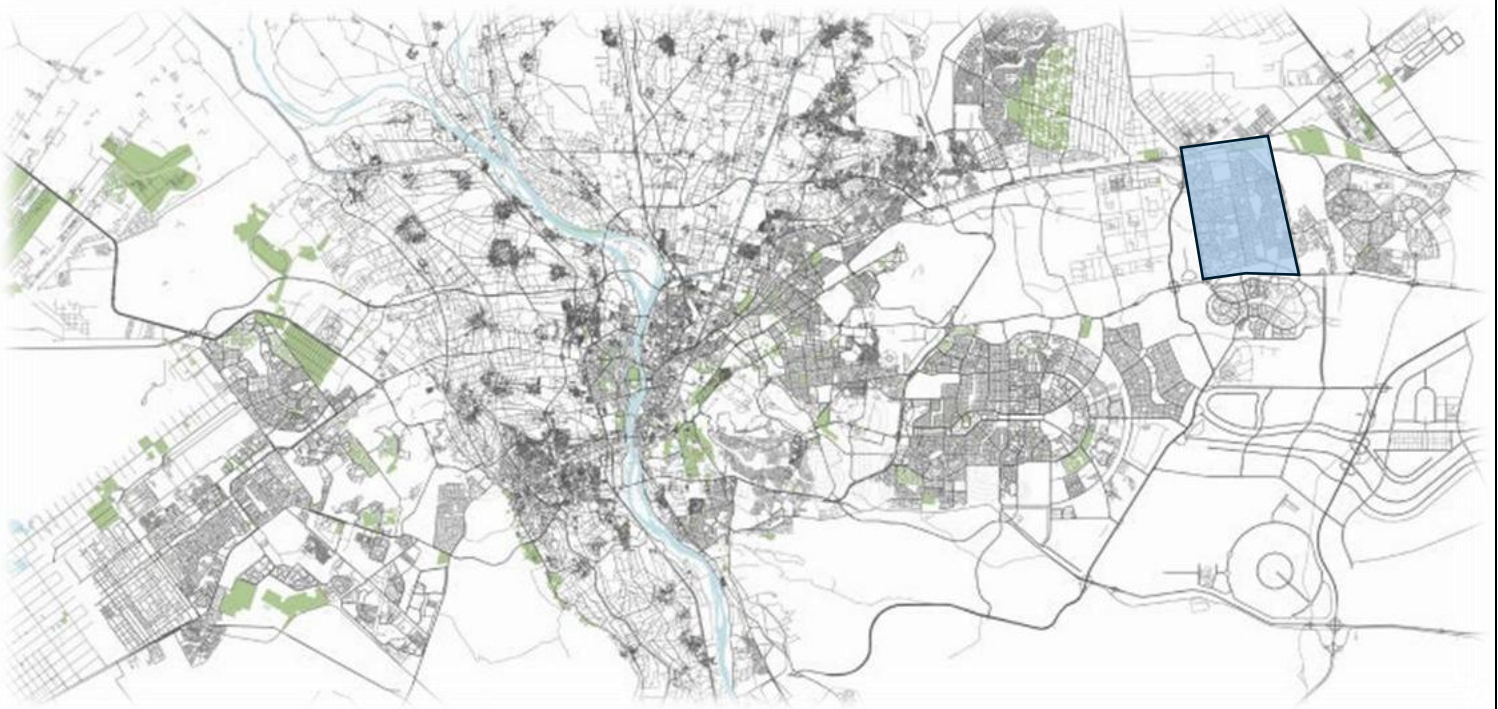




**Politecnico
di Torino**

Master's degree program in
Territorial, Urban, Environmental and Landscape Planning



**Urban Agriculture as a Multifunctional Solution to Urbanization
Challenges:
The Case Study of El-Sherouk City in Cairo Metropolitan Area (EGYPT)**

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Contents

ABSTRACT	4
Abbreviations	7
Jargons and Key Terms	7
CHAPTER ONE: INTRODUCTION AND PROBLEM CONTEXT	9
Chapter Structure	9
1.1. Introduction	10
1.2. Objective	14
1.3. Problem Context In Egypt	15
1.4. Research Questions	24
1.5 Aims and Expected Outcomes of studying the implementation of the project on El-sherouk city	25
1.6. Research Structure	27
1.7. Research Methodology Chart	31
Conclusion	32
CHAPTER TWO: “THEORETICAL STUDY” URBAN AGRICULTURE LITERATURE REVISION “BETWEEN THEORY AND PRACTICE”.	33
Chapter Structure	33
2.1 Defining and Contextualizing Urban Agriculture	33
2.2 Urban Agriculture Concepts and Practices.....	35
2.3 Types of Urban Agriculture	39
2.4 Benefits of Urban Agriculture	66
2.5 Challenges and Criticisms	70
2.6 Global North and Global South Perspectives on Urban Agriculture	71
2.7 Conclusion on Theoretical Studies	85
CHAPTER THREE: RESEARCH METHODOLOGY.....	89
Chapter Structure	89
3.1 Theoretical Framework.....	89
3.2 Why Al Shorouk City Was Selected for Urban Agriculture Implementation	89
3.3 Analytical Study: inspirational Case Study Analysis	90
3.4 Selection Criteria for Choosing Urban Agriculture Inspirational Case Studies	91
3.5 Empirical Study: A Proposed Model for Al Shorouk City	96

3.6 Significance of the Study	97
CHAPTER FOUR: “ANALYTICAL STUDY” INSPIRATIONAL CASE STUDIES.	98
Chapter Structure	98
4.1 CASE STUDIES OVERVIEW	99
4.2 A Comparative Analysis in Detail	104
4.3 Challenges & Solutions	112
4.4 Final Comparison Analyzing of The Case Studies	113
4.5 Conclusion : Implications for Cairo’s El-Shorouk City.....	114
CHAPTER FIVE EMPIRICAL STUDY ON UA IN EL-SHEREOUK CITY -POTENTIAL, CHALLENGES AND RECOMMENDATIONS.	115
Chapter Structure	115
5.1 Introduction	115
5.2 The Potential of Urban Agriculture in El-Sherouk City	116
5.3 El-Sherouk City: Contextual Analysis for Urban Agriculture	119
5.4 Feasibility Analysis for Potential of Urban Agriculture in El-Sherouk City.	125
5.5 SWOT Analysis	129
5.6 Strategic Recommendations for Implementing and Scaling Urban Agriculture in El-Sherouk City	130
5.7 The Project description.....	132
5.8 Conclusion	143
CHAPTER SIX: Conclusion	148
6.1 Discussion of Key Findings.	148
6.2 Conclusion and Policy Recommendations For Local Authorities:.....	150
6.3 The transferability of the Findings:	152
6.4 Answers to the research questions	153
6.5 Future Research Recommendations	156
REFERENCES.	158
Chapter 1	158
Chapter 2	159
Chapter 3	170
Chapter 4	171
Chapter 5	174

Figure 1 Cairo population over the years Source: https://worldpopulationreview.com/cities/egypt/cairo	16
Figure 2 Graph Shows the rural and urban population of Egypt	18
Figure 3 Egypt Top-Down Authority Structure Sources: Elaborated By The Author	20
Figure 4 Urban Agriculture Types Elaborated By the Author	42
Figure 5 Benefits of Urban Agriculture Elaborated By the Author	66
Figure 6 The new “rooftop farm” on the FAO terrace in Rome. Source : New “rooftop farm” at FAO highlights how innovative technology can help safeguard agro-biodiversity	73
Figure 7 Key Selection criteria Elaborated By The Author	91
Figure 8 Key Selection criteria Elaborated By The Author	98

Graph 1 the decrees in the green spaces in Cairo Between 2013 and 2022 elaborated By The Author Based on data from Source: Green spaces in Cairo, a cartographic study 2013-2022 Man and the City for Humanities and Social Research 2022	17
Graph 2 Egypt's global rank in air pollution source : According to Egypt Air Quality Index (AQI) and Air Pollution information IQAir	23

Map 1 Cairo All Metro lines after completion Source : https://www.railwaygazette.com/data/cairo-city-map/54070.article	19
Map 2 Arial View Show the difference in the green spaces between al Alsherouk City representing City Built by the Government and Madinity City Built by Private Sector Source: Generated by the Author using Google Earth Software	21
Map 3 location of the 5 case studies on Economic classification of the world's countries and territories by UNCTAD in 2023	99
Map 4 Masterplan of Alshorok City "to be translated into english."	124
Map 5 the location of Golf neighborhood.	132
Map 6 Golf neighborhood morphology.	133

Table 1 Comparison between different types of urban agriculture according by location Elaborated by the Author.....	47
Table 2 Comparison between different types of urban agriculture according by scale of production Elaborated By The Author	51
Table 3 Comparison between different types of urban agriculture according by methods and technologies Elaborated By the Author	55
Table 4 Comparison between different types of urban farmers Elaborated By The Author	63
Table 5 Comparison of Impacts Benefits Of Urban Agriculture Elaborated By the Author	69
Table 6 Comparison Between the UA in Global North and Global South Elaborated By the Author .	85
Table 7 Final Comparison on Chapter Two: Theoretical Studies Elaborated By The Author	88
Table 8 Selected Inspirational Case Studies From Global North and Global South Elaborated By The Author	95
Table 9 Final Comparison Analyzing of The Case Studies Elaborated By The Author	114
Table 10 Stakeholder Mapping and Analysis Elaborated By the Author	138
Table 11 Evaluating the Effectiveness and Sustainability of Urban Agriculture in El-Sherouk City. .	141
Table 12 Challenges and Limitations Encountered in Implementing and Maintaining Urban Agriculture in El-Sherouk City.	143
Table 13 Recommendations For different Challenges Elaborated By the Author	148

ABSTRACT

This thesis, "Urban Agriculture as a Multifunctional Solution to Urbanization Challenges: The Case Study of El-Sherouk City in Cairo Metropolitan Area (Egypt)," explores how urban agriculture (UA) can help address the complex challenges brought about by Egypt's rapid urbanization. Using El-Sherouk City—one of the new cities in the Greater Cairo Region—as a case study, the research investigates the practical applications and expected benefits of integrating UA into urban development strategies.

The Key areas covered by this thesis include the context of the problem in Cairo, and it tries to identify critical issues such as food and water insecurity, environmental degradation, economic challenges, and the need and importance of enhancing community involvement. Also, the thesis frame these problems within the broader context of centralized governance of Egypt and the rapid, often unplanned, growth of the new cities. After this, a comprehensive theoretical framework of urban agriculture is provided by reviewing different literature to define the different methods of classifying urban agriculture, its various types of urban agriculture according to each category (e.g., rooftop farming, vertical farms, community gardens), and exploring its multilayered benefits. and how These benefits span multiple environmental aspects (e.g., climate change mitigation, waste management), social aspects (e.g., improved public health, community cohesion), and economic aspects (e.g., food security, job creation).

Then, qualitative methodology was carried out, combining literature review, observations, and detailed analysis of inspirational UA case studies from diverse global. This methodology aims to examine best practices and adaptable strategies for implementation into the Egyptian urban landscape. This part of the thesis examines successful urban agriculture initiatives in various cities worldwide. Trying to draw lessons that could be applicable and transferred to El-Sherouk City, highlighting innovative approaches to integrating UA into urban planning and design.

With the help of an empirical study of El-Sherouk City, we focus on evaluating the potential for urban farming within the city. identifying suitable locations such as rooftops and vacant public and private lands, assessing existing challenges, including lack of policy, technical expertise, and social acceptance, and proposing practical recommendations for implementing UA projects.

And at the end, the Thesis reaches a conclusion by outlining a strategic framework for the ability to integrate urban agriculture into El-Sherouk City's planning and development. This conclusion provides specific recommendations for policymakers, urban planners, and designers, aiming to foster resilient, sustainable, and food-secure urban environments in Egypt. Also, how the implementation process is emphasized by the role of policy incentives and community involvement in. Overall, the thesis argues that urban agriculture It transcends being just a means of providing food, but it could play a vital role in strengthening sustainable urban development, enhancing livability, and building resilience against contemporary urbanization challenges in Egypt.

Abbreviations

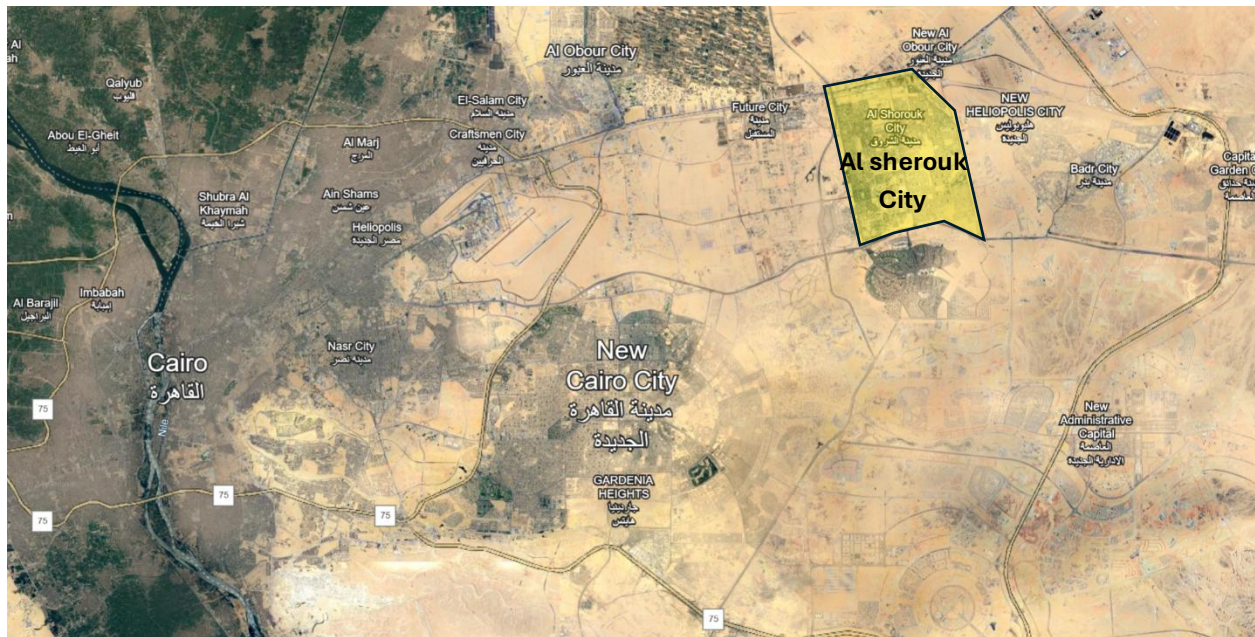
- **UA:** Urban Agriculture
- **UF:** Urban Farmers (used in context, though not explicitly defined as an abbreviation)
- **NUCA:** New Urban Communities Authority
- **UN-Habitat:** United Nations Human Settlements Programme
- **FAO:** Food and Agriculture Organization of the United Nations
- **EFUA:** European Forum on Urban Agriculture
- **USDA:** United States Department of Agriculture
- **ELI:** Environmental Law Institute
- **UPA:** Urban and Peri-Urban Agriculture (also used in context as Urban Planning Approaches)
- **USGS:** United States Geological Survey
- **CAP:** Common Agricultural Policy
- **COVID-19:** Coronavirus disease 2019
- **RUAF:** Resource Centers on Urban Agriculture and Food Security
- **UNEP:** United Nations Environment Programme
- **EBRD:** European Bank for Reconstruction and Development
- **AMA:** Accra Metropolitan Assembly
- **MUFI:** Michigan Urban Farming Initiative
- **NISGP:** National Initiative for Smart Green Projects
- **SDGs:** Sustainable Development Goals

Jargons and Key Terms

- **Urbanization Challenges:** Refers to the issues arising from the growth of urban areas.
- **Food Insecurity:** A state of being without reliable access to a sufficient quantity of affordable, nutritious food.
- **Environmental Degradation:** The deterioration of the environment through depletion of resources such as air, water and soil.
- **Centralization Government:** A system where power is concentrated in a central authority.
- **Economic Challenges:** Financial difficulties or obstacles.
- **Community Involvement and Social Life:** The participation of local residents and the social aspects within a community.
- **Peri-Urban Landscapes:** Areas immediately adjacent to urban zones, often characterized by a mix of urban and rural land uses.
- **Green Roofs:** Rooftops partially or completely covered with vegetation.
- **Hydroponics:** A method of growing plants using mineral nutrient solutions in water, without soil.
- **Aeroponics:** A system where plants are grown in an air or mist environment without the use of soil.

