

# Urban Farming: A Preemptive Tactic against Food Scarcity

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**Abstract**—In this period of rapid urbanization, the shift of rural population into urban land demands a larger area and more resources to cater the new crowd which results into urban expansion. In this process of expansion few rural lands and fields will be taken for the purpose of development. This act has a major impact on the production of the most basic necessity of a human, 'Food'. In present context, both rural and urban lands were in sufficient numbers with respect to each other. With the increase in population and declination of cultivation lands, there is a need for balance. A new idea which can help in attaining the balance has been proposed and implemented, referred as 'Urban Farming'.

Currently 'Urban Farming' is not a popular trend in the fields of urban planning or architecture. This is the main purpose of this study, which is to bring awareness to people about the concepts of 'Urban Farming'. This paper highlights the importance, practicability and implementation of urban farming as solution to food scarcity. Case examples from around the globe that can be concluded in an Indian context, have been referred to for a better understanding.

**Keywords:** Food scarcity, land use, sustainability, urban farming, urbanization.

## 1. INTRODUCTION

Urbanization is taking place in every city and town all around the globe. Urbanization statistics of India 2001 states that 28.5% of the overall population lives in urban areas. As of 2013, Indian statistics state that population living in urban areas has gone up to 31.16 percent [1]. This rate of urbanization is slow if compared to other developing nations like Singapore. Urbanization leads to migration of rural population into the urban areas, taking a toll on living conditions of urban settlements. This process of migration also has a major impact on agricultural and food sectors.

The activities that are related to farming like, cultivation of food or cattle grassing are primarily practiced in rural areas which are drastically affected by urbanization. When these farming activities are integrated into the urban scape it is known as urban farming.

The current generation of people have a false perception about this concept of urban farming i.e. A practice done in large

fields for cultivation located between the city blocks, which sounds bizarre. It is not a hard technique or a hi-tech idea which needs lot of area to harvest or implement. From a farmers' perspective, farming is cultivation of crop or animal husbandry, with no regard to the area of land that is required for its practice. As a matter of fact, farmers even suggest that farming gets easier in smaller farms than in larger fields, as everything in a farm is done within the reach of their hand.

## 2. SUSTAINABILITY IN TERMS OF FOOD

All the developing and developed nations across the globe are have raised the issue of sustainability in terms of conservation of energy and resources. Varying from the scale of a building to a city, for example installation of solar panel on a building to establishment of solar panel farms. Global awareness played a crucial role in promoting these concepts of sustainability. The trend of spreading awareness about depletion of natural resources has resulted in use of CFLs and LCDs all contributing towards energy conservation. Use of electricity has decreased in the past few years, this led to a better change in terms of climate, resources and economy. Hence, there is a need for awareness towards the problem of food scarcity and implementation of urban farming.

There is always a collateral or a compromise when there is a change in any scenario. In the present scenario, most of the urban population is compromising with food - A primary need for any human. It would be meaningless to discuss about free electricity and other facilities, when there is a problem of food scarcity in many nations. As long as food is available, it will always be taken for granted by the people who can afford it, with no concern towards it even if it being out of synthetic materials.

In earlier time before urbanization took place, the food sector was sustainable as there was no need for extra resources for preservation or refrigeration to keep the food fresh. As urbanization took place and population in urban areas increased, there is increase of demand for food in the urbanized areas. For example, if the urbanizing/urbanized region is far from the production region, then the demand for

food will escalate with rise in the population, thus the stress on the food requirement is greater. Urban farming can help in improving the quality and the quantity of food production by bringing back the culture of - cultivate, cook and consume within the same neighborhood.

### 3. ALLOCATION OF AGRICULTURAL LAND WITHIN THE CITY

Looking into the statistics by Data from World Bank (2013), for the past decade agriculture is being allocated up to 60 percent of the total area of the country as seen in the Fig.1. [2] Also being the second most producer of food in the world after china, half of the country still suffers to the problem of food scarcity. And most of the food the country consumes is imported.

