Prospectus and Challenges of Urban and Peri-Urban Agriculture in India

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Introduction

In worldwide, number of people living in cities has grown from 746 million in 1950 to 04 billion in 2015, more than a five-fold increase and is predicted to keep expanding during the ensuing decades. By 2050, the current urban populations of low- and middle-income economies are expected to more than quadruple and triple, respectively (United Nations, 2015). The world's requirement for food, freshwater, land, and other vital natural resources (biodiversity) is always growing for expanding populations, particularly in large cities. The increasing need for food and water is the most frightening of these (Dhyani and Thummarukudy, 2016). People who live in rural and peri-urban parts of the nation are impacted by metropolitan areas in different ways (Nagendra *et al.*, 2013).

India's fast-growing tier two and tier three cities, as well as megacities like New Delhi, Mumbai, Chennai, and Bangalore, are predicted to have a large population and face significant issues in ensuring urban food supply and nutritional security by 2030. India's urban population is predicted to grow dramatically from 377 million in 2010 to 600 million in 2030. Thirty-eight cities are situated in naturally seismic and sensitive zones, making them more vulnerable to both natural and man-made disasters, according to the Vulnerability Atlas of India (Kumar and Walia, 2012). India makes about 14.00 per cent of the urban population. (Dhyani *et al.*, 2018; Kundu, 2011) in five megacities with a population of more than ten million, and is predicted to increase to seven megacities by 2030 (UN Habitat, 2010; Taubenböck *et al.*, 2009). Additionally, India has 53 expanding urban sprawls with a population of over a million as of 2011, up from 35 in 2001 (Census, 2011).

In India, rapid urbanization has also resulted in complicated changes to the local ecosystem, economic growth, and social problems (DeFries and Pandey, 2010). Urban areas have abnormally enormous biological, carbon, and water "footprints," which have complex, pervasive, and frequently unanticipated effects on ecosystems. Therefore, it is visible that tremendous need to develop and progress urban and peri-urban agriculture for ensuring national food security and per capita availability of food in India.

Types of Urban Agriculture

Urban Agriculture: It includes the cultivation, processing, and distribution of agricultural products (food or non-food) in urban and suburban areas. Urban farming can provide environmental, economic, and social benefits to the surrounding communities. (USDA, National Digital Library). Any urban crop, vegetable, or flower production that employs low external input sustainable and climate adaptable agriculture (LEISAA) is referred to as Urban Agriculture. it occurs in a variety of forms, such as home gardens, kitchen gardens, rooftop cultivation, urban farm-based cultivation, and green space cultivation (Walters and Midden, 2018).

Peri-urban Agriculture: can be defined as practices that yield food and other outputs through agricultural production and related processes (transformation, distribution, marketing, recycling...), taking place on land and other spaces within cities outskirts and town regions. (FAO)

Subtypes under Urban and Peri-Urban Agriculture

a) **Kitchen garden:** Small scale cultivation in the backyard for daily consumption purpose
b) **Roof top garden:** Cultivation of vegetables and herbs on the roof top of houses
c) **Vertical farming:** Stacked plastic or iron layers used to grow vegetables or greens
d) **Street landscape:** Vacant areas of public roadsides, median are utilised for growing crops
e) **Greenhouse agriculture:** Small to medium areas with greenhouse infrastructure for vegetables and fruits cultivation
f) **Wasteland agriculture:** Abandoned lands, waste barren land properties utilized for agriculture
g) **Container garden:** Using plastic containers, pots, waste materials to utilize it growing small veggies and greens
h) **Hydroponics:** Soilless agriculture using nutrient rich water for growing crops
i) **Beekeeping:** Maintaining honey bee colonies near flower crop fields

j) **Small ruminants:** Growing poultry, sheep, goat for selling or subsistence

k) **Mushroom:** Edible fungi can be grown systematically in urban areas using mother spawn

