Challenges of Food Security and Increasing Urbaniztion: Reliance on Peri-Urban Agriculture (PUA)

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ABSTRACT

As the world population is growing rapidly and urbanization is increasing, food security is becoming a major challenge. Accessibility, Affordability and Availability of food are the three core aspects of food security. Peri-Urban agriculture (PUA) can become an important source of nutritionally adequate and culturally acceptable food for urban populations. However, the problems like limited recognition, land conversion, water pollution and increasing competition from other sectors for limited natural resources pose a threat to the potential of PUA to contribute to urban resilience. Tackling food security needs analysis of all the different levels of a food system such as food production, processing, distribution and consumption. When assumed, high awareness of healthy food in PUA-derived markets, the loss of locally produced and highly perishable food is reduced due to shorter supply chains thereby contributing to the reduction in overall food waste. According to the projection, India's urban population would increase by a total of 400 million by 2050. Using peri-urban regions has emerged as the need of the hour, and innovations like vertical farming and hydroponics both contribute to an increased availability of nutritious food. Urban and Peri-Urban Agriculture (PUA) are generally not a choice; they are means of survival, providing people not only with food, but also a living. The abstract concludes by suggesting that peri-urban agriculture has the potential to contribute to a sustainable and resilient food system in the face of global challenges.

Keywords: Peri-Urban Agriculture, Urban Agriculture, Food Security, Urbanization, Supply Chain, Vertical Farming, Hydroponics

Introduction

Food production is not only constricted to Rural areas but ordinarily occurring in the cities and their boundaries. The attention to contribution of urban and peri urban agriculture has been grown, but it remains undervalued. Peri-urban areas are transition zones located between urban and rural areas, characterized by a mix of agricultural and non-agricultural land uses. PUA is a critical component of food security in many urban areas, providing access to fresh, nutritious, and affordable food. Urban agriculture is another alternative to peri-urban agriculture

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that can contribute to food security in cities. It refers to the production of food within urban areas, including backyard gardening, community gardens, and rooftop farming (Smit et al., 1996). However, urban agriculture alone cannot meet the increasing demand for food in urban areas. The increasing demand for food in urban areas has led to the expansion of peri-urban areas worldwide. PUA is a vital source of income for peri-urban farmers and provides food to urban populations. Moreover, the peri-urban agriculture is capable to shorten the carbon emissions and magnify the carbon sequestration, thereby alleviating the effects of climate change. However, PUA faces several challenges, including land-use conflicts, water scarcity, environmental pollution, and inadequate infrastructure.

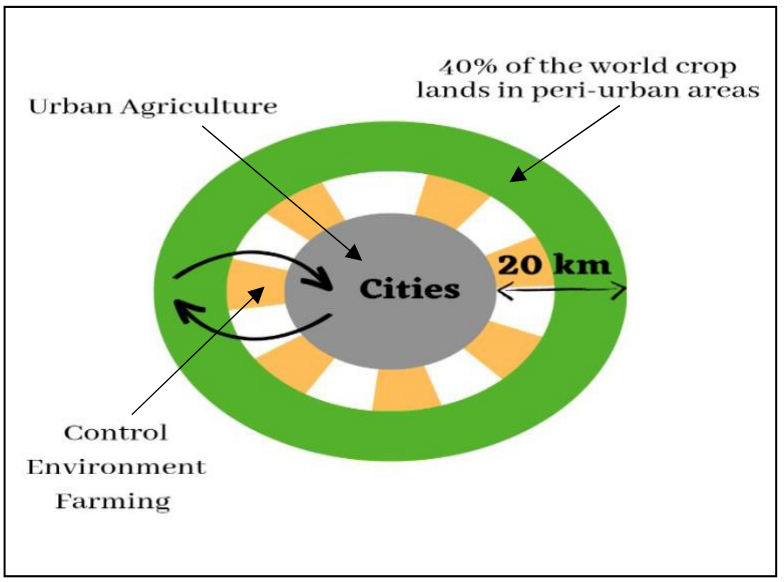

Figure 1. Location of urban agriculture (UA), peri-urban agriculture (PUA) and control environment farming

Background Information

The world population is growing at an alarming rate. Most of this population growth is centralized in urban areas and cities. Although many of those presently residing in cites, are facing the problems of malnutrition, Impoverishment and food insecurity in developing countries in the Global South.

The concept of urban and peri urban agriculture (UPA) refers to an industry located within or on the fringe of an urban area, using in-situ services, products and human as well as natural resources, to grow, to process and for distribution of agricultural products (FAO/WB,2008). For addressing the challenges of food security, the government has taken initiatives by providing the promising policy

entry points to help the development of urban and peri urban agriculture.