Revenue, economy and resources are few of the major factors on which land use distribution is based upon. Core comprises of land that can generate revenue and provide economy, to serve this purpose we either allocate it to commercial or institutional use and it positively effects the development of the city. The core attracts population not only from outside even from within the city. The new population growth demands an expansion in the area, which can only happen by pushing the outer land further more away, which results in encroachment of agriculture land.

As discussed the missing connect between 'urban' and 'agriculture' effects the prices of the food. All the current generation farmers living in the city with their farms located away from the city, transportation expenses will increase in addition to that, the transportation charges to bring the food into the cities should also be considered. The farther the food supply comes from, the costlier it gets. To make a living in the urban context, increasing the price of the food is the only choice that a farmers has.

Urban farming resolves the issue as the farms are located within the urban locality, the demand for transportation will decline as all producing, buying and selling are done in the same locality keeping the crop fresh and always available at any place throughout the year.



Source: (T. W. B. 2016)

Fig. 1: Showing the decline of agricultural land in India.

### 4. SCENARIO OF AGRICULTURE SECTOR

Agriculture, once a common practice, is completely detached from industrialized cities. Corporate monoculture farms dominate the rural landscape and have led to a distinct separation between food producers and urban consumers. As a result, food security and availability of fresh food in generic price is a problem in cities across the nation. Growing environmental and social concerns with our current food systems have caused citizens, policymakers, and entrepreneurs to reconsider this contemporary disconnect between "urban" and "agriculture". [3]

With the low incomes, and change in the land use to the industries the current generation of farmers are losing interest in the field of agriculture. With this scenario going on, the art of farming will be a lost in time to period of rapid urbanization.

According to a survey conducted by Registrar General of India & Census report 2011, most farmers in rural areas are ready to move to cities (as in Fig.2) and quit farming has been a tradition for majority of farmers as shown in (Fig.3). Most farmers are ready to quit farming (Fig.4) for only reason of the low income that is earned. Surprisingly, majority of the farmers do not want to give up farming (as in Fig.5). They are not able to afford the very food they produced when it is sold in an urban market.

For implementing this idea of urban farming, people will require a particular set of equipment to establish it. Cities like Delhi and Hyderabad have been trying to promote this idea, but it failed due to lack of awareness. In these cities local municipal authorities have been supplying farming kits for cheap which can last for a span of three months per farm. The kit contains all the required seeds, fertilizers, soil and other necessary requirements. [4]

The analysis of the survey conducted by Registrar General of India & Census report 2011, is given below [5]:

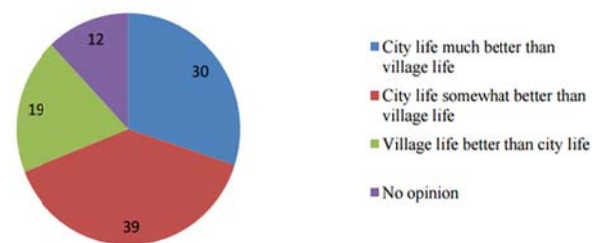


Fig. 2: In that survey most of the farmers think that city life is better than villages (In %)

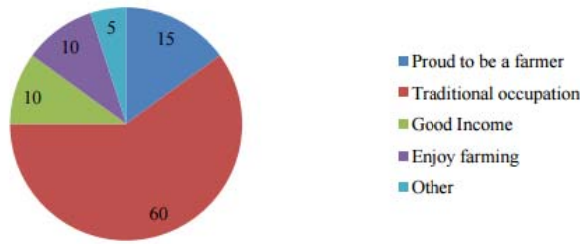


Fig. 3: Reason of liking farming (in %)