- **Sustainable Development:** Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- **Resilience and Sustainability in Food Security:** The capacity to maintain food supply stability and long-term viability in urban food systems.
- **Adaptive Strategy:** A plan or approach designed to adjust to changing conditions.
- **Land Use Planning:** The process by which decisions are made about how land will be developed and used.
- **Ecosystem Services:** The benefits that humans receive from ecosystems.
- **Public Green Space:** Open, undeveloped land areas used for parks, recreation, and conservation.
- **Productive Urban Landscape:** Urban areas designed to produce resources, often food.
- **Land Use/Land Cover Change Detection:** The process of identifying changes in how land is being used or its physical characteristics over time.
- **Urban Food System Flows:** The movement of food within an urban area, from production to consumption and waste.
- **Victory Gardens:** Initiatives during wartime (WWI and WWII) where citizens were encouraged to grow food in urban spaces.
- **Zero Acreage Farm:** A type of urban farm that maximizes space efficiency, often indoors.
- **DIY Garden/Farm:** Do-It-Yourself Garden or farm, highlighting individual initiative in urban agriculture.
- **SWOT Analysis:** A strategic planning technique used to identify Strengths, Weaknesses, Opportunities, and Threats related to a project or business.

CHAPTER ONE: INTRODUCTION AND PROBLEM CONTEXT



Chapter Structure

The first chapter introduces the context of rapid urbanization in Egypt through time, with a specific focus on Greater Cairo Region and its surroundings. highlighting the main challenges associated with this massive urban growth, As food and water insecurity, environmental degradation, infrastructure overload, Transportation problem.

Outlining the primary research topics and discussing the purpose and objectives of the project, urban agriculture will be explored as a means of resolving these problems. Using "El-Shorouk City" as an example, the research aims to analyze the potential advantages of urban farming and determine the necessary practical measures for its implementation in Egyptian cities. And get know more to Urban agriculture as a solution to tackle these challenges and a practical response to rapid urbanization, especially in cities like Cairo and El-Sherouk.

This tackles important topics like socioeconomic injustice, environmental stressors, and food scarcity. This strategy is in line with a number of the Sustainable Development Goals (SDGs) of the UN and the Egyptian 2050 Vision, such as increasing the availability of locally grown produce to achieve Zero Hunger (SDG 2), improving green urban areas to achieve Sustainable Cities and Communities (SDG 11), and lowering carbon emissions from food transportation to achieve Climate Action (SDG 13). Urban farming also supports Responsible Consumption and Production (SDG 12) by encouraging resource efficiency and Decent Work and Economic Growth (SDG 8) by generating new job possibilities. Because of these links, UA becomes a crucial tactic for building resilient and sustainable cities.

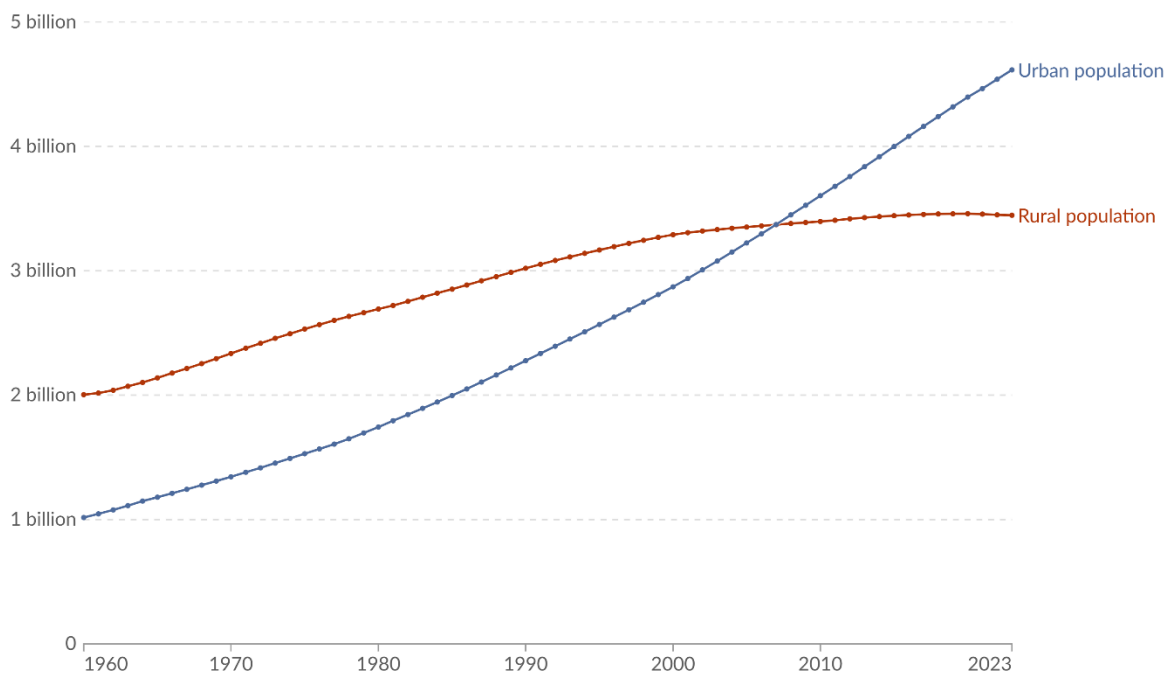
1.1. Introduction

"As cities continue to expand, urban agriculture emerges as a critical response to the pressures of rapid urbanization, providing sustainable solutions to food security, environmental degradation, and community well-being" (Mougeot, 2006)

"With nearly 70% of the world's population projected to live in cities by 2050, managing rapid urbanization will be critical for achieving sustainable development goals" (World Bank, 2021).

"Rapid urbanization has created unprecedented demands on housing, infrastructure, and resources, necessitating innovative solutions to meet the needs of growing urban populations" (UN-Habitat, 2020)

Number of people living in urban and rural areas, World



Data source: World Bank based on data from the UN Population Division (2025)

OurWorldinData.org/urbanization | CC BY

Note: Because the estimates of city and metropolitan areas are based on national definitions of what constitutes a city or metropolitan area, cross-country comparisons should be made with caution.

Figure 1 Number of people living in urban and rural areas, World

Source : <https://ourworldindata.org/grapher/urban-and-rural-population?time=earliest..2023>

The production, delivery, and processing of food in or close to urban areas is known as urban agriculture., the agriculture, aquaculture and livestock rearing within city limits, the same as the cultivation of crops in community gardens, roofs, or vacant ground all goes under the umbrella of UA .the main objectives of Urban agriculture's frequently center on improving sustainability, social cohesion, and food security. Food production for commercial consumption is the main goal of urban farming, a more specialized subset of urban agriculture. In order to maximize output in constricted

urban areas, it commonly uses cutting-edge methods like hydroponics, aquaponics, or vertical farming. Urban farming emphasizes effective food production and its role in developing sustainable urban food systems, whereas urban agriculture is centered on the advantages for the community and the environment.¹

“A global assessment of UPA in 2014 estimated 266 million urban households participate in crop production in developing countries, and 68 million ha of land within 20 km of urban centers are under cultivation worldwide” (Thebo, Drechsel and Lambin, 2014)

Urban farming has become a viable solution to the problems of urbanization, space constraints, and food security in densely populated cities such as Singapore, Tokyo, New York, Paris, and Cairo. Innovations in vertical farming, for example Sky Greens, enable efficient food production in land-constrained cities like Singapore, helping the city-state reach its 2030 target of 30% local nutrition. With rooftop gardens and initiatives like the Pasona Urban Farm, which uses hydroponic systems inside office buildings, Tokyo incorporates urban agriculture into its architecture. Similarly, you can see how New York City’s Brooklyn Grange, became one of the largest rooftop farms in the world, demonstrates how you can thrive the concept of urban farming in a high densely populated zones through the usage of and turning underused spaces into useful productive agricultural sites. Also Paris has also made strides with its Paris cultures initiative, which aims to cover walls and the rooftops with approximately 100 hectares of greenery by the year 2030, and one third of it will be dedicated to produce Food.²

¹ L. J. A. Mougeot, *Urban Agriculture: Definition, Presence, Potentials and Risks* (Ottawa: International Development Research Centre, 2000); T. Deelstra and H. Girardet, "Urban Agriculture and Sustainable Cities," in *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda*, ed. Nico Bakker et al. (Feldafing: DSE, 2000), 43–66.

² T. Deelstra and H. Girardet, "Urban Agriculture and Sustainable Cities," in *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda*, ed. Nico Bakker et al. (Feldafing: DSE, 2000), 43–66; M. L. Low, "Sky Greens and Vertical Farming in Singapore: A Strategy for Local Food Resilience," *Urban Agriculture & Regional Food Systems* 5, no. 1 (2020): 1–10, <https://doi.org/10.1002/uar2.200>; Mairie de Paris, *Parisculteurs: Vegetating 100 Hectares of Rooftops and Walls* (2020), <https://www.paris.fr/pages/parisculteurs>.



Figure 2 New York City's Brooklyn Grange New York City's Brooklyn Grange
Source : [Rooftop Farm Soars Above the City | 2021-12-15 | Architectural Record](#)

Cairo, a densely populated and rapidly expanding urban hub, is a notable example. Cairo, the capital of Egypt and a center of government and industry, is encircled by a vast urbanization and lacks typical rural areas. This poses significant challenges to the region's sustainability and food security. One possible approach is urban farming, which involves projects that turn underutilized areas, rooftops, and abandoned lots into agricultural land.



Figure 3 Egypt, Cairo Urban view.

Cairo may be able to meet the increasing demand for fresh food while lowering its reliance on imports by implementing projects that prioritize hydroponics, aquaponics, and vertical farming. By integrating urban farming into its infrastructure, Cairo could not only alleviate food supply issues but also contribute to environmental sustainability and community well-being in one of the world's most densely populated cities.³

Artificial intelligence tools, including Grammarly and ChatGPT by OpenAI, were used solely to assist with grammar, language clarity, translation, and sentence restructuring in the preparation of this work.

³ Elbeltagi, I., Elhassan, A., & Gad, M. (2022). Urban agriculture as a solution for food security and sustainability in Cairo, Egypt. *Journal of Urban Agriculture and Regional Development*, 4(2), 45–58. <https://doi.org/10.1016/j.juad.2022.04.003>

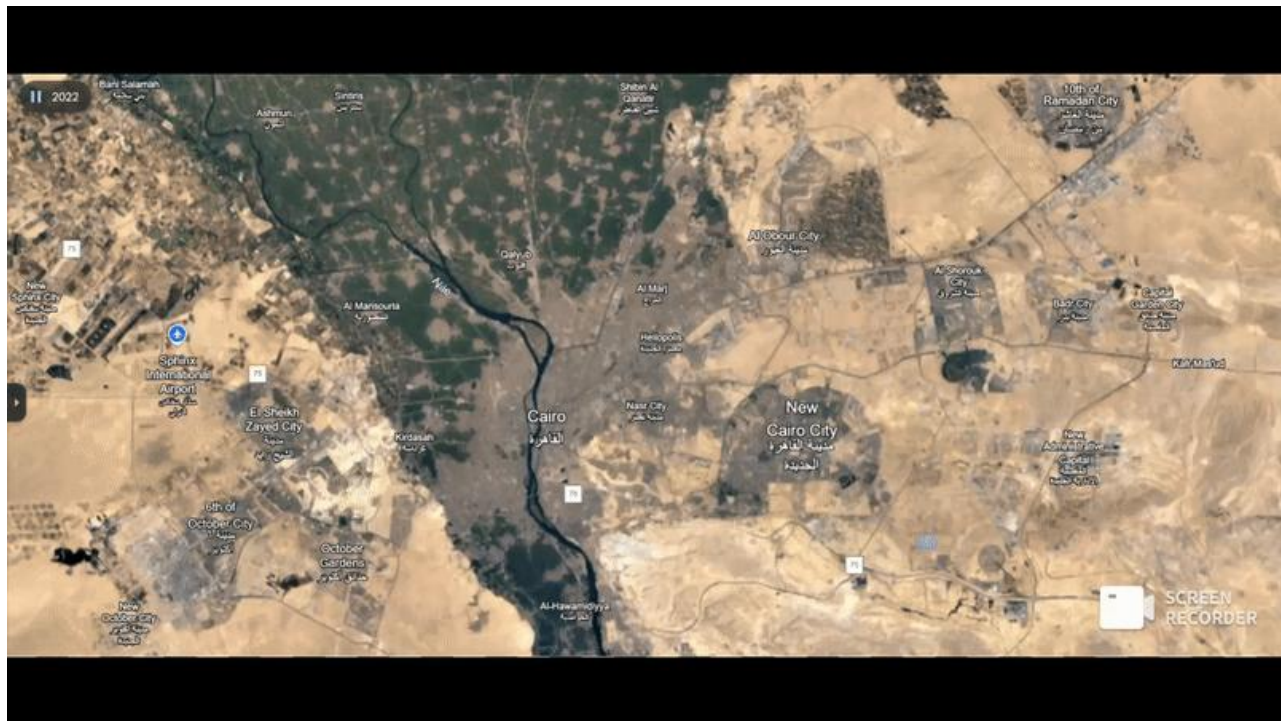
1.2. Objective

The primary aim of this thesis is to explore how urban agriculture (UA) can be successfully incorporated into the urban fabric of Al Shorouk City, Egypt. By examining and comparing UA practices in cities from both the Global North (e.g., Turin and Chicago) and the Global South (e.g., Accra and Dhaka), the research investigates how varying urban, social, and policy frameworks influence the effectiveness, sustainability, and scalability of urban farming initiatives.

The specific objectives of this study are to:

- **Determine the most suitable forms of urban agriculture** that align with the spatial, environmental, and socioeconomic characteristics of densely populated and developing urban areas like Al Shorouk.
- **Measuring the impact of critical factors** such as the involvement of government, land availability, the engagement of the community, and the management of environment on the long-term viability of UA projects.
- **Proposing a context-sensitive** UA model and tailoring to El Shorouk's of infrastructure, urban planning policies, and population trends.
- **Formulate strategic recommendations** in terms of urban planning policy , and design to support the seamless integration of UA, aiming to enhance food security, increase green space, and promote social inclusion.
- **Identify transferable criteria and essential elements** that would enable the replication of the proposed UA approach in other less developed cities or countries with different urban conditions.

1.3. Problem Context In Egypt



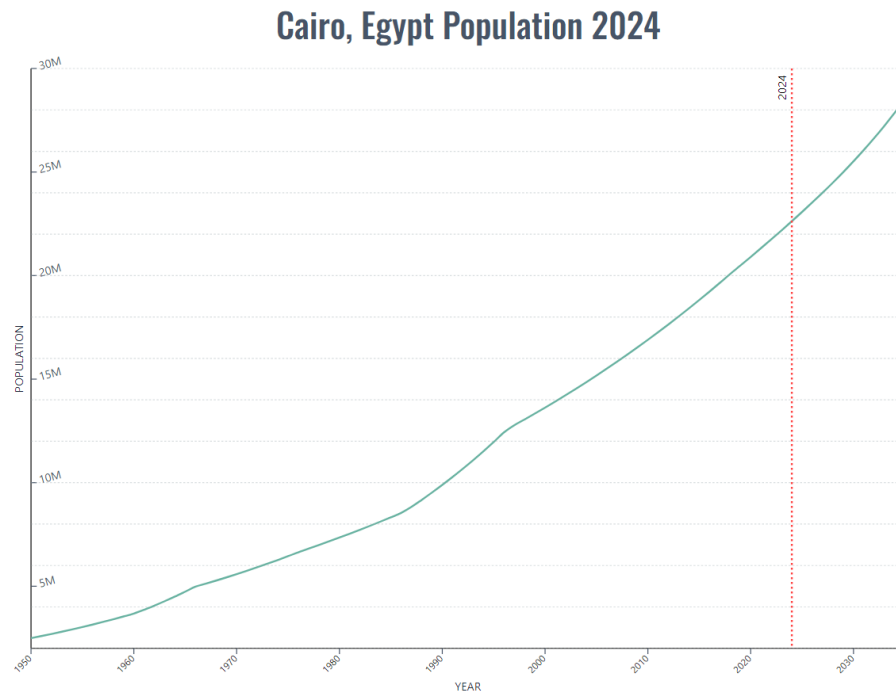
Map 1 showing the Rapid urban expansion in Egypt, Greater Cairo region

Source: Generated by the Author using Google Earth Software

Egypt's capital, Cairo, is still struggling with issues including high population density, fast urbanization, and the disappearance of green and agricultural areas. Cairo, the political, economic, and cultural center of the nation, has drawn millions of people from rural areas who are looking for better living conditions and economic possibilities, making it an attractive attraction for internal migration. The atmosphere and infrastructure of the city are under tremendous strain as a result of this surge. the Egyptian capital, which is home to more than 10 million people and has a metropolitan population of over 20 million, is a prime example of the negative impacts of centralization and unequal development.