National Land Utilization Policy

The goal of the national land utilization policy is to achieve improvement of livelihood, food and water security, and best possible realization of various developmental targets so as to ensure sustainable development of India, which also includes protection of agricultural lands from land use conversions so as to ensure food security and to meet consumption needs of a growing population and to meet livelihood needs of the dependent population. (Draft: National Land utilization policy, framework for land use planning and management, July 2013.)

Necessity of Peri-Urban Agriculture

With increasing urbanization and its population in the intermediary zones overlapping urban and rural areas the increasing food demands have to be met. The people residing in these areas are normally engaged in the agro based ventures, livestock cultivation and fishing. Therefore, the peri urban agriculture offers a fundamental strategy for building the resilience of a city's food supply.

The peri urban agriculture provides a source of fresh and healthy food for urban populations. There is an increased demand of food in urban areas with increase in population. In addition, due to reduced transportation time and distance between the production and consumption points, the carbon foot prints of food can be reduced and the fresh produce can be supplied.

PUA can provide the employment opportunities for both skilled and unskilled labor, and simultaneously it helps to individuals who have been displayed from rural areas or are unable to identify the employment in other sectors. Therefore, PUA is necessary approach to meet the increasing demand of food, to overcome the impact of climate change and for creating the employment opportunities as well as to promote the food security.

This review paper examines the various aspects of peri-urban agriculture, including its benefits and challenges, and discusses its potential as a sustainable solution for food security and increasing urbanization. The review also provides a critical analysis of the existing literature on peri-urban agriculture, highlighting the gaps and opportunities for future research.

Materials and Methods

Case Studies

The case study revealed the dynamics of Urban and Peri-urban agriculture in three major Indian cities, namely, Delhi, Mumbai and Hyderabad. The main

focus is on the assessing the extent to which peri-urban agriculture facilitate food production and its impact on sustainability and well-being outcomes through food security in urban areas. Along with, it's also examined on the area utilization pattern, reasons and sources of motivation, models adopted, constraints and opportunities in urban and peri-urban (UPA) agriculture of diverse metropolis of India.

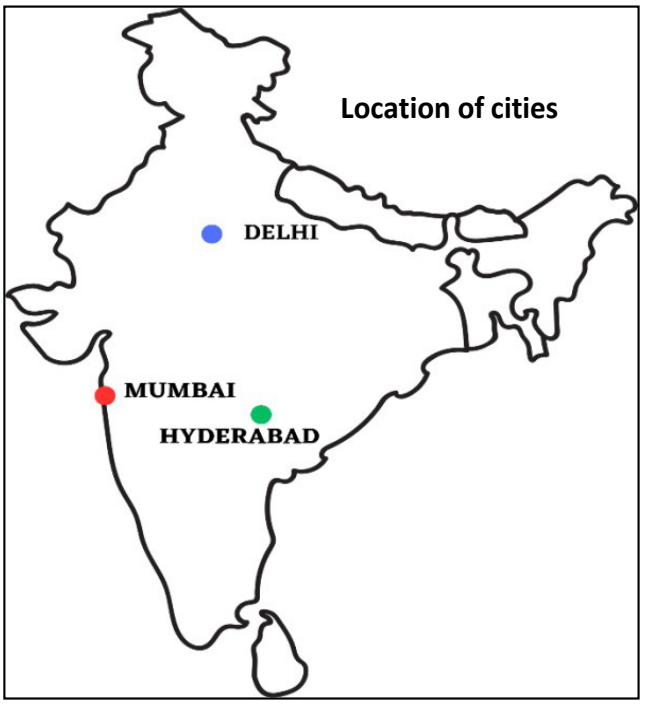

Figure 1: Location of the three cities on the map of India

Delhi

In administrative context New Delhi is the capital of India and a part of the National Capital Territory (NCT) with dense population of about 16 million (Census of India 2011) and geographically 'Yamuna' river and the Najafgarh drain water is the most significant water sources of irrigation for this whole region in purpose to carried out agricultural practices (Neelam et al.,2019) but, future is vulnerable due to lack of Government support and development of metro station along Yamuna bank (Harmanjot and Anuj, 2020).

The ten spots (Palla, Christian Ashram, Jagatpur, Wazirabad Barrage, Indraprasthan Power Station, Okhla Barrage, Noida and Basantpur) lies nearer to industrial area of Delhi, which are core source of contamination of water. Due to discharge of industrial effluents into the river increase level of metal contamination (Cd, Cr, Cu, Ni, Zn and Pb) which leads to accumulation of heavy

metals in soil which ultimately enters the vegetables, fruits and varied crops growing in fringes of the city and become constraint to nutritional security of urban residential (Arghya et al.,2015).