Rationale behind Urban Agriculture

1. The urban populace hiking and is expected to grow by 404 million by 2050.
2. Increased nutritional requirements and awareness of urban people.
3. Increased specialised demand for vegetables, fruits, eggs, meat, dairy and flower products.
4. There is considerable nutritional insecurity as reported by M. S. Swaminathan research foundation in the urban and semi-urban areas.
5. Farmers growing crops in rural areas with increased pesticides and diseases control chemicals for fetching better yield and prices in the urban market.
6. To get fresh products within city limits and promote better health.
7. Better utilization of available resources and small land resources to stay active and cultivate productive things.
8. Easy operations and act as a subsistence or second source of income.
9. Wider application of treated waste in the urban agriculture.
10. Utilization of kitchen wastes into compost making for agriculture.

Challenges and opportunities

In our nation, food and nutritional security is always associated with rural context but the reality is that food and nutritional security of dwellers is convinced by many reasons including non-availability of food, price fluctuations and poverty. (Radhakrishna and Reddy, 2004). Currently, the nation's megacities and other expanding urban agglomerates are dependent on an external food supply that originates from rural or peri-urban locations distant from these urban centres.

In particular, food security in India's expanding sprawls would be severely impacted by the country's fast expanding infrastructure and population. In order to improve urban food production and attain food self-sufficiency, the decentralized/local food production system, or Urban Agriculture, is gaining traction.

Land unavailability, Soil contamination, Water Management, Regulatory Hurdles, Lack of Infrastructure, and Access to Resources are the major challenges as reported in the urban agriculture and its various forms (Krishnaveni *et al*, 2024)

Reduced food miles have the potential to provide indirect environmental advantages, which can aid in the decarbonization of the earth (Specht *et al.*, 2014). According to the Food and Agricultural Organization of the United Nations (FAO), urban and peri-UA practices support domestic food production, nutritional security, employment, better urban ecology and sanitation, and poverty alleviation for sustainable urban development (Zezza and Tasciotti, 2010).

Major Problems

1. Inadequate availability of land in the fast-growing urban cities in India.
2. On the outskirts of many cities agricultural land is either converted for commercial purposes or bought in the anticipation of a price hike.
3. In many scenario farmers have become labourers and farming area has become unaffordable in peri urban areas and even in villages.
4. Illegal conversion of farming land into construction sites where the government fails in that crucial step of preventing those things.
5. High initial investment and infrastructural facilities make them to take step backwards in the process of urban agriculture.
6. Large water requirement for the agriculture process is a biggest hurdle in the mega cities as it demands more for daily consumption purpose for people.
7. Unsystematic and over-adoption of chemical pesticides and fertilizers can create detrimental effects and impact on the soil, water and environmental.
8. Pollution is higher in urban areas than rural areas as it creates bad impact on health and not considering to purchase the products which is from urban agriculture.

Suggestions for developing urban agriculture

1. More attention on academic curriculum regarding urban agriculture.
2. Conducting research and development programmes to develop the insights into it.
3. Not only narrowing the studies to discover multifunctionality and also to identify land secured ownership, special groups and government support.
4. Research on developing climate resilient smart cities in the country.

5. To identify the challenges and problems encountered by the different types and subtypes of urban agriculture under various socioeconomic contexts.
6. To develop better policies towards urban farming and its kinds.
7. Conscious awareness creation to make it as livelihood diversification.

Conclusion: A Way forward

In India's constantly expanding cities, urban and peri-urban agriculture has enormous potential to improve urban food and nutritional security. Incorporating food production into city planning can lessen vulnerabilities in the food supply and increase access to wholesome, fresh vegetables as urbanization picks up speed. Future plans for urban expansion should include areas set aside for peri-urban production zones, community gardens, and rooftop farming. Scaling these approaches will require policy support in the form of financial incentives, technical help, and urban land-use planning. Sustainability can be improved by supporting resource-efficient and climate-resilient technologies like trash recycling, hydroponics, and vertical farming. Urban households and entrepreneurs can participate more widely if research, extension services, and public awareness are strengthened. Urban agriculture may play a significant role in creating resilient, sustainable, and self-sufficient cities in India with the help of inclusive policies and supporting government.

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