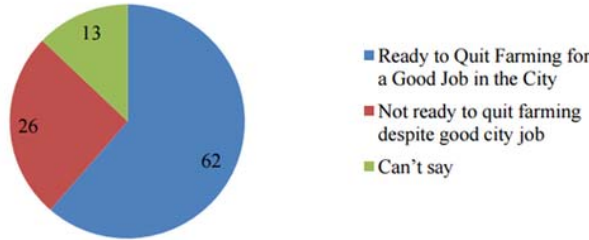


Fig. 4: Around 62% farmers are ready to quit farming if they get good job (In %)

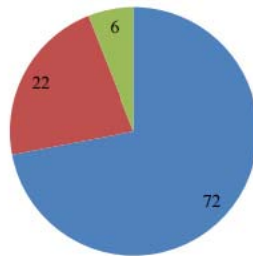


Fig. 5: Farmer Interest in farming (in %)

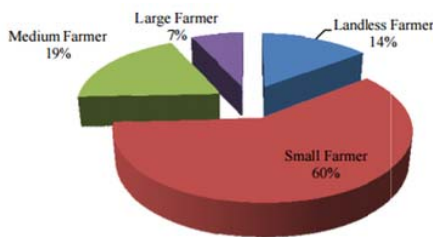


Fig. 6: Farmers by land ownership (In %)

5. SCENARIO OF DEMAND AND SUPPLY OF FOOD

Production of food is also increasing with increase in population, but the quality is being compromised. Many people have very less concern about the food they intake. The most recent example to support the statement is a video named 'Fake Cabbage' that has gone viral on the social media, it showcases a Japanese worker at a plastic food factory making cabbage. The man uses chemicals and wax that are floated in water before being formed into the correct shape. There would

be an adverse effect on the human body in case of consumption of such vegetables.

The requirement for food is not only to fulfill a human's hunger, the nutrients it contains play a very vital role in the development of the human body. This idea of manufacturing vegetables instead of growing vegetables is a result of lack in time, area and man power that is necessary for cultivation of enough crop to cater the growing population.

Cities have rapid urbanization taking place expanding their peripheries by reducing the cultivation lands. When the area of cultivation decreases then obviously the production decreases, which costs for more time for production in greater quantities. This leads to increase in demand of the product, which gives the retailers a chance for increasing its cost of selling, and making it non affordable to the local population.

6. WHY URBAN FARMING?

In the present time, architects and planners are trying to achieving sustainability in terms of conserving nonrenewable energy whereas major concern of food is not considered till date. Implementing many techniques of which green roofs and urban gardens are often playing a major part. These are the green areas having plants and grass, it don't necessarily need to produce food. On the other hand urban farming means cultivating food and also taking into account, animal husbandry. Urban farming can be considered as an upgrade to the concept of urban gardening, people often confuse between the two.

Both urban gardens and urban farms have a few common advantages as mentioned below;

- Keeping urban lives close to nature.
- Regulates the micro climate within the site and its surroundings.
- Reduces the urban heat island.
- Plants consume lot of carbon, hence reducing the carbon foot print.
- Improves the recreational areas.

Apart from the points mentioned above, urban farming in particular has its own unique and major advantages, apart from the listed above;

- Continuous supply of fresh food within the city.
- Easy access to fresh food without any major transportation.
- Creates the possibility for employment and opportunities.
- Improves economy when certain priority is given.
- A good measure for harvesting energy and resources.
- Leads to a healthy urbanization.

- Keeps the practice of farming alive.
- A sustainable process in terms of food security.

Urban farming includes animal husbandry which allows to practice poultry and dairy within the municipal limits. Making nutritious food available and affordable for all the categories of people living in an urban area, also reducing the use of preservatives or vehicles for transportation.