The study was conducted in the peri-urban environment of Faridabad city of National Capital Region (NCR) which undergoes land use transformation were the urbanization the key factor for catalyzing changes in land uses, land transactions, increased rural-urban migration and the overall transformation of land uses in peri-urban areas (Neha et al, 2011). associated air pollution threatens urban and Peri-urban (UPA) food production and its quality through gaseous air pollutants, particularly Sulphur dioxide, nitrogen dioxide and secondary photo- chemical oxidant, ozone (Agrawal et al; 2003). Recently, the issues in the peri-urban settlements shifted to new domains, including that urban agriculture, sustainability and even more importantly provision of urban infrastructure with related water management, energy management and waste disposal (Ravindran et al.,2011).

Concept of waterscape is to capture urban hydro-social flows continues to be theoretically and conceptually relevant in pointing out the interconnectness of economic, political, cultural and social processes embedded in water (Swyngedouw et al., 1999). Peri- urban Delhi, specifically the area around Ghaziabad, presents four keys 'problems' in terms of the conceptualization of waterscapes. The Peri-urban waterscapes do not fit into existing policy and planning models. They represent territories in-between urban and rural which are more than a simple mixing of the two (Wandl and Rooij, 2014). peri-urban spaces are seen as problematic and in a transition state towards a greater urban modernity by policy-makers. Still, they remain permanently and persistently in-between, because this serves the power dynamics between the poor and politicians, middle class employers and their laborer's (Lyla et al.,2015).

Mumbai

Mumbai, known as the commercial capital of India, becoming the fourth largest urban agglomeration in the world (Krishna and Govil, 2005; United Nations, 2010) having 9 million slum population (Census of India 2011). Result, to 'Urbanization of Poverty' characterized with poor provision for housing, water, sanitation, health, education and social security (UNDP, 2009).

Migration is an acute issue in Mumbai Metropolitan Region (MMR), Urban and Peri- urban (UPA) production in MMR play corner stone role in providing income generation through plenty of opportunities for migrant people and hence reduce urban poverty. To promote peri-urban (UPA) agriculture production (Harmanjot and Anuj, 2020) and create employment opportunities

Indian Railway started the "Grow More Food" with a motto to produce fresh vegetables near railway tracks of Central, Western and Harbor line to meet daily demand of urban people (Vazhacharickal and Buerkert, 2013).

The UPA in Mumbai started with Dr. Doshi's garden methods convenient to reduce spaces such as balconies and terraces which depends on locally available sugarcane waste, polythene bags and household organic waste. Mumbai Port Trust (MBPT) through the rooftop farming distributed fresh and healthy food to 3,000 employees per day (Chaitra and Amit, 2020).

Hyderabad

The Greater Hyderabad Area (GHA) is among south India's fastest growing urban conglomerations. With population of 6.8 million people (Census of India, 2011), has adopted an "infrastructure-led growth model" (Kennedy 2007).

The urban and peri-urban agriculture is the new trend that catching up in the city because of that more than 400 households in outskirts of the city currently self-reliant for vegetable needs of the family (Pranita et al. 2013). Due to increased access to information and extension advisory services of the Urban Farming Division (UFD) of Horticulture Department on implication of "terrace gardening" now urbanites have been habituated to work in garden as it gives a soothing impact from their "Business as routine" (Vincent and Suchiradipta, 2019). So, UPA can address food security and nutritional security of the urban and peri-urban dwellers (Veenita and Shirisha, 2022). Still there some constraints like crop choice, intensity of production, environment impact, water shortage in the urban fringes, nitrogen leaking, accumulation of chemical residues in farm produce and technologies in use in peri-urban farming. Through, studies on pesticide residues, reported high residual level in ground water in Hyderabad (Shukla et al, 2006). To overcome these challenges the policies in support to peri-urban farmers should not try to slow down on-going structural changes due to environment fluctuation because it's support leads to foster the supply of nutritional produce to urban people.

Conclusion

Peri-urban Agriculture also known as Multifunctional agriculture not only has the primary role of producing food and fiber but also functions in other dimensions as well. In these fringe areas of cities, the ventures of agriculture and its allied sectors can grow and propagate so as to ensure the food security in the urban areas. Not only this but it also helps in generation of employment for migrant people who have migrated from their homes (rural areas) to the urban areas in search of jobs. In conclusion, urbanization poses a significant challenge

to global food security, and peri-urban agriculture is a critical component in addressing this challenge. However, PUA faces several challenges that threaten its sustainability and ability to provide food security for urban areas. Still the actions by government, Private sectors and people as a whole need to be taken to proceed forward with the food security issues in both urban and peri urban areas of developing countries.

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