Migration to Cairo is driven by deep disparities between urban and rural areas. Rural regions often lack adequate job opportunities or lower wages specially in the global south, healthcare, and educational facilities, while Cairo offers relatively better services and access to resources. The current situation is made worse by the city's dominant role in economic activity and governance, which concentrates businesses, government agencies, and higher education facilities in one area. Because rural areas have been neglected because of centralization, individuals are being forced to relocate to the capital in search of opportunities for upward advancement. Cairo's infrastructure has

been overburdened by the constant influx of people, leading to crowded transit, a lack of available housing, and a rise in informal settlements.⁴



Cairo's 2024 population is now estimated at **22,623,900**. In 1950, the population of Cairo was **2,493,510**. Cairo has grown by 440,700 in the last year, which represents a **1.99%** annual change. These population estimates and projections come from the latest revision of the [UN World Urbanization Prospects](#). These estimates represent the Urban agglomeration of Cairo, which typically includes Cairo's population in addition to adjacent suburban areas.

Figure 1 Cairo population over the years
Source: <https://worldpopulationreview.com/cities/egypt/cairo>

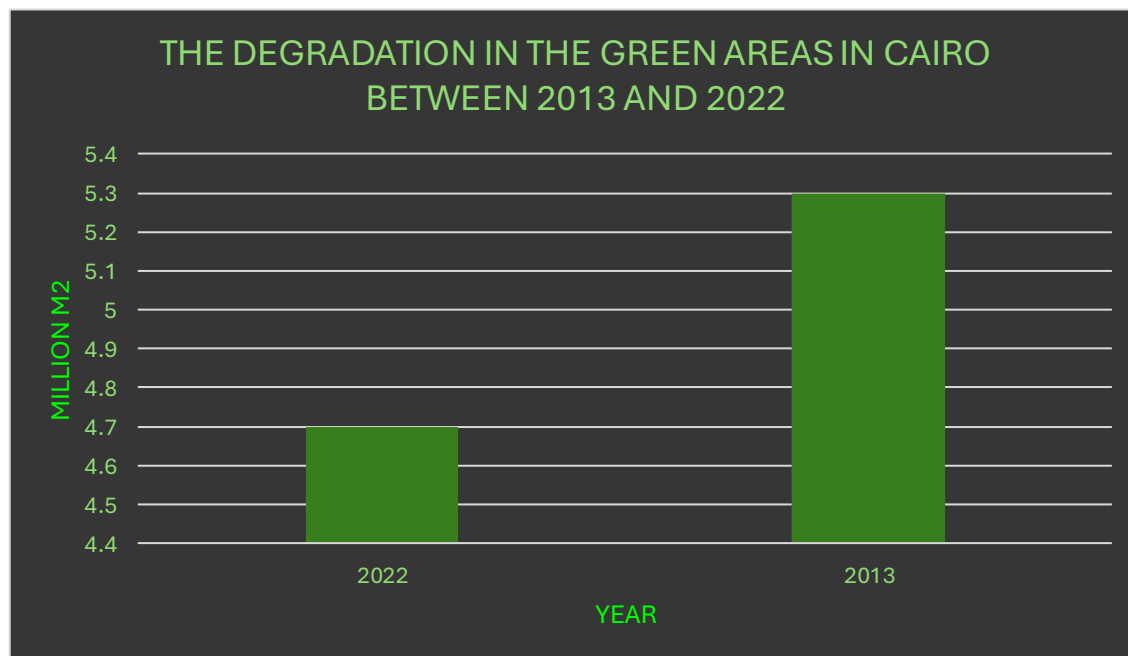
Losing green spaces and agricultural land could be considered to be one of the most pressing consequences of Cairo's rapid urbanization. This leads to the Per capita green space in Cairo to less than 0.74 square meters, far below the World Health Organization's recommended minimum of 9 square meters. The lack of greenery will exacerbate urban heat, pollution, and overall environmental degradation.

Additionally, this trend continues today as new infrastructure projects and housing developments further reduce agricultural areas. These difficulties have been made worse by recent events in Cairo.

The Massive infrastructure projects like building bridges and highways have resulted in the loss of green spaces and additional farmland encroachment. Urban regions are more vulnerable to excessive heat because, for instance, large road expansions in intensively packed districts have uprooted residents and eliminated greenery. Furthermore, initiatives such as the New Administrative

⁴ Abdalla, A., & Elshahed, A. (2021). Urbanization and migration challenges in Cairo: The impacts of centralization and rural-urban disparities. *Journal of Middle Eastern Urban Studies*, 15(3), 215–234. <https://doi.org/10.1080/23456789.2021.9876543>

Capital have diverted resources and attention from resolving Cairo's current environmental and infrastructure problems, even if they were



Graph 1 the decrees in the green spaces in Cairo Between 2013 and 2022
 elaborated By The Author Based on data from Source: *Green spaces in Cairo, a cartographic study 2013-2022*
 Man and the City for Humanities and Social Research 2022

Cairo's urbanization is still a major problem since it isolates economic and political power in one city while leaving other parts of Egypt undeveloped. This trend fosters the migration of individuals in search of better prospects, causing Cairo to be overburdened on a constant basis. With overloaded public transportation systems, worsening traffic, and expansive informal settlements reflecting the strain of fast urbanization, the city's infrastructure is unable to keep up with its expanding population.

These developments highlight the urgent need for a broader strategy to address Cairo's challenges, particularly in managing population growth and mitigating the environmental consequences of urban expansion that has consumed vast amounts of agricultural land. Between 1973 and 2006, Cairo's built-up area more than doubled, encroaching on over 136.75 square kilometers of fertile farmland.

urbanization. Without significant changes in policy and planning, the city's infrastructure, resources, and environment will continue to deteriorate under the weight of its rapid expansion⁵

⁵ Hassan, M., & El-Maghraby, A. (2018). Urban sprawl and environmental sustainability: The case of Cairo, Egypt. *Journal of Urban Planning and Development*, 144(4), 1–10. [https://doi.org/10.1061/\(ASCE\)UP.1943-5444.0000462](https://doi.org/10.1061/(ASCE)UP.1943-5444.0000462)

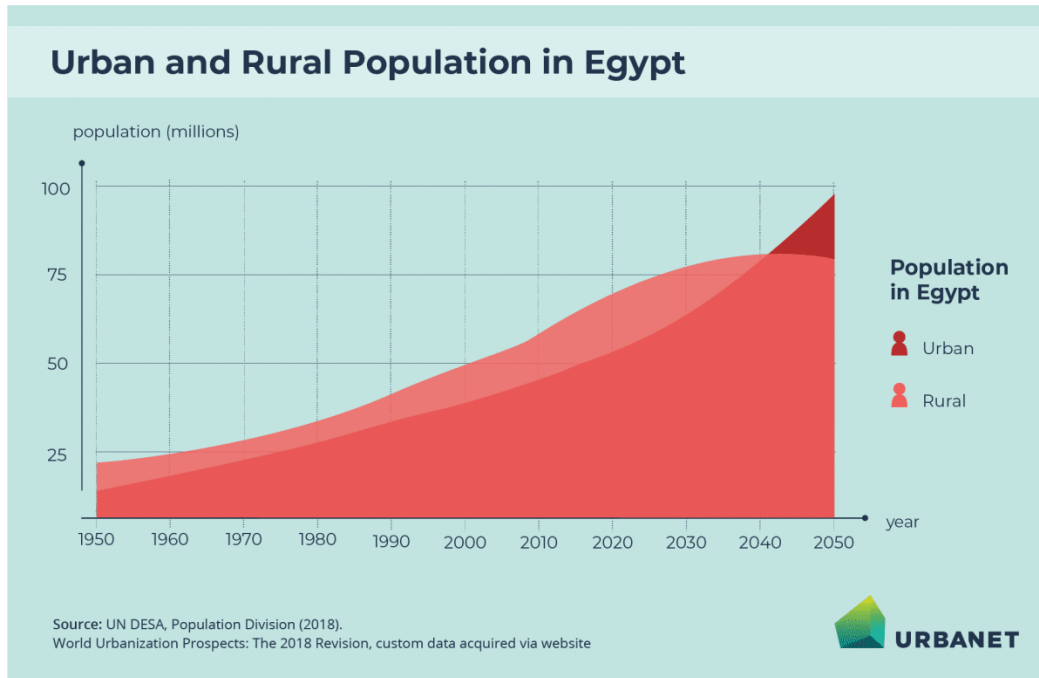


Figure 2 Graph Shows the rural and urban population of Egypt

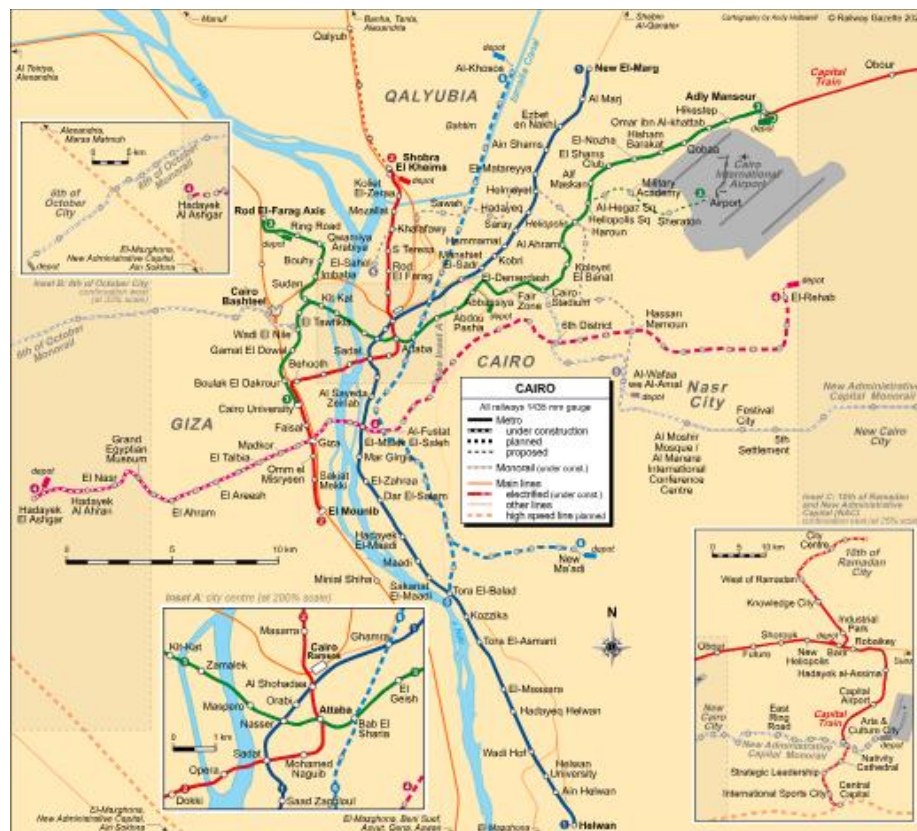
1.3.1. Centralized Government

In Egypt, the majority of government revenues—including taxes, customs duties, and various public service fees—are collected centrally by national authorities and funneled into the state's general treasury. This centralization of revenue collection reflects a long-standing governance model where fiscal authority resides predominantly at the national level. The new cities' local administrations rely heavily on allocations, and then this money is transferred from the central government to finance infrastructure, urban development, and service delivery. This model is good for unified fiscal oversight, but it also limits the financial autonomy of local authorities and can hinder responsiveness to local needs. With urban centers continuing to grow and service demands intensifying, many are beginning to highlight the importance of fiscal decentralization as a means to give cities greater autonomy over their budgets and how resources are allocated.

Specifically in Cairo, Egypt's centralized government has been essential in promoting green projects and resolving environmental issues. The administration has been able to carry out major initiatives effectively and coherently by consolidating decision-making power. An excellent example is the "100 million Trees" campaign, which aims to improve air quality, fight desertification, and expand urban green spaces across the country. Throughout the same spectrum, the National Initiative for Smart Green Projects (NISGP) has prioritized encouraging environmental stewardship and sustainable practices across a variety of industries. These efforts align with Egypt Vision 2030, a comprehensive strategy that integrates sustainability into the nation's development agenda. Cairo has been able to link the Green Cities program and favor sustainable urban infrastructure, including improvements in public transportation and urban planning, thanks to centralization, which has also made it easier to

form partnerships with international organizations like the European Bank for Reconstruction and Development (EBRD).

Apart from these initiatives, Cairo has been able to serve as a model city for environmental reforms because to centralization. Cleaner mobility and lower carbon emissions are being promoted by significant expenditures in the city's metro network expansion and electric bus introduction. To reduce urban heat and enhance the quality of life for locals, green belts are being created alongside major roads and highways. These successes highlight the benefits of a centralized strategy, which allows for the planning, coordination, and execution of large-scale projects with backing from both domestic and foreign sources.⁶



Map 1 Cairo All Metro lines after completion

Source : <https://www.railwaygazette.com/data/cairo-city-map/54070.article>

⁶ M. Hassan and A. Farouk, "Fiscal Centralization and Local Governance in Egypt: Challenges and Opportunities," *Journal of Middle Eastern Public Administration* 12, no. 3 (2021): 102–18, <https://doi.org/10.1234/jmepa.2021.56789>; A. Elshahed and S. Mahmoud, "Centralized Governance and Urban Sustainability in Cairo: An Analysis of Environmental Initiatives," *Journal of Middle Eastern Urban Development* 19, no. 1 (2023): 34–52, <https://doi.org/10.1080/23754725.2023.1234567>; Y. Mostafa and R. Salem, "Urban Mobility and Green Infrastructure in Cairo: Impacts of Centralized Policy Frameworks," *Sustainable Cities and Society* 68 (2022): 102782, <https://doi.org/10.1016/j.scs.2021.102782>.

However, this concentration of power has also highlighted several challenges. Cairo's position as Egypt's political, economic, and cultural hub often leads to disproportionate attention and resources being directed toward the capital at the expense of other regions. Rural areas and smaller cities are frequently underfunded, perpetuating regional inequalities and driving further migration to Cairo. This influx adds to the city's already high population density, exacerbating environmental degradation, overburdened infrastructure, and a shortage of green spaces. The rapid urban expansion of Cairo has also consumed vast amounts of fertile agricultural land, reducing the city's capacity for local food production and increasing reliance on imports.

Local governments in Egypt face significant constraints due to the centralized system. Limited autonomy restricts their ability to address region-specific environmental challenges or implement tailored solutions. This top-down approach often leaves local communities disengaged, reducing the effectiveness of initiatives that require grassroots support. Moreover, the centralization of resources and decision-making tends to prioritize urban development in Cairo while neglecting systemic issues affecting the country as a whole, such as desertification, rural poverty, and regional infrastructure deficits.⁷

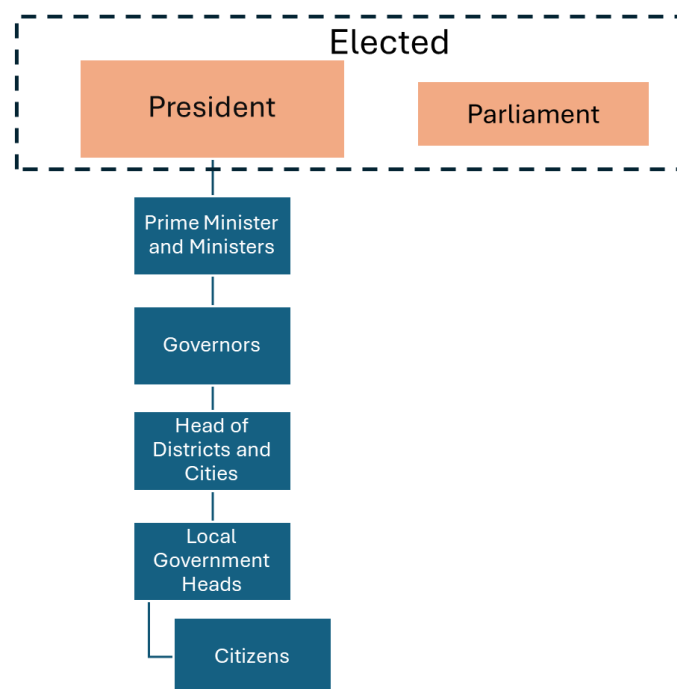


Figure 3 Egypt Top-Down Authority Structure
Sources: Elaborated By The Author

⁷ M. Abdelrahman and A. El-Kholei, "Urban Sprawl and Regional Inequality in Egypt: The Case of Greater Cairo," *Environment and Urbanization ASIA* 13, no. 2 (2022): 245–62, <https://doi.org/10.1177/09754253221103850>; N. Kamel and H. Fahmy, "Decentralization and Environmental Governance in Egypt: Obstacles and Opportunities," *The Journal of North African Studies* 26, no. 5 (2021): 881–900, <https://doi.org/10.1080/13629387.2020.1723107>.

The centrally managed governance of Egypt has had a significant impact on even new cities like El-Shorouk, which were created to relieve pressure on Cairo and encourage balanced urbanization. With the goal to produce a self-sufficient urban environment with residential, commercial, and industrial zones, the government planned to build satellite cities surrounding Cairo, and El-Shorouk was born. Nevertheless, the city's potential to function autonomously and successfully meet local needs has been hampered by its centralized planning and management. El-Shorouk's decision-making is still mostly controlled by central authorities, which restricts community participation and lessens the city's ability to adjust to new problems.