## 7. CASE STUDY - GOTHAM GREENS, NEW YORK

Gotham Greens is a 15,000ft<sup>2</sup> hydroponic rooftop business in Brooklyn, New York (Fig.7). The project cost over \$2 million to construct and the farm opened in April 2011. The greenhouse is partially powered by 6,000sf<sup>2</sup> of photovoltaic solar panels, reducing electricity needs. The rooftop greenhouse, designed, built, owned and operated by Gotham Greens, measures over 20,000 square feet and grows over 200,000 pounds of fresh leafy greens, herbs and tomatoes each year.



Fig. 7: Gowanus, Brooklyn, NYC

Gotham Greens was partially financed with a \$400,000 grant from the New York State Energy Research and Development Authority for its energy production and innovative approach to local food systems. Gotham Greens is partnered with 28 local groceries and restaurants. Gotham Greens maximizes revenue by signing contracts that guarantees that their produce will be purchased at a fixed rate. The greenhouse produces 100 tons of leafy greens annually and it is all rooftop hydroponic agriculture [6].

Gotham Greens is an innovative company that has seen success in their first year of operation. Their specific financial figures are not public, it has secured millions of dollars to expand which indicates venture capitalists see a profitable future in the industry. According to the company Vice President even in its first year it secured funding to open two more greenhouses in the near future. These next projects will be larger, 44,000sq.ft and 120,000sq.ft (Fig.8), in order to improve efficiencies of scale.



Fig. 8: Green point, Brooklyn, NYC

Hydroponic systems (Fig.9), are one of the new practices in the fields of urban farming where plants are grown without the use of soil as shown in Fig.10. Plants receive all the essential nutrients from a nutrient-rich water-based solution. There are a variety of hydroponic methods in which plants can either grow in a non-soil medium or directly in the solution. These operations are systematically controlled and therefore tend to produce higher per-acre yields than conventional farming. Within the past few years this method has been used in urban environments to improve access to fresh food. Urban rooftops are an ideal location for because they have better access to sunlight compared to the ground level. Furthermore, leasing space at top of a buildings is often cheaper and more available than on the ground level.



Fig. 9: Hydroponics

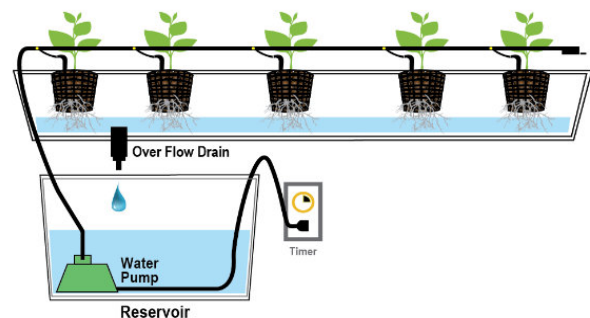


Fig. 10: The Technique



## 8. CONCLUSION

The future vision for India are the 100 smart cities proposed by the government, the project is on a verge to be developed as soon as possible. Sustainability is taken as thrust area for designing these cities without having major concern towards food production and supply. If the concept of urban farming is to be incorporated into these smart cities, it would be a great platform to analyze the impact of urban farming and its benefits in terms of food production and energy harvesting. In fact, with all the technological advancement being implemented into these cities, urban farming can be incorporated and adopted with ease.

As the problem of food scarcity is increasing it is important for this generation architects to set priorities and work around the concepts of urban farming. Implementing urban farming into a building can be simple, for example when a large field is broken down into smaller farms then there will be a possibility to incorporate them into the building, in form of small green areas. Architects and planners hold the key for this concept of urban farming to be incorporated successfully into the buildings and into the society.

As discussed in the case large quantities of food can be produced just by allocating 25% of the overall area for urban farming, including the open areas that are left out according to the byelaws. Urban farming gives hope for people who want to continue the profession of farming and still experience the urban lifestyle. Farmers migrating from the rural areas can be employed to take care of the farm, as it is hard for the people of the city to take care of job and farming simultaneously. It creates an opportunity for employment - A job for a single farmer in an urban farm will supply fresh and nutritious food for ten people or two families living in the city.

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