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# Significance of Vertical Farming and Urban Agriculture for Metropolitan Cities in India

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## Abstract

Urban agriculture can reflect varying levels of economic and social development. It may be a social movement for sustainable communities, where organic growers from social networkers found on a shared ethos of nature and community holism. With land constraints increasing in Metropolitan cities, it is difficult to designate land for farming thus in this case for ensuring food security with innovative technologies like Roof Top Gardens (RTG), Vertical Farming, IKheti, UGF Farms and Home Crops can be an alternative option in urban farming. By identifying the need, problems and possible alternative approaches, and based on these factors highlighting the potential possible optimistic future of India. Farming in Metropolitan cities is the need of today for securing future cities food and raw materials demand. Monetary attainability, codes, guidelines and an absence of aptitude stay significant hindrance in the way to executing various methods of farming.

## Introduction

With urbanization increasing at a pace that the UN estimates by 2050 almost double the population living now will believe in cities then (80% of earth's population) accounting to about 6.5 billion. Metropolitan cities are majorly considered the cause of polluting earth (cities contribute up to 70% of total global CO<sub>2</sub> emissions- UN Habitat) resulting in climate change and its ill effects (majorly for future cities) thus in future situation when mostly urban areas would be there ensuring food security for city dwellers could not be only dependent on conventional methods of farming. Innovative methods of urban design which intent to combine food, built from city production and design in a way to produce food on a larger scale.

Vertical farming and urban farming is not a new phenomenon the term "vertical farming" was created in 1915 by American geologist Gilbert Ellis Bailey architects and since then architects and scientists have been frequently looking into the idea since then. It is said that the concept of integrating agriculture into a built environment was invented in a Danish farmhouse back in the 1950's that attempted to grow cress — a peppery, tangy flavored herb botanically related to mustard — in a factory on a mass scale (October/ November 2013, food & beverage Asia). At present fully controlled indoor urban agriculture is gaining attraction in Europe, Asia, US, Singapore and South Korea.

## Urban Agriculture: The Possible Optimistic Future of India

Urban agriculture and vertical farming might have started becoming popular internationally but in India it has not been very popular. Rural areas are providing

food to the country's population traditionally. At some places it lacks government support and policies while at other places there is lack of interest among people to practice this change and taking time out of their daily life and getting involved in it. Lack of availability of land or open space or interest of government to identify such potential spaces (New York State Energy Research and Development Authority is working towards it. Sustainable Urban Agriculture program where it has been identified and mapped vacant land and community gardens, public vacant lands and other potential sites for urban agriculture in NYC) are some of the major challenges faced by Metropolitan cities of India in urban agriculture.

It is not only lack of open spaces in cities but also lack of awareness and thought among people in India that we do not see urban farming in India in practice. India is a developing country thus lot of construction work keeps on occurring which takes time of about 2-4 yrs on average (taking group housing as an example) thus vacant lands where construction has not been started yet, farming is done to contribute in food market. Also the builders constructing flats give open spaces in their colonies for ornamental plants. Thus by giving incentives, raising awareness and promoting interest among people to get engage in urban farming is vital and need for Metropolitan cities.

With population increasing in urban areas the nutritional requirements of this increasing population has to be met. People living in urban areas has very limited or less control over the supply and quality of food thus in this case of urban farming or growing own food can be a possible solution to this problem. Urban agriculture has several benefits. It's not only an efficient and effective tool for making use of vacant unused open spaces in urban areas but also a way for generating income and employment and managing freshwater resources in Metropolitan cities. The benefits are in many dimensions ranging from environmental, social and economical.

Environmental benefits are steps forward towards organic farming and prevention in use of fertilizers and pesticides, farmland preservation, reduction in food miles, water management, climate control etc. Social benefits are that it can be a source of leisure activities in urban life and contribute to psychological health and mental well-being of the society. It can be a tool for keeping food culture and tradition blooming. With people's participation it can also turn out to be an active public space along with enhancing food security in the community.

The urban population in India expected to grow by 404 million by 2050 (World Urbanization Prospects, 2014). In India like any other cities of the world are continuously increasing in size with the increase in population thus it is quite possible in future that the types of land use practices will gradually encroach and engulf into the land which is currently utilized for agriculture.