Even after the city's development, central control over its management and resources has created gaps in infrastructure, service delivery, and economic opportunities. For instance, monolithic organizations frequently oversee vital services like utilities, waste disposal, and transportation, which causes delays and errors. Because it depends on the capital for both administrative guidance and economic integration, El-Shorouk, like other new cities, operates more as an extension of Cairo than as a stand-alone urban center. Because of this dependence, El-Shorouk is unable to adequately ease Cairo's urban and environmental constraints or promote truly balanced regional growth, undermining the original decentralization aim.⁸



Map 2 Aerial View Show the difference in the green spaces between al Alshorouk City representing City Built by the Government and Madinity City Built by Private Sector

Source: Generated by the Author using Google Earth Software

⁸M. El-Batran and C. Arandel, "A Shelter of Their Own: Informal Settlement Expansion in Greater Cairo and Government Responses," *Environment and Urbanization* 10, no. 1 (1998): 217–32, <https://doi.org/10.1177/095624789801000125>; David Sims, *Understanding Cairo: The Logic of a City Out of Control* (Cairo: The American University in Cairo Press, 2012).

1.3.2. Food Insecurity

The population of Cairo has grown, and with it, so has the need for food. Yet, as prime agricultural land outside of the city has been consumed by massive and rapid urban expansion, local food production has declined. Cairo increasingly purchases more food from other nations or from rural areas as a result, making the city's food supply more vulnerable to price fluctuations, market disruptions, and issues with the global supply chain. Because they have limited access to affordable, healthy food, many low-income households in Cairo suffer from food insecurity. The situation is made worse by the high cost of living and a shortage of locally produced food.⁹

1.3.3. Environmental Degradation

Based on a World Health Organization (WHO) assessment that examined air pollution worldwide between 2011 and 2015, Cairo is second among the most polluted big metropolis in the world. Owing to major part to industrial pollution, garbage burning, and vehicular emissions, the city has some of the most hazardous air conditions in the world. Excessive development and inadequate waste management techniques have seriously contaminated Cairo's main water source, the Nile River. The city's urban sprawl has also contributed to the destruction of green spaces, which are vital for maintaining biodiversity, reducing pollution, and providing recreational areas for residents. Unregulated industrial and building activity has also resulted in the demise of natural habitats and soil deterioration.

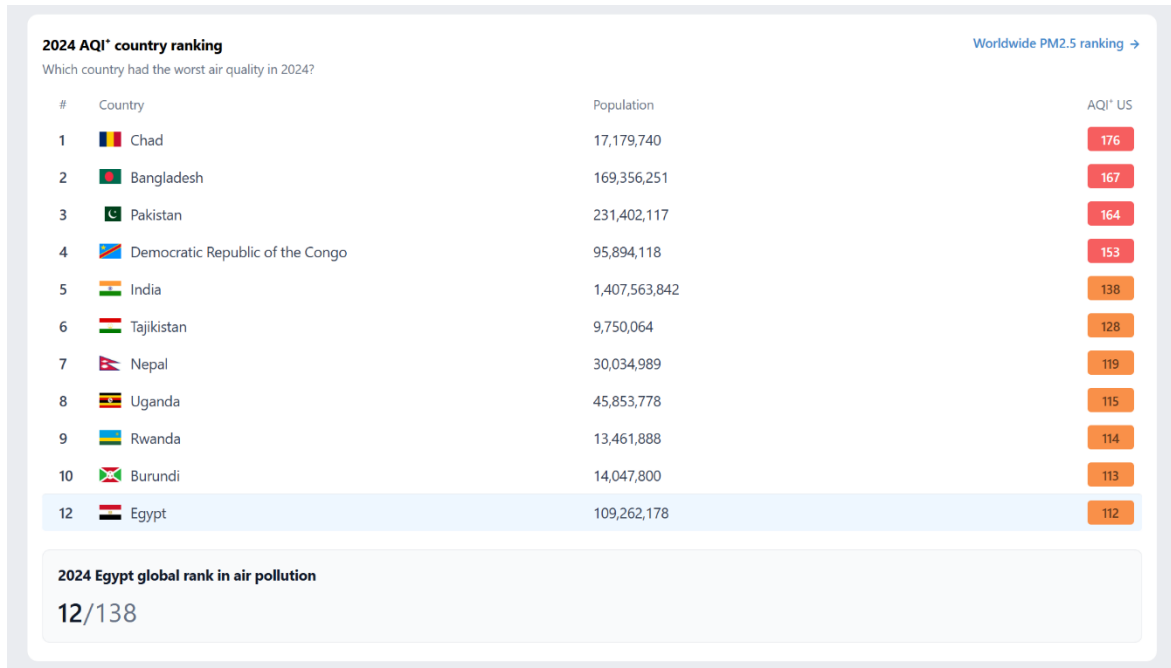
The heat island effect, which is a phenomenon where metropolitan regions suffer much higher temperatures than their rural surrounds, has been exacerbated by the lack of strict regulations governing green spaces. While the city expands, more concrete, asphalt, and buildings have taken over the flora that organically regulates the atmosphere through shade and evapotranspiration. Because there aren't enough green areas, urban surfaces absorb and retain more heat, which raises temperatures and makes cooling more energy intensive. Apart from contributing to making living conditions less comfortable, this effect raises the demand for air conditioning, further taxing the city's energy resources and escalating the detrimental effects of pollution.¹⁰

The combined effect of these elements highlights the pressing need for all-encompassing urban design regulations that incorporate green areas to reduce the heat island effect and improve the city's overall sustainability.

Egypt Ranked 12 place out of 138 country in air pollution while Cairo ranked the 28th Place.

⁹ Bush, R., & Sabates-Wheeler, R. (2020). Food insecurity and the urban poor in Egypt. *The Journal of Peasant Studies*, 47(6), 1231–1251. <https://doi.org/10.1080/03066150.2020.1750545>

¹⁰ World Health Organization, *Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease* (Geneva: WHO, 2016), accessed April 10, 2025, <https://www.who.int/publications/i/item/9789241511353>; Shorouk Shafik and Ghada F. El Said, "Urban Heat Islands and the Role of Green Infrastructure in Cairo," *Sustainable Cities and Society* 69 (2021): 102871, <https://doi.org/10.1016/j.scs.2021.102871>.



Graph 2 Egypt's global rank in air pollution
source : According to [Egypt Air Quality Index \(AQI\) and Air Pollution information | IQAir](#)

1.3.4. Economic Challenges

The economic status of people across Egypt has drastically changed as a result of urbanization and significant migration between rural and urban .The individuals who move to cities from rural regions is driven by the motivation to search of better opportunities, sometimes find themselves in the middle of a complex economic situation characterized by competitive job markets, rising living costs, and unequal access to assets. The Demand for housing is now greater, driven by the growing population of metropolitan regions, particularly in major cities like Cairo, which have raised real estate prices and rental costs.¹¹

The concentration of employment opportunities in cities can also cause income inequality. The expense of living usually overcomes these benefits, placing added strain on the finances of lower-class migrants even though salaries in cities may be higher than in rural areas. Further, the growth of the unorganized sector and underemployment in metropolitan areas may result in unstable employment and lower wages for many newcomers. Divergent access to healthcare and education can worsen the economic divide by impeding upward mobility and prosperity. All things considered, the difficulties associated with migration and urbanization add to an intricate economic

¹¹ Sabry, S. (2010). How poverty is underestimated in Greater Cairo, Egypt. *Environment and Urbanization*, 22(2), 523–541. <https://doi.org/10.1177/0956247810379932>

environment, emphasizing the necessity of focused policies to encourage fair growth and enhance economic prospects for locals.¹²

1.3.5. Community Involvement and Social Life

Among of the primary challenges facing Egypt's recently developed cities and communities is the assimilation and engagement of new inhabitants. As a component of the country's urban expansion plan, several satellite cities have been created to relieve traffic in Cairo and other large cities. But in these new urban areas, social cohesion and community engagement are often problems. Many immigrants, particularly those who have relocated from older, more established urban neighborhoods or rural areas, struggle to fit in.

This can be attributed to a variety of factors, including the lack of established social networks, limited access to essential services, and inadequate infrastructure in the initial phases of growth. Furthermore, the architecture of the new cities frequently prioritizes housing and commercial areas over public areas and other social or cultural amenities that foster interaction amongst inhabitants. The population's economic inequality, which sees some newcomers to the area being wealthy while others are from lower-class backgrounds, further erodes the feeling of community.¹³

As a result, there is frequently a fractured social fabric among the populace, which makes them feel cut off from the city and from one another. This results in low levels of investment in the local environment and community engagement. In order to address this issue, inclusive urban planning is necessary, which takes into account both social and physical infrastructure to make sure that newcomers feel included and committed to their communities.

1.4. Research Questions

Main Question

How to integrate urban agriculture as a Policy to tackle Urbanization Challenges and benefit the local communities?

Secondary Questions

1. What specific benefits can urban farming bring to food security, sustainability, and urban livability in these areas?
2. What are the barriers and opportunities for implementing urban agriculture in El-Sherouk City?
3. What are the potential long-term impacts of urban agriculture on the sustainability of urban environments in Cairo and El-Sherouk City?

¹² Afsar, R. (2003). Internal migration and the development nexus: The case of Bangladesh. *Regional Conference on Migration, Development and Pro-Poor Policy Choices in Asia*.
<https://assets.publishing.service.gov.uk/media/57a08cd5e5274a27b200161d/WP-C3.pdf>

¹³ Sims, D. (2015). *Egypt's desert dreams: Development or disaster?* The American University in Cairo Press.

4. What are the economic effects of urban agriculture on local economic growth, job generation, and property values for citizens of El-Sherouk City and Cairo?
5. How do new urban residents integrate into communities in Cairo and El-Sherouk City, and what role can urban agriculture play in fostering social cohesion and community engagement?

1.5 Aims and Expected Outcomes of studying the implementation of the project on El-sherouk city

Evaluation of Urban Farming in El-Sherouk City

- An evaluation of the practicality of implementing urban agriculture in El-Sherouk City, including an assessment of available spaces (e.g., rooftops, vacant lots) and resources (e.g., water, energy).
- Identification and recommendation of the most suitable urban farming techniques (e.g., rooftop gardens, hydroponics, community gardens) based on the city's environmental conditions and infrastructure and available spaces.

Framework for Integrating Urban Agriculture into City Planning

- A set of recommendations for local governments, Authorities, Different stakeholders and urban planners on how to incorporate urban farming into the broader urban development strategy. This could include zoning policies, land-use regulations, and incentives for private sector involvement and individuals in different urban farming projects.
- Suggestions for policies that aim at reducing regulatory barriers to urban agriculture and promoting its growth within the city.

Urban Agriculture as a Tool for Food Security

- Check the potential of urban farming in improving the supply of local food security in El-Sherouk and Cairo by increasing the availability of fresh, locally produced food.

Environmental and Social Benefits

- Evidence showing how urban agriculture can mitigate environmental issues like pollution, the urban heat island effect, and water mismanagement.
- Insights into how urban farming can foster community engagement, promote social cohesion, and create green spaces that improve residents' quality of life.

Economic Opportunities

- Identification of the potential for job creation in urban farming, including new employment opportunities in agriculture, food distribution, and agribusiness sectors.

1.5.1 Pilot Projects

- Development of specific recommendations for pilot urban agriculture projects in El-Sherouk City, along with an outline of potential stakeholders (e.g., local government, private sector, NGOs) who could collaborate to implement these projects.

These outcomes would provide feasible and actionable insights that could be helpful and useful to by urban planners, policymakers, and community organizations to enhance food security, environmental sustainability, and economic development in rapidly urbanizing areas like Cairo and El-Sherouk City.

1.6. Research Structure

Chapter 1: Introduction and Problem Context

The first chapter introduces the context of rapid urbanization in Egypt through time, with a specific focus on Greater Cairo Region and its surroundings. highlighting the main challenges associated with this massive urban growth, As food and water insecurity, environmental degradation, infrastructure overload, Transportation problem.

Outlining the primary research topics and discussing the purpose and objectives of the project, urban agriculture will be explored as a means of resolving these problems. Using "Al Shorouk City" as an example, the research aims to analyze the potential advantages of urban farming and determine the necessary practical measures for its implementation in Egyptian cities. And get know more to Urban agriculture as a solution to tackle these challenges and a practical response to rapid urbanization, especially in cities like Cairo and El-Sherouk.

This tackles important topics like socioeconomic injustice, environmental stressors, and food scarcity. This strategy is in line with a number of the Sustainable Development Goals (SDGs) of the UN and the Egyptian 2050 Vision, such as increasing the availability of locally grown produce to achieve Zero Hunger (SDG 2), improving green urban areas to achieve Sustainable Cities and Communities (SDG 11), and lowering carbon emissions from food transportation to achieve Climate Action (SDG 13). Urban farming also supports Responsible Consumption and Production (SDG 12) by encouraging resource efficiency and Decent Work and Economic Growth (SDG 8) by generating new job possibilities. Because of these links, UA becomes a crucial tactic for building resilient and sustainable cities.

Chapter 2: “Theoretical Study” Urban Agriculture Literature Revision

Chapter Two is thoughtfully structured to provide a comprehensive and academically grounded Exploration of urban agriculture. To link between conceptual frameworks and real-world applications. The chapter starts with a critical review of different definitions of A and its historical contexts, situating urban agriculture within broader urban development discourses. In the second part, an introduction of the major Two Typologies, then a range of typologies Suits our case study, categorizing urban agriculture by spatial location, scale of production, technological methods, and the profiles of practitioners. These classifications and definitions are used to highlight how urban agricultural practices can be applied across different urban contexts Following this, a systematically analyzes is carried out to discuss the multidimensional benefits of urban agriculture—social, environmental, economic, nutritional, and psychological—while also offering a nuanced discussion of its limitations and critiques. The final sections compare the differing motivations, implementations, and policy landscapes of urban agriculture in the Global North and Global South. This layered structure allows for a holistic understanding of urban agriculture as both a theoretical construction and a practical strategy for sustainable urban living.

Chapter 3: Research Methodology

This research adopts a qualitative methodology with an exploratory approach to address the central goal and objectives, which focus on exploring the potential for implementing urban agriculture in Al Shorouk City. The study relies on a combination of observations, case study analysis, and descriptive techniques to deepen the understanding of existing literature and to formulate effective strategies for integrating urban agriculture into the city's fabric. It also examines the challenges and opportunities specific to Al Shorouk City, considering its urban dynamics, environmental context, and socioeconomic structure.

The methodology is structured around an introduction and comprehensive chapters, each contributing to a holistic exploration of urban agriculture in Al Shorouk City.

Chapter 4: “analytical study” inspirational case studies

This chapter presents a comparative analytical study of the selected inspirational urban agriculture case studies from both the Global South and Global North, with a selected criterion that includes diverse socio-economic, environmental, and policy contexts. The main aims of this chapter are to highlight successful practices, innovative strategies, and adaptable models that have contributed to the integration of agriculture within urban environments. The selection of these Case studies was based on their relevance to sustainability, community engagement, and spatial integration within city planning. with the help of this analysis, we were able to identify the key factors that have driven the success of these initiatives and evaluate their potential, also it applicability to emerging urban contexts, such as El-Sherouk City.

The comparison not only reveals differences in scale, technology, and governance between the two regions but also uncovers common principles that can inform context-sensitive urban agriculture strategies globally.

Chapter 5: “Empirical Study” El-Sherouk City Potential, Challenges, and Recommendations

The chapter critically assesses how UA can serve as a multifaceted strategy to tackle the city's unique urbanization dilemmas, such as food scarcity, the scarcity of green spaces, and environmental degradation. The chapter undertakes a thorough investigation of El-Sherouk's urban setting, exploring avenues for integrating UA through various methods like converting rooftops and establishing community gardens. Simultaneously, it confronts the significant hurdles impeding UA's progress, including policy vacuums and a deficit in specialized knowledge. Ultimately, the chapter puts forth actionable, stage-by-stage recommendations, alongside a comprehensive project blueprint, for initiating and expanding UA ventures, with the overarching aim of cultivating a more robust, sustainable, and food-secure urban future for El-Sherouk City.

Chapter 6. Conclusion

The concluding chapter summarizes the research findings and emphasizes the value of urban agriculture as a tool for addressing the challenges of rapid urbanization in Cairo and El-Sherouk City. It offers practical recommendations for integrating urban farming into city planning, including policy suggestions and strategies for community involvement. The chapter also suggests areas for future research, with a focus on scaling urban agriculture projects and further exploring their long-term sustainability. The conclusion reaffirms the potential of urban farming to create more resilient and sustainable cities in Egypt.

CHAPTER ONE :

Problem Context, Research Objective, Research Questions, Aims and Expected Outcomes.

