This new "Green wall" product, known as the Core Hydraulic Integrated Arboury panel, promises to bring the benefits of green roofs to any exterior surface of skyscraper. This adds aesthetic to already famous building designed by Ar. Norman foster.

C. Office of Maharashtra Water Supply & Sanitation Department of Maharashtra state in Pune.

The experimental set up was constructed on the front walls of the office of Maharashtra Water Supply & Sanitation Department. The office houses 125 fixed staff and a daily visitor count of 65 in average. Dual plumbing was installed in the first and 2nd floor of the building which connects approximately 60 staff and 25 visitors connected to a storage tank of 300Litre capacity. The pilot green wall comprises of two parallel units on either sides of the entrance.



The inflow from the collection tank is stored in two intermittent loading tanks of 100Litre capacity each whose outflows are controlled by a timer based solenoid valve. The feeding of the treatment unit happens through hourly flush of 10Litre of greywater. The discharge is directly allowed to flow into the garden next to the walls.

-Shantanu Singhal created UNNAT, a hydroponics project and experiment in soilless agriculture.

-Pasona Group Tokyo office grows own food in vertical farm.

-Fukuoka Prefectural International Hall, by emilio Ambasz.

IX. PSYCHOLOGY

The fusion of green and space has a strong effect on the spatial experience. The spaces to some aspect has experience as nature. They stimulate the Sensation of Green. The green structure as an example is a strong contradiction to dense urban surroundings. such green spaces assists in reducing stress and could stimulate relaxation. This links to the social meaning of green. It could open a discussion about other meanings of green, in which might be not green at all, but stimulate a 'green emotion'. Children are more susceptible to correlate with nature. They show purest form of emotion 'affection'. They are happy in gardens rather than enclosed within concrete wall.

X. VERTICAL GARDEN DESIGN

Each vertical garden has unique design and selection of plant species depend on locally available plants. The composition of plants takes in consideration of the specific environment where it can be implemented , considering the local and micro climate, sun exposure and the surrounding context.

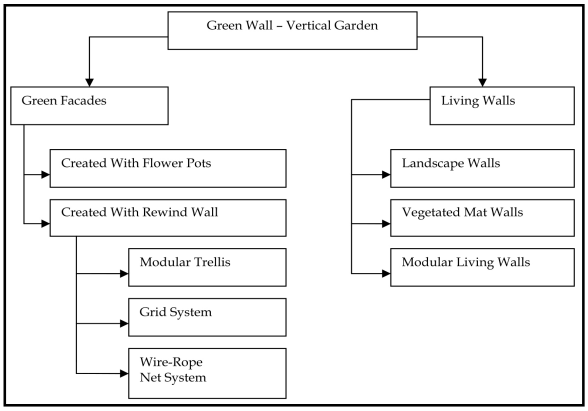
All together a unique garden is creating with much content, surprise and variation.

A vertical garden can be installed in almost any location and as a living material; the potential of integrating plants in our urban environments is interesting. Places never thought of as possible could be inhabited by plants or other intensely frequented places where horizontal space is difficult to spare.

XI. TYPES OF VERTICAL GARDENS

the selection of plants is mainly decided by local climate and sun exposure. In an urban context these factors can be influenced by tall buildings that generate winds and irregular patterns of sun exposure. Studying local flora gives a good indication of which plants that might be used. Although wild species rarely are available in nurseries, it still tells about the hardiness zone and what related species that can work.

XII. TYPES OF VERTICAL GARDENS



XIII. CONCLUSIONS

Vertical gardening is all about growing your plants on vertical surfaces, be it on the wall of a home or a large facade of a building. In india if strategies with action plan of 25 years. Sustainable green can be achieved . vertical gardening is not just aesthetics; it can help to cool and insulate buildings, reducing the need and price for air-conditioning also. Growing plants in the building helps to purify air and improve air quality as well as and add some eco breeze to centrally cooled offices/houses/school at the same time. Vertical gardening requires little maintenance but in case of vertical farm some extra care may require which will reap good dividends and it does not use soil. It save water by reducing the need for irrigation and watering which can be done precisely. Vertical garden also helps to soften the hard look of concrete especially in urban concrete jungles.

Vertical gardens has great use in a city and have big and positive environmental effect. with introduction of vertical gardens into cities can be justified and is the right solution for saving environment in different places .Spaces that are conditioned by cultural and natural systems directly connect our well-being. It means that the spread of vertical gardens in urban areas is an indication of the concern of man about its ecology, as well as the high quality of the cultural landscape with ethos and traditions.

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