Water management is suppose to be a major issue in future for Metropolitan cities of India, According to the published report of Indian express of October 2015, Mumbai, the total usable water quantity in all the seven lakes supplying water to the city is 11 lacks million liters, three lacks million liters less than what was recorded in the 2014. Thus the city is currently facing a 15 percent water deficit, which has forced the civic body to continue with the less supply of the required water. Due to water shortage, further degeneration, urban indoor farming can be a way out for ensuring food security in cities as in case of geaponics farmers' use up to 95% less water than traditional farmers for farming thus further resolving issue of shortage of use of water for ensuring food security in the future.

## Vertical Farming a Possible Replacement to Conventional Farming in Future

The food travels in cities from source of production will increase many folds in the future, if this way of dependency of cities for food and nutrition security on rural conventional farming will continue as per today's scenario. In this situation, Metropolitan cities would have to produce their own food. With increasing land prices conventional land farming would not be possible but vertical Farming or Roof Top Farming (called as Zero-Acreage Farming as they are characterized by non-use of land) would be the possible approach and solution for nutrition to Metropolitan cities.



Figure 1: Vertical Farming

## Innovations in Urban Farming

### Urban Green Fate Farms (UGF Farming)

In 2013, Linesh Pillai co-founded **Terra Farms** with Dan Gomes, another farm entrepreneur from Poland, in Manori Island (Malad) and introduced the concept of urban vertical farming. The organization was renamed as UGF Farms in 2017. The Mumbai-based startup converts unused spaces into live

food gardens. Live food gardens are built in a way that they will do no structural damage to buildings during the process of farming. The company sends residents micro-greens in pots, with organic coco peat as opposed to heavy soil to grow. All a user needs to do is cut the greens from the live plant as and when they need them. Under retailing, UGF sells their live micro greens and leafy greens at hyper city, Big Basket and Big Bazaar.



Figure 2: UGF Farms

UGF currently operates in Mumbai, Bangalore and USA. UGF also visits schools and organizations to teach people how they can easily grow their own vegetables in the city.

#### Home Crops

**H**ome crop, founded by four graduates from VITS, Manvitha Reddy, Sharmila Reddy, Sai Krishna and Krishna Reddy, brings urban farming to our backyards, terraces and balconies. The company sets up edible farms for urban households who want to grow their own vegetables. Manvitha began conceptualizing the idea of growing out the best way to grow one's own vegetable needs in an urban setting.



Figure 3: Home Crops

#### iKheti

**I**t is an enterprise formed by Priyanka and her brother around 2011. They began growing herbs at home, plucking chilies and lemons for family dinners. Being an MBA graduate to present a business idea, she determined to use the opportunity fruitfully and combined her love for nature with business skills to conceptualize IKHETI, as an urban farming enterprise.

Today, iKheti has become a full fledged eco-friendly enterprise that facilitates farming among city dwellers with workshops, consultancy and gardening resources.



Figure 4: iKheti

## Conclusion

**A**s per the above study we can analyse the available spaces in Metropolitan cities for vertical farming and less spaces for urban agriculture due to urbanization. Farming have been around since early times for around of thousands of years and they are as essential for our daily lives as it was since early times and will continue to be vital and more demanding in future in one or the other way form providing food to supplying industries with much-needed resources including cotton, hemp and lumber to feeding to the mass urban population of the future.

Urban farming whether it is vertical farming or Z-farming or farming on vacant open spaces, all can be favorable way for ensuring this demand of future in India and Globally. With many countries of Europe, USA and Singapore has already risen to many folds towards this future farming, but in India, still has a long way to go ahead as vertical farming is still restricted to a few individual driven interest projects. With several benefits inherent in this method of farming, it does not need an multi acre farm as it is vertical, it is good for environment as it can be used as water recycle (Some of the most recent vertical farms situated in the United States are also recycling waste material from the cities'- According to

report of Vertical Farming: Enter the Urban Farmer 22 January 2017, 19:00), grown food are completely free from pesticides thus organic and healthy, a more reliant and stable production source as it does not depend on outside environment.

These are few benefits to count thus there is a need of institutional support along with interest in people to participate in it and this is possible by spreading awareness



Figure 5: Creations in Green

of benefits associated with it, strengthening policies like incentivizing farming for making it attractive to the urban dwellers, financial and technological support by government to developers of urban farmers or moving forward to a concept of sharing backyard, so that different communities can be reached in need of space. Urban farming if done safely and properly, it can be used as an effective income generating farming system and seen as an integral part of urban food system.

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