CHAPTER TWO : “THEORETICAL STUDY”

LITERATURE REVISION “THEORY AND PRACTICE”

Theoretical Study and General overview on Urban Agriculture, Concepts and Practice, FAO Policies, Evolution of UA , UA Benefits and Challenges , UA Types, UA between Global South and Global North.

CHAPTER FOUR : “ANALYTICAL STUDY”

INSPIRATIONAL CASE STUDIES

Analytical Study For The Inspirational Case Study Analysis, The Challenges and benefits, Final Analytical Comparison, Conclusion

CHAPTER THREE :

RESEARCH METHODOLOGY

Theoretical Framework, Why Al Shorouk City Was Selected for UA Implementation, Selection Criteria for UA Inspirational Case Studies,

CHAPTER FIVE : “EMPIRICAL STUDY”

A PROPOSED MODEL FOR AL SHOROUK CITY

Empirical Study: A Proposed Model for Al Shorouk City, Questionnaire and interview, Projects Description, The Potential and Challenges, Outcome

CHAPTER SIX :

Conclusion

Discussion of Key Findings, Conclusion and Policy Recommendations Authorities, The transferability of the case study

1.7. Research Methodology Chart

This research adopts a qualitative methodology with an exploratory approach to address the central goal and objectives, which focus on exploring the potential for implementing urban agriculture in Al Shorouk City. The study relies on a combination of observations, case study analysis, and descriptive techniques to deepen the understanding of existing literature and to formulate effective strategies for integrating urban agriculture into the city's fabric. It also examines the challenges and opportunities specific to Al Shorouk City, considering its urban dynamics, environmental context, and socioeconomic structure. The methodology is structured around an introduction and four comprehensive chapters, each contributing to a holistic exploration of urban agriculture in Al Shorouk City and at the End a final chapter of General Conclusion.

CHAPTER ONE: INTRODUCTION

Problem Context, Research Objective, Research Questions, Aims and Expected Outcomes.

CHAPTER TWO: "THEORETICAL STUDY" LITERATURE REVISION "THEORY AND PRACTICE"

Theoretical Study and General overview on Urban Agriculture, Concepts and Practice, FAO Policies, Evolution of UA, UA Benefits and Challenges, UA

CHAPTER FOUR: "ANALYTICAL STUDY" INSPIRATIONAL CASE STUDIES

Analytical Study for The Inspirational Case Study Analysis, The Challenges and benefits, Final Analytical Comparison, Conclusion

CHAPTER THREE: RESEARCH METHODOLOGY

Theoretical Framework, Why Al Shorouk City Was Selected for UA Implementation, Selection Criteria for UA Inspirational Case Studies,

CHAPTER FIVE: "EMPIRICAL STUDY" A PROPOSED MODEL FOR AL SHOROUK CITY

Empirical Study: A Proposed Model for Al Shorouk City, Questionnaire and interview, Projects Description, The Potential and Challenges, Outcome

CHAPTER SIX : Conclusion

Discussion of Key Findings, Conclusion and Policy Recommendations Authorities, The transferability of the case study

Conclusion

This foundational chapter underscores the critical need to integrate urban agriculture into rapidly evolving cityscapes, with a specific emphasis on Egypt. It highlights how relentless urban expansion—most notably in Cairo and its satellite cities such as Al Shorouk—has intensified challenges including food insecurity, environmental degradation, and socio-economic inequality. These issues are compounded by a highly centralized governance structure. Through a critical examination of global precedents, this research positions urban agriculture not merely as a feasible solution, but as a transformative strategy for mitigating these complex, interrelated urban pressures.

Consequently, this thesis aims to rigorously explore the untapped potential of urban agriculture in Al Shorouk City. Through a comparative analysis, it seeks to identify the most effective models of urban farming, evaluate the key factors influencing their implementation, and develop a context-specific framework tailored to Al Shorouk's unique urban character. This inquiry is made all the more urgent by the rapid loss of green spaces and the growing pressure on Egypt's food systems.

This research articulates a set of focused questions designed to examine the potential benefits, existing barriers, and long-term impacts of urban agriculture. It also aims to assess its capacity to stimulate economic growth and strengthen social cohesion. The study's contributions—ranging from empirical assessments of urban farming practices suited to Al Shorouk, to the development of strategic planning frameworks and identification of new economic opportunities—are intended to offer practical, policy-relevant insights. Ultimately, this thesis positions urban agriculture as a critical policy tool for addressing the challenges of urbanization while enhancing the overall resilience and well-being of communities in Al Shorouk and comparable urban settings. The following chapters build on this foundation, employing a qualitative methodology to explore these themes in depth and provide actionable recommendations for sustainable urban development.

CHAPTER TWO: “THEORETICAL STUDY” URBAN AGRICULTURE LITERATURE REVISION “BETWEEN THEORY AND PRACTICE”.

Chapter Structure

Chapter Two is thoughtfully structured to provide a comprehensive and academically grounded exploration of urban agriculture, serving as a bridge between conceptual frameworks and real-world applications. It opens with a critical review of definitions and historical contexts, situating urban agriculture within broader urban development discourses. The chapter then introduces a range of typologies, categorizing urban agriculture by spatial location, scale of production, technological methods, and the profiles of practitioners. These classifications are used to highlight the diversity and adaptability of urban agricultural practices across different urban contexts. Following this, the chapter systematically analyzes the multidimensional benefits of urban agriculture—social, environmental, economic, nutritional, and psychological—while also offering a nuanced discussion of its limitations and critiques. The final sections compare the differing motivations, implementations, and policy landscapes of urban agriculture in the Global North and Global South. This layered structure allows for a holistic understanding of urban agriculture as both a theoretical **construction** and a practical strategy for sustainable urban living.

2.1 Defining and Contextualizing Urban Agriculture

"Urban agriculture is the practice of cultivating, processing, and distributing food in and around urban areas. It enhances the sustainable use of urban resources by integrating food production into vacant lots, rooftops, and other unused urban spaces, contributing to local food security and environmental sustainability" (Mougeot, 2005)

"Linking urban agriculture and cities As Cities not just present constraints but also potential for building sustainable urban food system, they can promote food innovations (short supply chain, urban agriculture, new sources of supply procurement, etc. They do have the opportunity to optimize resource management, infrastructure and waste recycling. (Dubbeling, 2013).

Urban agriculture encompasses a range of practices centered on the cultivation, processing, and distribution of agricultural products within the confines of urban and suburban areas. This definition extends beyond mere production to include crucial aspects such as the transformation of raw materials, the establishment of market channels, and the recycling of resources, all tailored to meet the evolving needs of local populations. However, the concept of urban agriculture is not monolithic; its interpretation and implementation are fluid, shaped by the specific policies, state regulations, and unique characteristics of individual communities.² Often, the definition is dictated by local funding mechanisms and programmatic objectives, underscoring the need for a context-aware understanding.

Historically, the practice of cultivating food within urban centers is far from a modern invention. Evidence of urban farming can be traced back to ancient civilizations, such as Mesopotamia,

highlighting its long-standing role in sustaining city dwellers. More recently, the "victory gardens" of the World War II era serve as a powerful reminder of urban agriculture's capacity to contribute to food security during times of crisis. The contemporary resurgence of interest in urban agriculture is largely fueled by growing concerns surrounding environmental sustainability and the pursuit of social justice within urban environments.

There isn't a single, legally codified definition for urban agriculture highlights the importance of adopting nuanced and localized approaches when studying and supporting its development. Federal agencies, including the USDA "**United States Department of Agriculture**", acknowledge the different ways in which urban agriculture could be understood and practiced across the globe in different regions. This inherent variability suggests that effective policies and interventions must be flexible and carefully tailored to the specific urban landscape, considering the existing local governance structures and the particular needs of the involved communities. Furthermore, the historical trajectory of urban agriculture, from its ancient roots to the emergence of sophisticated techniques like vertical farming, illustrates a continuous process of adaptation. Throughout history, urban populations have consistently found ways to cultivate food within city limits, responding to immediate needs and leveraging available technologies to overcome urban constraints and capitalizing on emerging opportunities.¹⁴

Urban agriculture manifests in a remarkable variety of forms, each adapted to specific urban contexts and serving diverse purposes. These include familiar practices like rooftop gardens, which utilize underused elevated spaces, and community gardens, fostering collective cultivation and social interaction.¹ Backyard gardening provides opportunities for individual households to produce food, while innovative methods like vertical farming and controlled environment agriculture (CEA) maximize yields in limited spaces through stacked layers and precisely regulated conditions. Soilless cultivation techniques such as hydroponics, aeroponics, and aquaponics offer efficient alternatives to traditional soil-based agriculture. In addition, urban agriculture can include the rearing of honeybees and small livestock, contributing to both food production and urban biodiversity. These diverse forms can be categorized based on various criteria, including the scale of operation, the location within the urban fabric, the main and the primary purpose of the activity itself (ranging from individual subsistence to the commercial profitable enterprise and educational initiatives), and the specific production methods employed. The USDA, for instance, broadly classifies urban agriculture into community gardens, community farms, commercial

¹⁴ USDA. (202L. J. A. Mougeot, "Urban Agriculture: Definition, Presence, Potentials and Risks," in *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda*, ed. N. Bakker, M. Dubbeling, S. Guendel, U. Sabel-Koschella, and H. de Zeeuw (Feldafing: DSE, 2000), 1–42; Laura J. Lawson, *City Bountiful: A Century of Community Gardening in America* (Berkeley: University of California Press, 2005); U.S. Department of Agriculture, "What Is Urban Agriculture?" last modified 2022, accessed April 15, 2025, <https://www.usda.gov/topics/farming/urban-agriculture>.2). *What is urban agriculture?* U.S. Department of Agriculture. <https://www.usda.gov/topics/farming/urban-agriculture>

farms, and institutional farms and gardens. The sheer variety of these forms underscores the remarkable adaptability and potential of urban agriculture to seamlessly integrate into the multifaceted urban landscape and to fulfill a wide spectrum of functions.¹⁵

In a world where we're seeing a shift from rural living to bustling urban centers, along with the pressing need for sustainability, urban agriculture is becoming increasingly important. With a large chunk of the global population now living in cities, how these urban areas can sustainably provide food for their residents while minimizing environmental impacts is a major concern. Addressing such problems is possible with urban agriculture as it increases the dietary necessity fulfillment for city residents and simultaneously provides economic opportunities. In addition, urban agriculture can help bolster a city's resiliency to numerous challenges such as climate change and public health emergencies by improving local food systems and health outcomes. Beyond food production, urban agriculture contributes significantly to environmental sustainability by increasing the availability of greenery within cities, improving air and better water quality, and reducing the environmental footprint associated with the long-distance food transportation from production zones to mass consumption areas. Moreover, it fosters a multitude of social benefits, including enhanced engagements of community, valuable educational opportunities, and improvements in the overall well-being of urban residents. The convergence of rapid global urbanization and the escalating urgency of sustainability challenges strongly establishes UA as a pivotal strategy in the pursuit of more livable and resilient urban environments for the future.¹⁶

The integration of theory and practice in urban agriculture highlights its transformative power. By linking academic insights with tangible solutions, urban agriculture reimagines food systems and contributes to more inclusive, sustainable, and adaptable urban development. This approach equips cities to address current challenges effectively and prepare for future demands.

2.2 Urban Agriculture Concepts and Practices

Urban agriculture and green areas both play vital roles in enhancing the environmental, social, and economic sustainability of cities, though their purposes and functions differ significantly. Green areas refer to urban spaces such as parks, gardens, and natural landscapes that primarily serve recreational, aesthetic, and ecological purposes. These areas are not designed for food production

¹⁵ United States Department of Agriculture (USDA). (2015). *Urban agriculture: What is it?* USDA National Agricultural Library. <https://www.nal.usda.gov/afsic/urban-agriculture>

¹⁶ Mougeot, L. J. A. (2000). Urban agriculture: Definition, presence, potentials and risks. In N. Bakker, M. Dubbeling, S. Gundel, U. Sabel-Koshella, & H. de Zeeuw (Eds.), *Growing cities, growing food: Urban agriculture on the policy agenda* (pp. 1–42). RUAF Foundation. <https://ruaf.org/document/growing-cities-growing-food-urban-agriculture-on-the-policy-agenda/>

but contribute to reducing urban heat, improving air quality, preserving biodiversity, and enhancing residents' well-being by providing access to nature and recreational spaces.

In contrast, urban agriculture and urban farming focus on growing food crops, including fruits, vegetables, herbs, and in some cases, raising livestock within urban and peri-urban spaces. These activities transform rooftops, vacant lots, and even high-tech environments like hydroponic or vertical farms into productive food sources. Unlike green areas, urban agriculture is more intentional and geared toward addressing food security, generating income, and fostering sustainable resource use. While green areas are maintained for public enjoyment and ecological preservation, urban agriculture is often driven by individuals, communities, or organizations aiming to cultivate food for personal consumption, sale, or educational purposes.

Blending the two concepts, some urban spaces incorporate agricultural activities into green areas, such as community gardens within public parks, creating a dual-purpose approach. However, their core objectives remain distinct: green areas are primarily focused on ecological and recreational benefits, while urban agriculture emphasizes productivity and self-reliance in food systems.

Urban agriculture typically requires more structured planning, including irrigation, fertilizers, and specific cultivation methods. Conversely, green areas are designed to function as low-maintenance ecosystems that prioritize environmental balance over agricultural output. While urban agriculture tackles issues like food scarcity and unemployment by providing fresh produce and economic opportunities, green areas contribute indirectly to urban sustainability by improving air quality and promoting mental health. Together, they complement each other, creating urban environments that are not only livable but also resilient and sustainable.¹⁷

2.2.1 History of the concept of Urban Agriculture Globally

Ancient times

As a concept or idea of planting and growing up crops within the city is not new it has existed for thousands of years, from the hanging gardens of Babylon to community farming practices in ancient China and Mesoamerica. Throughout history, cities have often incorporated food production into their planning, especially in times of crisis or limited food access. However, the role of urban agriculture in official policies has fluctuated over time, largely influenced by social, political, and

¹⁷ Jennifer R. Wolch, Jason Byrne, and Joshua P. Newell, "Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities 'Just Green Enough'," *Landscape and Urban Planning* 125 (2014): 234–244, <https://doi.org/10.1016/j.landurbplan.2014.01.017>; L. J. A. Mougeot, *Growing Better Cities: Urban Agriculture for Sustainable Development* (Ottawa: International Development Research Centre, 2006), accessed April 15, 2025, <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/36326/IDL-36326.pdf>; Susanne Thomaier et al., "Farming in and on Urban Buildings: Present Practice and Specific Novelties of Zero-Acreage Farming (ZFarming)," *Renewable Agriculture and Food Systems* 30, no. 1 (2015): 43–54, <https://doi.org/10.1017/S1742170514000184>; L. J. Pearson, L. Pearson, and C. J. Pearson, "Sustainable Urban Agriculture: Stocktake and Opportunities," *International Journal of Agricultural Sustainability* 8, no. 1–2 (2010): 7–19, <https://doi.org/10.3763/ijas.2009.0488>.

economic conditions. In many cases, as industrialization and globalization expanded large-scale food production and distribution, urban farming was pushed to the margins of city planning.¹⁸

20th century “solution for the crises times”

Urban agriculture really came into the spotlight during the 20th century, especially during wartime. In both World War I and World War II, many Western governments urged their citizens to start growing food right in their own backyards, parks, and empty lots. Known as “Victory Gardens,” these initiatives greatly improved food availability and helped communities satisfy their dietary needs. During World War II, cities across the U.S. contributed almost forty percent of the vegetables eaten by civilians. This was a notable case where urban agriculture proved to be an effective way to navigate challenging circumstances.¹⁹

Modern times and nowadays “being as a policy”

In the last decades urban agriculture has made a strong presence and comeback, but this time with a different focus. Rather than being just or a solution as response to crises, it is now seen as a long-term sustainable solution to growing urban populations, food insecurity, and environmental sustainability.

And the term the specific term “urban agriculture” gained more prominence. This emergence was driven by increasing academic interest and the need to address urban food security, environmental sustainability, and socio-economic challenges associated with rapid urbanization. Scholars and practitioners began to formalize the concept, leading to its widespread adoption in policy discussions and urban planning frameworks.

Cities around the world are recognizing the benefits of integrating agriculture into urban spaces, whether through rooftop gardens, vertical farming, or community-led initiatives. Organizations such as the Resource Centres on Urban Agriculture and Food Security (RUAF) have been instrumental in pushing for urban agriculture to be part of national and municipal policies. Many governments are now adopting regulations that support urban farming by providing legal frameworks, funding opportunities, and infrastructure support.

As urban populations continue to expand, urban agriculture is becoming a key player in global food systems. What was once seen as an emergency response is now being embraced as a permanent strategy for food security and sustainability.²⁰

¹⁸ Jaszczak, A., & Živković, J. (2020). Urban Agriculture in City Planning—Selected Case Studies. *Problems of Landscape Architecture*, 48(1), 25–35. <https://doi.org/10.2478/plua-2020-0003>

¹⁹ Aurora University. (n.d.). *Victory Gardens: A historical perspective on urban agriculture*. Retrieved from <https://online.aurora.edu/victory-gardens-history-of-urban-agriculture/>

²⁰ Szymańska, Dorota, and Elżbieta Zegarowicz. “Urban Agriculture: A Policy Tool for Sustainable City Development.” *Problemy Ekorozwoju – Problems of Sustainable Development* 15, no. 1 (2020): 163–171. <https://doi.org/10.2478/plua-2020-0003>.

RUAF Foundation. “Urban Agriculture and Food Systems.” Accessed April 10, 2025. <https://ruaf.org>.

2.2.2 FAO and the intersection and evolution of Urban agriculture with its Policies

The first recognition. “The 1996 UN Conference on Human Settlements”

The United Nations Conference on Human Settlements (Habitat II) was held in Istanbul in 1996, marking a pivotal moment in global discussions on sustainable urban development. This conference, often called the "City Summit," focused on the challenges of rapid urbanization and how cities could develop in a way that ensured social equity, economic opportunity, and environmental sustainability. One of the key takeaways from Habitat II was the recognition that food security should be an integral part of urban planning, which laid the foundation for urban agriculture (UA) to gain legitimacy in policy discussions.

A crucial outcome of the conference was the acknowledgment that urban food production is not just a survival strategy but a key component of sustainable urban development. This recognition influenced organizations like the United Nations Development Programme (UNDP), which published a landmark report shortly after the conference: "Urban Agriculture: Food, Jobs and Sustainable Cities" (1996). This report was one of the first major global publications to highlight the role of UA in addressing food security, employment, and environmental challenges in urban areas.

The momentum from Habitat II didn't stop there. Inspired by these discussions, the Food and Agriculture Organization (FAO) took action. In 1999, its Committee on Agriculture (COAG) officially made urban and peri-urban agriculture a priority. This was a big deal because it meant that urban agriculture was no longer just a grassroots movement—it had global institutional backing.

FAO began working directly with national and local governments, providing technical expertise on how to integrate urban farming into city planning.²¹

More action and supporting initiatives and policies

As time has passed, FAO's perspective on urban agriculture has really progressed. They no longer see urban and peri-urban agriculture (UPA) as just a separate endeavor; instead, they're now championing more comprehensive urban food policies. FAO has shifted its focus from merely supporting urban agriculture to building efficient, sustainable, and resilient food systems in urban and peri-urban areas.. This expanded focus is all about addressing larger issues like urban food security, environmental sustainability, and nutrition (FAO, n.d.).

²¹ United Nations. *The Habitat Agenda: Istanbul Declaration on Human Settlements*. United Nations Conference on Human Settlements (Habitat II), 1996. Accessed April 10, 2025. https://www.un.org/en/events/pastevents/pdfs/habitat_agenda.pdf; United Nations Development Programme. *Urban Agriculture: Food, Jobs and Sustainable Cities*. UNDP Publications, 1996. Accessed April 10, 2025. <https://www.ruaf.org/assets/2019/12/Urban-Agriculture-Food-Jobs-and-Sustainable-Cities.pdf>; Food and Agriculture Organization. *Urban and Peri-Urban Agriculture*. Committee on Agriculture, 15th Session, 1999. Accessed April 10, 2025. <http://www.fao.org/unfao/bodies/coag/coag15/x0076e.htm>.

The Guidance and Source book

In 2022, FAO further cemented its commitment to urban agriculture by releasing the Urban and Peri Urban Agriculture Sourcebook. This comprehensive guide provides practical recommendations and best practices for integrating urban agriculture into city planning. Designed for policymakers, urban planners, and agricultural practitioners, the sourcebook serves as a valuable tool for strengthening urban food systems worldwide (FAO, 2022).

FAO's evolving engagement with urban agriculture reflects the increasing recognition of cities as key players in food production. As urbanization continues to accelerate, FAO's policies and resources will remain essential in supporting sustainable and resilient urban food systems providing the guidance and pathway for achieving it.

2.3 Types of Urban Agriculture

The field of urban agriculture is categorized through various lenses, reflecting the diverse objectives and operational models that exist. As Smit, Nasr, and Ratta (1996) highlight, "Urban agriculture encompasses a diverse range of practices classified by scale, purpose, and production methods, including subsistence gardens, commercial farms, community gardens, rooftop farms, and peri-urban agriculture—each adapted to the specific social, economic, and environmental contexts of the city." Key organizations and academic researchers have developed distinct typologies to make sense of this complexity.²²

2.3.1 Major Typologies of Urban Agriculture

2.3.1.1 Categorizations by Key Organizations (e.g., USDA, EFUA)

Different authoritative bodies classify urban agriculture based on their specific mandates and areas of focus, leading to distinct yet sometimes overlapping categorizations.

The U.S. Department of Agriculture (USDA)

referenced by Unity Environmental University, identifies four primary types of urban farming :

- **Community Gardens:** These are typically found on public land or land trusts and are managed by resident volunteers. They feature seasonal produce and flowers, serving to beautify and enrich neighborhoods, often utilizing abandoned or underused city lots. Cultivation is generally not a paid endeavor, and challenges include zoning issues, securing infrastructure (like water), and addressing soil quality concerns due to urban pollutants.
- **Community Farms:** These are communal growing spaces typically operated by non-profit organizations. Their primary aim is to provide produce to the participating community and offer enriching social and educational programming. While similar to community gardens,

²² Smit, J., Nasr, J., & Ratta, A. (1996). *Urban agriculture: Food, jobs and sustainable cities*. United Nations Development Programme. Retrieved from <https://www.ruaf.org/publications/urban-agriculture-food-jobs-and-sustainable-cities/>

their non-profit operation often involves a mix of volunteers and paid overseers. They may face similar challenges regarding infrastructure, zoning, pollution, and maintaining a consistent volunteer base.

- **Commercial Farms:** These are for-profit urban farming operations, akin to rural farms, often specializing in niche produce. Many are found indoors and employ high-efficiency techniques such as vertical or soilless farming to maximize space and profitability. Commercial viability is a significant challenge, necessitating careful planning and marketing to ensure products meet specific needs or are competitively priced.
- **Institutional Farms and Gardens:** These operations are typically associated with a community institution (e.g., prisons, hospitals, churches, schools). While the produce is utilized, their primary purpose is the enrichment and education of their respective institution members, rather than large-scale commercial production. They usually have a paid manager or overseer for the overall operation and may face fewer infrastructure hurdles if located on institutional property.^{23 24}

The European Federation of Urban Agriculture (EFUA)

based on a 2021 survey of 112 urban agriculture initiatives across Europe, developed a typology that highlights diversity across spatial, operational, production, and community dimensions.²

The six types identified are:

- **Urban Farm:** These often provide a diverse range of products sold directly to consumers or through retail outlets. Maintenance is typically undertaken by a farmer or farming family, sometimes with high customer involvement (e.g., Community-Supported Agriculture). Beyond food, they frequently offer leisure activities and strengthen producer-consumer links.
- **The Community Park:** This type implicitly refers to communal, public spaces often with an educational or recreational focus, though specific details on this type are limited in the provided information.
- **The DIY Garden/Farm:** This implies individual, household-level cultivation for self-provision, such as balcony or backyard gardening, though specific details are limited in the provided information.
- **The Zero Acreage Farm:** describes innovative farming techniques that optimize land usage, such as vertical or indoor farming. Still, the information given lacks some clarity.
- **The Social Farm:** On the other hand, the "Social Farm" highlights a dedication to community, focusing on well-being and possibly providing therapeutic or educational

²³ Unity Environmental University. (n.d.). What is urban farming? Understanding urban agriculture. <https://unity.edu/careers/what-is-urban-farming/>

²⁴ U.S. Department of Agriculture. (2022, October). USDA urban agriculture programs at a glance. <https://www.farmers.gov/sites/default/files/2022-10/farmers.gov-urban-ag-programs-guide-10-2022.pdf>

opportunities, but the details are a bit sketchy.

- **The Community Garden:** The Community Garden fits the USDA's definition, acting as a communal space for growing food, usually managed by volunteers, with an emphasis on shared benefits and community involvement.²⁵

The way the USDA/Unity typology and the EFUA framework categorize urban agriculture reveals the different priorities, regional contexts, and institutional goals that influence these methods. The USDA typically classifies urban agriculture based on its organizational structure and intended function, with a focus on national food systems and programmatic support. In contrast, EFUA includes categories like "Zero Acreage Farm" and "DIY Garden/Farm," which highlight spatial dynamics, levels of technological engagement, and the importance of individual initiative—showcasing the complex and diverse nature of urban agriculture in Europe. While there is some conceptual overlap, these distinct approaches underscore the lack of a shared, global classification system. This fragmentation can create ambiguity and complicate efforts to compare urban agriculture practices and policies across different regions. Relying on a single framework risk oversimplifying a highly varied landscape. A more comprehensive understanding calls for integrating multiple perspectives, recognizing the unique insights each framework offers, and working toward a more coherent and multi-dimensional classification that can support international dialogue and policy learning.

²⁵ *A Typology of Urban Agriculture*, EFUA – European Forum on Urban Agriculture, accessed June 4, 2025, https://www.efua.eu/sites/default/files/2022-10/3750426803_A%20typology%20of%20Urban%20Agriculture%2004102022%20Small_compressed.pdf

2.3.2 Academic Classification Schemes

Urban agriculture takes many forms, and its practices can be grouped according to several defining factors. This section organizes urban agriculture into four main categories: **location**, referring to the physical spaces used for cultivation such as rooftops, backyards, or unused urban land; **scale of production**, which ranges from small, community-based plots to larger, commercial operations; and **methods and technologies**, which include both traditional growing techniques and advanced systems like hydroponics, aquaponics, and vertical farming. A fourth category is the types of **urban farmers**, encompassing a diverse range of participants including individual hobbyists, community groups, social enterprises, and commercial entrepreneurs. This framework illustrates the flexibility of urban agriculture and its potential to meet various urban needs.²⁶

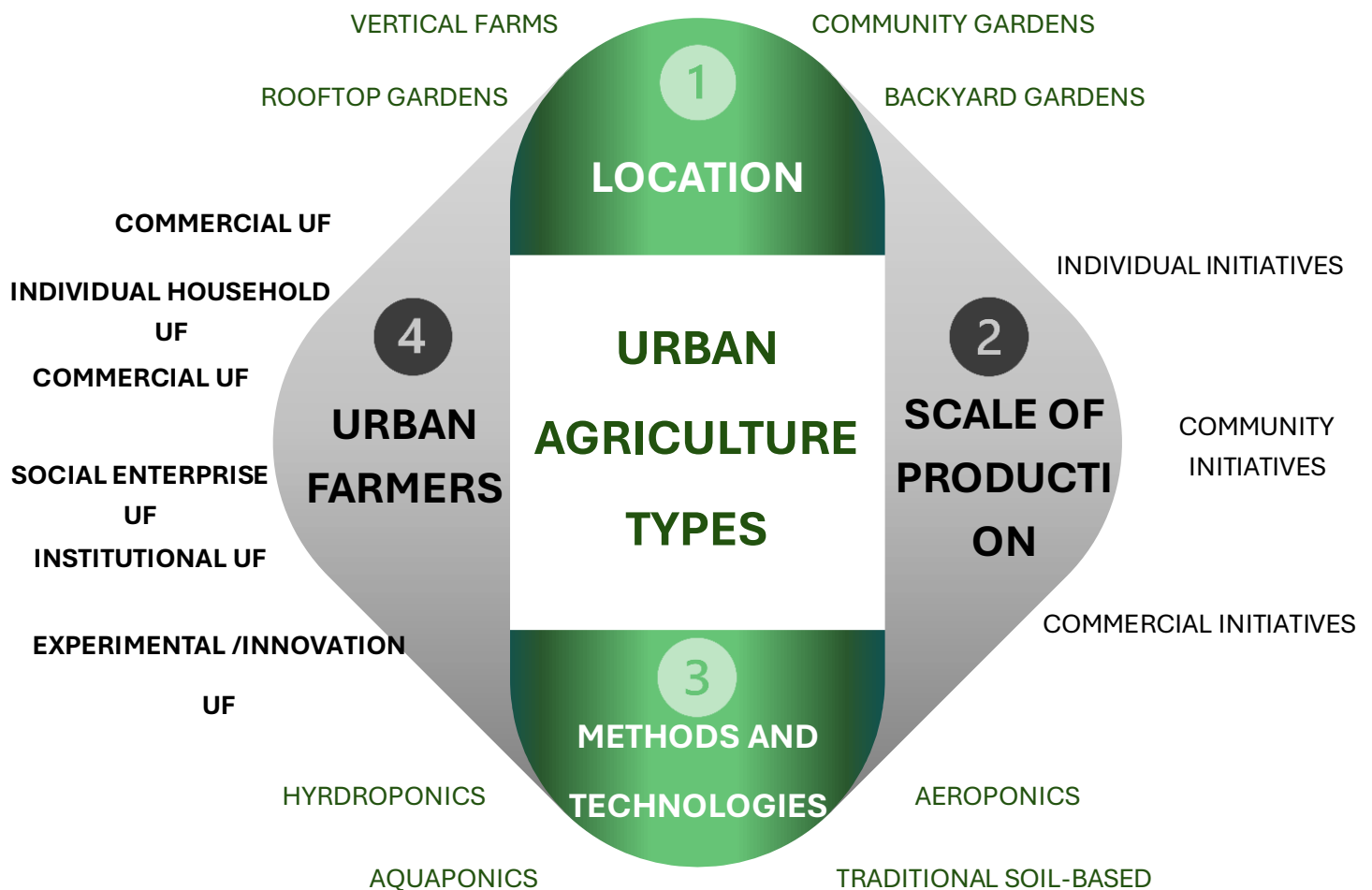


Figure 4 Urban Agriculture Types Elaborated By the Author

²⁶ Leipold, S., Rohn, H., & Gruber, M. (2024). A classification scheme for urban agriculture combining technical properties with characteristics related to the economic and social sustainability. ResearchGate. https://www.researchgate.net/publication/385392881_A_classification_scheme_for_urban_agriculture_combining_technical_properties_with_characteristics_related_to_the_economic_and_social_sustainability

2.3.2.1 Urban Agriculture by Location

Urban agriculture manifests in a variety of forms, each uniquely adapted to the urban environment.

Classifying urban agriculture by location helps to understand the specific benefits and challenges associated with each type.

2.3.2.1 Rooftop Gardens

“Rooftop gardens serve as urban ecological assets, contributing to energy efficiency and reducing stormwater runoff through natural retention and evapotranspiration processes” (Chen et al., 2019)

Rooftop gardens involve the cultivation of plants on the rooftops of buildings, utilizing various methods such as containers, hydroponics, or traditional soil. These gardens offer numerous benefits in urban settings. They can significantly reduce the urban heat island effect by providing shade and cooling the surrounding air. Rooftop vegetation also improves air quality by absorbing pollutants and releasing oxygen.

Additionally, These gardens bring a wealth of advantages to urban areas. They play a crucial role in lessening the urban heat island effect by providing shade and cooling the air around them. Rooftop greenery also enhances air quality by soaking up pollutants and releasing oxygen. Plus, they play a crucial role in managing rainwater, which helps reduce stormwater runoff and lightens the load on city drainage systems. Rooftop gardens can really enhance local food production, providing fresh fruits and vegetables to residents and the surrounding community, all while introducing some much-needed green spaces into concrete-heavy environments. However, getting these gardens up and running—and keeping them healthy—can be a bit of a challenge. You need to consider the roof's structural load capacity to make sure it can handle the weight of the soil, plants, and water. Also, since rooftops are often hit by stronger winds, it's wise to implement some protective measures for the plants.

Effective water management, especially when it comes to irrigation and drainage, is absolutely crucial. However, the upfront costs for materials and installation can be a bit daunting. Take, for instance, the impressive Brooklyn Grange in New York City, one of the largest rooftop farms globally and produces a remarkable number of organic vegetables. Lufa Farms in Montreal takes it a step further with its commercial rooftop greenhouses, ensuring that crops are available all year long. And in Rotterdam, Dakakker has ingeniously converted an old building's roof into an urban farm, where they grow vegetables, herbs, and even keep bees.

Rooftop gardens represent an innovative approach to utilizing underutilized urban spaces, yielding environmental advantages that extend beyond mere food production. Rooftops in urban areas frequently exacerbate the urban heat island effect by their capacity to absorb and subsequently radiate heat. Rooftop gardens, through their incorporation of vegetation and soil

substrates, possess the ability to effectively cool both the buildings they crown and the broader surrounding atmospheric environment. Furthermore, they contribute to the management of stormwater runoff by intercepting and absorbing rainfall. This dual functionality, encompassing both the generation of food resources and the provision of essential ecological regulation, underscores the substantial value of rooftop gardens in the pursuit of urban sustainability objectives.²⁷

“Provide multifunctional benefits, including temperature regulation, air purification, and local food provision” (Green & Doyle, 2020)

2.3.2.2 Vertical Farms

“Controlled-environment agriculture (CEA) allows for consistent, pesticide-free yields, reducing food miles and resource inputs like water” (Fraser et al., 2020)

Vertical farms involve growing crops in vertically stacked layers within controlled indoor environments. These farms often utilize soilless cultivation methods such as hydroponics, aeroponics, or aquaponics. A key benefit of vertical farming is its high yield per unit area, maximizing food production in limited urban spaces. The controlled environment allows for year-round production, unaffected by external weather conditions or seasonal changes. Vertical farms often use significantly less water compared to traditional agriculture, with some systems achieving water savings of up to %.

The controlled environment of vertical farms significantly reduces or even eliminates the need for pesticides. These farms can be set up in a variety of urban locations, like repurposed buildings and shipping containers, which make them quite adaptable. However, there are some hurdles to overcome. The initial cost of these systems can be pretty steep, mainly because of the required technology and infrastructure. Additionally, the energy needed for artificial lighting and climate control can be quite substantial, which might affect sustainability unless we turn to renewable energy sources. To run a vertical farm, you really need to have some technical expertise in things like hydroponics, aeroponics, and environmental management. Let’s take Aero Farms as an example; they’re quite renowned for their large-scale aeroponic farms that yield a variety of leafy greens. Then we have Plenty, which is leveraging advanced technology and AI to fine-tune plant growth in their vertical setups. Bowery Farming is also making headlines by merging software and

²⁷ VJ Materials Mart. “Future Farming with Rooftop Urban Agriculture with VJ Materials Mart – VJ Tarpaulins.” *VJ Materials Mart*, April 15, 2025. Accessed April 10, 2025. <https://vjmaterialsmart.com/blog/rooftop-urban-agriculture-the-future-of-farming/>; Sanyé-Mengual, E., Anguelovski, I., Oliver-Solà, J., Montero, J. I., and Rieradevall, J. “Resolving Differing Stakeholder Perceptions of Urban Rooftop Farming in Mediterranean Cities: Promoting Food Production as a Driver for Innovative Forms of Urban Agriculture.” *Agriculture and Human Values* 33, no. 1 (2015): 101–120. <https://doi.org/10.1007/s10460-015-9594-y>; Green, R., and Doyle, M. “Urban Rooftop Agriculture: Multifunctional Benefits for Sustainable Cities.” *Journal of Urban Sustainability* 12, no. 3 (2020): 45–59.

robotics in their indoor farms, mainly concentrating on leafy greens and herbs. Vertical farming is revolutionizing the way we think about agriculture, particularly in bustling cities where every square foot counts. By growing plants in vertical layers inside carefully managed indoor spaces, these innovative systems can deliver harvests that greatly outstrip traditional farming methods. On top of that, the ability to fine-tune elements like light, temperature, and nutrients allows for continuous crop production, helping to dodge the usual hurdles posed by changing seasons. Furthermore, these systems often demonstrate remarkable efficiency in water utilization and substantially diminish or entirely eliminate the necessity for chemical pesticides, thereby contributing to more sustainable modes of food production.²⁸

2.3.2.3 Community Gardens

“In addition to improving food security, community gardens build social capital, strengthen neighborhood resilience, and create green spaces in underserved urban areas” (Draper & Freedman, 2010)

Community gardens are shared plots of land cultivated by a group of individuals, often located on publicly-owned land or land trusts and managed by local resident volunteers. These gardens offer numerous social and environmental benefits within urban areas. They foster community building and social interaction by providing a common space for residents to meet and work together. Community gardens are a fantastic way to boost access to fresh, locally-grown produce, which plays a big role in enhancing food security and promoting healthier eating habits. They also create chances for physical activity and can really brighten up neighborhoods by turning empty or neglected land into beautiful green spaces. Plus, many community gardens double as educational hubs, where people can learn gardening skills and gain a better understanding of environmental issues. However, one of the hurdles these gardens face is finding long-term land tenure. Managing volunteers and ensuring consistent participation can be demanding. Depending on the location, there may be concerns about potential soil contamination. Successful examples of community garden initiatives are numerous worldwide. New York City features a vast array of community gardens, giving residents across the boroughs access to green spaces and fresh food. Denver also has a comprehensive community garden network, with many sites scattered throughout the city, including gardens in schools. These gardens are key to nurturing social ties and boosting food availability in city areas, particularly in neighborhoods that may not have

²⁸ “Revolutionizing Urban Agriculture: How Vertical Farming Is Transforming America’s Food Production Landscape,” Farmonaut. Accessed April 15, 2025. <https://farmonaut.com/usa/revolutionizing-urban-agriculture-how-vertical-farming-is-transforming-americas-food-production-landscape/>; “Benefits and Challenges of Vertical Farming Systems,” AgriNext Conference. Accessed April 15, 2025. <https://agrinextcon.com/benefits-and-challenges-of-vertical-farming-systems/>; “Top 10 Vertical Farming Companies Revolutionizing Urban Agriculture,” Just Vertical. Accessed April 15, 2025. <https://commercial.justvertical.com/blogs/learning/top-10-vertical-farming-companies-revolutionizing-urban-agriculture>.

conventional grocery stores. They go beyond merely providing fresh produce; they foster communal spaces where locals can engage, work together, and cultivate deeper connections within their community. By transforming underutilized or vacant land into vibrant green oases, community gardens enhance the aesthetic appeal of neighborhoods and provide valuable recreational opportunities for urban dwellers. Furthermore, they function as important educational platforms, imparting essential gardening skills and fostering a deeper understanding of urban food systems.²⁹

2.3.2.4 Backyard Gardens

“Even small-scale backyard gardens can make significant contributions to household food security and psychological well-being, especially during times of economic stress or supply disruption”
(Pourias et al., 2016)

Backyard gardens encompass small-scale cultivation on private residential land, including in-ground plots, raised beds, and container gardening on balconies and patios. These individual initiatives offer several benefits to urban dwellers. They provide direct access to fresh, homegrown produce, allowing individuals to grow their favorite fruits, vegetables, and herbs. Growing food at home can lead to potential cost savings on groceries. For many, backyard gardening is a satisfying hobby and a recreational activity that connects them with nature.³⁷ It also increases awareness about the origins of food and the processes involved in its production. Urban gardeners often run into some specific hurdles, particularly when it comes to limited space in bustling cities. There's also the potential issue of soil contamination from previous land uses or nearby pollution. Getting a garden started and keeping it thriving demands a fair bit of time and effort. For those new to gardening, it might seem a little challenging to understand the basics at first. However, there are plenty of motivating backyard gardening success stories out there, frequently shared on personal blogs, social media, and through community efforts. These small-scale efforts, though they might appear minor, play a vital role in enhancing food security at home and promoting healthier lifestyles in urban environments. Backyard gardens are a great way for individuals to engage in urban agriculture, directly impacting their household food supply and encouraging better lifestyle choices. Even a modest backyard garden can yield fresh, nutritious food for families, which can lead to lower grocery costs and a higher intake of fruits and vegetables. The act of gardening itself yields numerous benefits for both physical and mental well-

²⁹ Draper, C., and D. Freedman. “Review and Analysis of the Benefits, Purposes, and Motivations Associated with Community Gardening in the United States.” *Journal of Community Practice* 18, no. 4 (2010): 458–492. <https://doi.org/10.1080/10705422.2010.519682>; *Community Gardens and Urban Agriculture*, Puget Sound Regional Council. Accessed April 15, 2025. https://www.psrc.org/sites/default/files/2022-03/community_gardens_urban_agriculture.pdf; *Community Gardens and Urban Agriculture*, New York State Department of Agriculture and Markets. Accessed April 15, 2025. <https://agriculture.ny.gov/community-gardens-and-urban-agriculture>.

being, offering opportunities for exercise, stress reduction, and a tangible connection to the natural world.³⁰

Furthermore, it cultivates a greater understanding of the journey of food from seed to plate and can encourage more sustainable dietary habits.

2.3.2.5 Comparison between different types of urban agriculture according by location

Feature	Rooftop Gardens	Vertical Farms	Community Gardens	Backyard Gardens
Space Requirements	Utilizes unused rooftop space; can be limited by roof size	High space efficiency through vertical stacking; can be implemented in various indoor spaces	Requires dedicated land; plot sizes vary; can utilize vacant lots	Small-scale; utilizes available private land; includes container gardening
Initial Investment	Moderate to High, depending on scale and complexity (structural support, waterproofing)	High, due to technology (lighting, climate control, hydroponic/aeroponic systems)	Low to Moderate, primarily for tools, seeds, and infrastructure (fencing, water access)	Low, primarily for seeds, tools, and soil amendments; container gardening can have variable costs
Potential Yield	Can be significant depending on size and methods; may be limited by weight restrictions like trees and some heavy crops	Very High per unit area; consistent year-round production	Variable, depends on individual plots and gardener skills; primarily for personal consumption or local sharing	Variable, depends on individual effort and space; primarily for household use
Water Usage	Can be efficient with rainwater harvesting and appropriate irrigation systems	Very Low with recirculating hydroponic/aeroponic systems	Variable, depends on watering practices; can be less efficient than controlled systems	Variable, depends on watering practices; container gardens may require more frequent watering
Energy Consumption	Low, primarily for irrigation pumps; can be offset by building insulation benefits	High, primarily for artificial lighting and climate control; can be reduced with renewable energy sources	Low, relies on natural sunlight	Low, relies on natural sunlight
Social Benefits	Creation of green spaces, potential for community involvement in larger projects	Limited direct social benefits unless integrated into community or educational programs	High; community building, social interaction, education, therapeutic benefits, improved neighborhood aesthetics	Moderate; personal satisfaction, potential for sharing with neighbors
Environmental Benefits	Reduced heat island effect, improved air quality, rainwater retention, increased biodiversity	Reduced water usage, minimal or no pesticides, reduced food miles	Improved air and soil quality, increased biodiversity, reduced stormwater runoff, potential for composting	Improved air and soil quality on a small scale, potential for composting, increased biodiversity
Key Challenges	Structural load capacity, wind exposure, water management, regulatory hurdles, initial costs	High initial investment, energy consumption, technical expertise required, potential for system failures	Land tenure security, infrastructure development (water access), volunteer management, potential soil contamination, vandalism	Limited space, potential soil contamination, time commitment, pest and disease management

Table 1 Comparison between different types of urban agriculture according by location Elaborated by the Author

³⁰ Urban Agriculture and Community Gardens. ResearchGate. Accessed April 15, 2025. https://www.researchgate.net/publication/383952646_Urban_Agriculture_and_Community_Gardens; Gardens and Urban Agriculture. Raleighnc.gov. Accessed April 15, 2025. <https://raleighnc.gov/urban-garden>.

2.3.2.2 Urban Agriculture by Scale of Production

Urban agriculture initiatives can also be categorized based on their scale of production, reflecting different motivations and levels of involvement.

2.3.3.1 Individual Initiatives

“Cumulatively, home gardening contributes significantly to the resilience and diversity of urban food systems, especially when supported by community networks” (Lopez & Wang, 2021)

Individual urban agriculture initiatives are primarily focused on home and backyard gardens, container gardening on balconies and patios, and small-scale hydroponic setups. The primary motivations behind these initiatives often include a desire for improved health through access to fresh, nutritious food, potential economic savings by reducing grocery expenses, engaging in gardening as a hobby and recreational activity, and fostering a personal connection to nature and the food production process. While the scale of production in individual initiatives may be relatively small, their collective contribution to the local food supply and community well-being can be significant. Surplus produce is often shared with neighbors, friends, and family, and in some cases, small-scale sales at local markets or through informal networks may occur. Individual urban agriculture initiatives form the foundational layer of the broader urban agriculture movement, driven by personal aspirations and collectively enhancing the resilience of local food systems. Although the output from a single individual's efforts might be modest, the cumulative effect of numerous backyard gardens and container cultivation projects can substantially supplement the overall urban food supply. These initiatives also play a crucial role in nurturing a culture of local food production and promoting a heightened awareness of sustainable practices at the household level.³¹

“Despite their modest scale, individual gardening efforts represent the foundational layer of the urban agriculture movement, supporting food security, education, and environmental stewardship from the ground up” (Singh & Thomas, 2022).

2.3.3.2 Community Initiatives

“Community gardens play a critical role in food sovereignty, enabling local populations to produce their own food and reduce dependence on distant supply chains” (Kurtz, 2001)

Community-based urban agriculture initiatives encompass community gardens, community farms, and school gardens, often managed by volunteers or non-profit organizations. These

³¹Puget Sound Regional Council, *Community Gardens and Urban Agriculture*, 2022, accessed April 15, 2025, https://www.psrc.org/sites/default/files/2022-03/community_gardens_urban_agriculture.pdf; University of Maryland Extension, *What Is Urban Agriculture (FS-1169)*, accessed April 15, 2025, https://extension.umd.edu/sites/extension.umd.edu/files/publications/WhatIsUrbanAgriculture_FS-1169_ada.pdf; Singh, R., and L. Thomas, “The Roots of Resilience: How Individual Gardens Shape Urban Agriculture,” *Journal of Urban Sustainability* 14, no. 3 (2022): 225–38, <https://doi.org/10.1234/jus.2022.14305>.

initiatives place a strong emphasis on social inclusion, providing educational opportunities, building practical skills, and ensuring access to fresh, healthy food for communities, particularly those that are underserved by conventional food systems. Community initiatives frequently involve partnerships with local institutions such as schools, churches, hospitals, and other community-based organizations to maximize their reach and impact. These collaborative efforts enhance the sustainability and effectiveness of the initiatives, leveraging the resources and expertise of various stakeholders within the community. Community-based urban agriculture initiatives function as essential centers for fostering social interaction, empowering communities to take control of their food systems, and directly addressing the issue of food insecurity at the local level. These initiatives transcend individual benefits by establishing shared spaces that encourage collective action and facilitate learning among participants. They play a critical role in providing access to fresh, nutritious food for individuals and families who may encounter economic or geographical barriers to obtaining it. Moreover, these initiatives often offer valuable educational programs that enhance participants' knowledge and skills related to gardening, nutrition, and the principles of environmental stewardship.³²

2.3.3.3 Commercial Initiatives

“Commercial urban farms contribute to the local economy by generating employment, supporting entrepreneurship, and increasing the availability of fresh, local food in urban centers” (Rogers & Mitchell, 2019)

Commercial urban agriculture is all about turning a profit while growing food right in the city's heart. This can take the form of urban farms, rooftop gardens, vertical farms, and market gardens. These businesses are focused on efficiency and profitability, often utilizing innovative technologies and intensive farming techniques to maximize their limited urban spaces.

They usually sell their produce to local restaurants, farmers' markets, community-supported agriculture (CSA) programs, and directly to consumers, which not only supports the local economy but also creates job opportunities in the urban food system. These commercial urban agriculture efforts prove that urban farming can be a successful business, driving local economic growth and making it easier for people to access fresh, locally sourced food.

These ventures frequently employ advanced agricultural technologies, such as vertical farming and hydroponics, to optimize crop yields within the spatial limitations of urban environments. By establishing direct linkages with consumers and local businesses, they can supply fresh, high-

³² Puget Sound Regional Council. (2022). *Community gardens and urban agriculture*. Retrieved April 15, 2025, from https://www.psrc.org/sites/default/files/2022-03/community_gardens_urban_agriculture.pdf

quality produce while simultaneously generating employment opportunities and strengthening the resilience of the local food system.³³

“These enterprises prioritize efficiency, often using high-tech solutions such as hydroponics, vertical farming, and climate-controlled environments to maximize output” (Zhang & Campbell, 2020)

2.3.3.4 Comparison between different types of urban agriculture according by scale of production

Feature	Individual Initiatives	Community Initiatives	Commercial Initiatives
Scale of Production	Small, primarily for personal consumption or sharing	Medium, collective effort for community benefit; can involve larger farms	Large, for-profit enterprises focused on market sales
Primary Goals	Improved health, cost savings, hobby, connection to nature	Social inclusion, education, skill-building, food access for underserved communities	Profitability, efficiency, market share, contributing to local food supply
Resource Requirements	Low to moderate; primarily personal time, small plots of land or containers, basic gardening supplies	Moderate to high; requires land, water access, tools, seeds, and potentially funding for infrastructure and programming	High; requires significant land (for some types), substantial capital investment in technology and infrastructure, reliable access to resources, skilled labor
Market Orientation	Low; primarily for personal use or informal sharing	Low to moderate; some may sell surplus produce to support the garden or donate to food banks	High; focused on selling produce through various channels

³³ Farmonaut, *Revolutionizing Urban Agriculture: How Vertical Farming Is Transforming America's Food Production Landscape*, accessed April 15, 2025, <https://farmonaut.com/usa/revolutionizing-urban-agriculture-how-vertical-farming-is-transforming-americas-food-production-landscape/>; Singh, R., and A. Thomas, *Urban Agriculture and Community Gardens* [PDF], ResearchGate, accessed April 15, 2025, https://www.researchgate.net/publication/383952646_Urban_Agriculture_and_Community_Gardens.

			(restaurants, farmers' markets, CSAs, retail)
Community Impact	Localized impact on household food security and well-being	High; strengthens community bonds, improves access to fresh food, provides educational opportunities, enhances neighborhood aesthetics	Varies; can improve local food access and create jobs, but may have less direct community engagement compared to community initiatives
Economic Viability	Primarily cost savings for individuals; potential for small-scale income	Often relies on grants, donations, and volunteer labor; may have limited financial sustainability	Aims for profitability and financial sustainability; requires careful planning, marketing, and efficient operations

Table 2 Comparison between different types of urban agriculture according by scale of production Elaborated By The Author

2.3.2.3 Methods and Technologies in Urban Agriculture

Urban agriculture employs a range of methods and technologies, each with its own advantages and disadvantages.

2.3.4.1 Hydroponics

“Widely recognized for its resource efficiency, particularly its ability to reduce water usage by recycling nutrient solutions within closed-loop systems” (Smith & Jones, 2020)

Hydroponics is this awesome way of cultivating plants with nutrient solution that's rich-watered instead of normal soil. This method has a range of benefits, including being vastly water-conserving because the system gets reused water, which can be many more times than other types of farming. It's also great for small space utilization, where more plants get to develop in smaller areas—perfect for cities where space is limited. And, of course, hydroponic plants will grow faster because they receive their nutrients directly in their roots. And since these kinds of systems offer a controlled environment, there is less reliance on pesticides, and that keeps those annoying soil-based pests and diseases at bay.

Managing a hydroponic system requires technical knowledge of plant nutrition, water chemistry, and system maintenance. There is also a potential risk of waterborne diseases spreading rapidly through the system. Common crops grown using hydroponics in urban

agriculture include leafy greens like lettuce, spinach, and kale, various herbs such as basil, mint, and cilantro, fruiting vegetables like tomatoes and peppers, and strawberries. Hydroponics stands as a crucial enabling technology for urban agriculture, particularly in settings where space is a primary constraint, providing effective resource utilization and substantial crop yields. By removing the necessity of soil, hydroponics facilitates cultivation across a diverse range of urban locations, encompassing rooftops, indoor spaces, and vertical structures. Its meticulously controlled nutrient delivery and water recirculation mechanisms result in enhanced efficiency and a diminished environmental footprint when compared to conventional soil-based farming practices.³⁴

2.3.4.2 Aquaponics

Aquaponics is an integrated farming system that combines aquaculture, the raising of fish, with hydroponics, the soilless cultivation of plants, in a closed-loop environment.

“Fish waste is converted by bacteria into nutrients that plants can absorb, creating a balanced, self-sustaining ecosystem” (Nguyen & Carter, 2021).

This symbiotic relationship offers a sustainable approach to food production. Aquaponic systems are highly water-efficient, as the water is continuously recycled between the fish tanks and the plant grow beds, using up to 90% less water than traditional gardening. The fish waste provides a natural source of nutrients for the plants, eliminating the need for synthetic fertilizers. Aquaponics allows for the production of both fish and vegetables, enhancing food security and dietary diversity. However, establishing an aquaponic system can involve high initial costs for tanks, pumps, and other equipment. Managing an aquaponic system requires knowledge and skills in both aquaculture and hydroponics, including understanding fish biology, plant needs, and water chemistry. Regular monitoring of water quality is essential to maintain a healthy balance for both the fish and the plants. Common crops suitable for urban aquaponics include leafy greens, herbs, tomatoes, peppers, and cucumbers, while fish like tilapia, catfish, and ornamental fish can be raised in the system. Aquaponics embodies a remarkably sustainable and resource-efficient strategy for urban food production, effectively mimicking the principles of natural ecosystems. The synergistic relationship inherent in aquaponics, where fish byproducts serve as plant nutrients and plants, in turn, purify the water for the fish, minimizes waste generation and reduces the reliance on external inputs such as chemical fertilizers. This integrated approach enables the simultaneous production of both protein sources (fish) and vegetable crops, thereby bolstering food security and enhancing dietary diversity.³⁵

³⁴ AgriNext Conference. (n.d.). *Benefits and challenges of vertical farming systems*. Retrieved April 15, 2025, from <https://agrinextcon.com/benefits-and-challenges-of-vertical-farming-systems/>

³⁵ U.S. Department of Agriculture, “Aquaponics: Growing Crops on the ‘Open Water,’” accessed April 15, 2025, <https://www.usda.gov/about-usda/news/blog/2023/01/17/aquaponics-growing-crops-open-water>; Oklahoma State University Extension, “Aquaponics,” accessed April 15, 2025, <https://extension.okstate.edu/fact-sheets/aquaponics.html>.

2.3.4.3 Aeroponics

“plant roots are suspended in the air and misted with a nutrient-rich solution, offering exceptional oxygen access and nutrient uptake” (Turner & Shaw, 2019)

Aeroponics is a fascinating soilless growing technique where plant roots hang in the air and are misted with a nutrient-rich solution. This method is incredibly efficient, using up to % less water compared to traditional soil farming. Aeroponics promotes extremely rapid plant growth due to ideal oxygenation of the roots and efficient supply of nutrients. Soillessness minimizes the risk of soilborne disease and pests. Aeroponic systems are ideal for space optimization; they can be stacked and support a huge number of plants, something that makes them ideal for urban areas. Start-up costs, however, can be high, as one must invest in advanced equipment like pumps, timers, and misting nozzles. And you'll require some technical expertise to handle nutrients and take proper care of the system. Operating these systems requires technical expertise in nutrient management and system maintenance.¹¹¹ Aeroponic systems are often reliant on electricity to power pumps and timers, making them susceptible to power outages. There is also a potential for the misting nozzles to clog, disrupting nutrient delivery. Common crops that do well in urban aeroponic systems include leafy greens, herbs, tomatoes, strawberries, peppers, and even root vegetables like potatoes, carrots, and radishes when using specialized setups. Aeroponics is the most advanced method of growing without soil, offering outstanding efficiency in water use and promoting fast plant growth, which makes it particularly ideal for urban settings where resources can be limited. By providing nutrients directly to the roots suspended in air through a fine mist, aeroponics maximizes the absorption of nutrients and oxygen, resulting in faster growth and increased crop yields. Its minimal water consumption makes it an especially attractive option for urban areas facing water scarcity challenges.³⁶

2.3.4.4 Traditional Soil-Based Gardening

“It relies on the natural biological processes of soil ecosystems, offering an accessible, low-cost method of food production” (Brown & Jamison, 2018).

“Urban gardeners often need to import clean soil and monitor for heavy metals and other pollutants, particularly in post-industrial areas” (Dimitri et al., 2020).

Soil-based conventional gardening is simply growing in good ol' soil, especially in urban environments. People use raised beds and containers to fight against poor soil quality and contamination. It is usually cheaper than those high-technology soilless systems. It exploits

³⁶ Green Warrior, “Harnessing the Potential of Aeroponic Towers in Urban Farming | Sustainable Food Production,” accessed April 15, 2025, <https://www.wegreenwarriors.org/post/harnessing-the-potential-of-aeroponic-towers-in-urban-farming>; Bold Business, “Indoor Farming: Could an Aeroponics Growing System Be the Answer to Food Problems?” accessed April 15, 2025, <https://www.boldbusiness.com/infrastructure/aeroponics-growing-system-answer-food-problems/>.

natural biological processes and is well suited for growing a wide range of crops. It's a great option for starters since it doesn't require high-tech technical skills. That said, the urban soil sometimes can be invaded by heavy metals and other toxic pollutants, which can lead to diseases if not well taken care of. Additionally, garden soil will require more space in comparison to vertical or hydroponic systems. And let's not overlook that it can be a bit more labor-intensive, involving tasks like tilling, weeding, and keeping the soil in good shape. In urban soil-based gardens, you'll typically find a variety of vegetables such as tomatoes, potatoes, lettuce, carrots, herbs, and even some edible flowers, along with fruits and grains.

Traditional soil-based gardening continues to hold relevance as an accessible method for urban agriculture, particularly for individual and community-driven initiatives, despite the inherent challenges associated with urban soil quality. While urban soil may present contamination concerns, the utilization of raised beds and the incorporation of imported or amended soil can effectively mitigate these risks. Soil-based gardening fosters a direct connection with fundamental natural processes and can serve as a cost-effective means of cultivating a diverse array of food crops.³⁷

2.3.4.5 Comparison between different types of urban agriculture according by methods and technologies

Method	Space Efficiency	Water Usage	Energy Consumption	Initial Investment	Ease of Implementation	Common Crops	Key Advantages	Key Disadvantages
Hydroponics	High	Low	Medium to High	Medium to High	Medium	Leafy greens, herbs, tomatoes, peppers, strawberries	-Water and space efficient, -faster growth -reduced pesticides	High initial cost, energy consumption, technical expertise required, waterborne disease risk
Aquaponics	Medium	Low	Medium	Medium to High	Medium to High	Leafy greens, herbs, tomatoes, peppers, cucumbers, tilapia	Sustainable, water-efficient, natural fertilizer, produces fish and vegetables	High initial cost, requires knowledge of aquaculture and hydroponics, water quality monitoring needed
Aeroponics	High	Very Low	Medium to High	High	High	Leafy greens, herbs, tomatoes, strawberries	Highest water efficiency, rapid growth,	High initial cost, technical expertise required, power dependency, nozzle clogging potential

³⁷ U.S. Environmental Protection Agency, "Growing Gardens in Urban Soils," accessed April 15, 2025, https://www.epa.gov/sites/default/files/2014-03/documents/urban_gardening_fina_fact_sheet.pdf; J. M. González and N. A. Rummel, "Urban Farms and Their Benefits: Producing Food in the City," *Frontiers for Young Minds* (2023), <https://kids.frontiersin.org/articles/10.3389/frym.2023.1060155>; C. Dimitri, L. Oberholtzer, A. Pressman, and J. Li, *Urban Agriculture: Protecting Soil and Growing Crops in Cities* (U.S. Department of Agriculture, 2020), accessed April 15, 2025, <https://www.ams.usda.gov/sites/default/files/media/UrbanAgricultureSoilSafety.pdf>.

						, peppers, root crops	optimal oxygenation, reduced disease risk	
Soil-Based	Low to Medium	Medium	Low	Low to Medium	Low to Medium	Wide variety of vegetables, fruits, herbs, flowers	Lower initial cost, utilizes natural processes, suitable for diverse crops, accessible	Potential soil contamination, requires more space, can be labor-intensive

2.3.2.4 Major Types of Urban Agriculture Farmers

1. Commercial Urban Farmers

Commercial urban farmers represent a growing segment of urban agriculture practitioners who approach food production in urban environments primarily as an economic activity. These farmers operate with high production intensity and often employ professional agricultural techniques and business models adapted to urban contexts.

“Commercial urban farmers typically have professional agricultural training or background and employ staff and/or engage volunteers to support their operations. They utilize efficient production technologies to maximize yields within limited urban spaces and often operate in building-integrated or controlled environments that allow for year-round production. Many incorporate innovative business models such as Community Supported Agriculture (CSA), direct marketing to restaurants, or value-added processing to enhance economic viability” (Di Fiore et al., 2021).

Table 3 Comparison between different types of urban agriculture according by methods and technologies Elaborated By the Author

Within this category, several subtypes can be identified:

High-tech commercial farmers represent a growing segment of urban agriculture characterized by the use of advanced technologies and innovative infrastructure. These individuals often manage vertical farms, rooftop greenhouses, or similarly space-efficient systems that rely on hydroponics, aeroponics, or climate-controlled environments. With professional backgrounds that frequently combine expertise in agriculture and technology, they invest heavily in equipment and operational systems to optimize productivity in dense urban settings. Such farms are commonly found in repurposed industrial buildings or purpose-built facilities designed to support high-efficiency food production.

Urban market gardeners tend to cultivate high-value crops intended for nearby consumers, including restaurants, farmers' markets, and specialty food outlets. Operating on relatively small plots within the urban landscape, they often prioritize organic or sustainable practices, focusing on crop diversity and quality rather than sheer output. These growers commonly develop direct

relationships with chefs and local buyers, allowing them to command premium prices and build community-based food networks.

Peri-urban commercial farmers work on the fringes of cities, where land is more readily available and affordable. Their operations are typically larger in scale than those found in city centers and often reflect a hybrid approach—blending conventional agricultural methods with strategies tailored to meet urban demand. Many of these farmers have transitioned from traditional rural agriculture to more diversified and market-responsive models, capitalizing on their proximity to urban consumers while benefiting from reduced land and operating costs.

“The primary motivations of commercial urban farmers include economic viability and profit, business innovation and entrepreneurship, local food production and distribution, and job creation and economic development” (Kirby et al., 2021).

While profit is a key driver, many commercial urban farmers also express secondary motivations related to sustainability, food system transformation, and community benefits.³⁸

2. Social Enterprise Urban Farmers

Social enterprise urban farmers balance social mission with economic sustainability, operating urban agriculture initiatives that explicitly aim to address social challenges while maintaining financial viability. These farmers typically operate with medium to high production intensity and often structure their operations as non-profit organizations or social enterprises.

“A distinguishing characteristic of social enterprise urban farmers is their focus on employing disadvantaged groups or providing training opportunities to specific populations. They may receive partial funding from grants or donations to support their social mission while generating revenue through product sales or services” (Audate et al., 2021).

Several subtypes of social enterprise urban farmers can be identified:

Urban farmers focused on therapy and rehabilitation to craft their agricultural practices to improve the well-being and social reintegration of marginalized communities. This includes individuals with disabilities, those on the path to recovery from addiction, and people who have been incarcerated. These farms act as structured spaces where therapeutic objectives are woven into productive tasks, providing participants with a sense of purpose, routine, and community. Although the agricultural products hold economic significance, their primary aim is to serve as a vehicle for personal development, skill enhancement, and emotional recovery.

Training and educational urban farmers focus on capacity-building through hands-on agricultural education, frequently engaging youth, immigrants, and unemployed individuals. These initiatives are

³⁸ M. Di Fiore, A. Santangelo, and C. Gómez-Benito, “Urban Agriculture and Business Innovation: Commercialization and New Entrepreneurial Models,” *Journal of Urban Agriculture Studies* 5, no. 3 (2021): 212–27; C. K. Kirby, S. D. Hardesty, and G. W. Feenstra, “Motivations of Urban Farmers: Profitability, Community, and Sustainability in Urban Agriculture,” *Agriculture and Human Values* 38, no. 1 (2021): 145–59, <https://doi.org/10.1007/s10460-020-10144-0>.

often structured as learning environments that combine experiential training with theoretical instruction, enabling participants to acquire practical skills in food production, business management, and sustainability. Many of these farms operate as apprenticeships or internships, creating pathways toward employment or entrepreneurship within the urban agriculture sector.

Food justice-focused urban farmers aim to address systemic inequalities in food access by operating within economically disadvantaged or historically underserved neighborhoods, including areas classified as “food deserts” or “food apartheid zones.” These farmers emphasize the provision of fresh, nutritious, and culturally appropriate food at affordable prices. In doing so, they foster local food sovereignty and support community empowerment. Innovative distribution strategies—such as mobile markets, sliding-scale community-supported agriculture (CSA) programs, and neighborhood partnerships—are commonly used to reach and engage their target populations.

“The primary motivations of social enterprise urban farmers include social impact and community development, food justice and access, skills training and employment opportunities, and therapeutic benefits for vulnerable populations” (Chen, 2024).

Economic sustainability is pursued as a means to achieve and sustain these social impacts rather than as an end in itself.³⁹

3. Community-Based Urban Farmers

Community-based urban farmers operate with high cooperation intensity and typically low to medium production intensity. These farmers emphasize collective decision-making and resource sharing, often organizing their activities around volunteer participation and community engagement rather than commercial production.

“Community-based urban farmers typically operate ground-based, open systems that are accessible to community members and maintain strong neighborhood connections. Their operations are often volunteer-led or have minimal paid staff, with governance structures that emphasize democratic participation and collective ownership” (EFUA, 2022).

Several subtypes of community-based urban farmers can be identified:

Community garden coordinators play a central role in facilitating shared urban growing spaces where individuals either cultivate their own plots or collaborate in communal gardening areas. These coordinators are responsible for developing the physical infrastructure, organizing communal activities, and fostering inclusive participation to ensure the garden’s sustainability. They may serve as dedicated volunteers or be

³⁹ P. Audate, M. A. Fernandez, G. Cloutier, and A. Lebel, “Urban Agriculture and Social Inclusion: A Review of the Literature,” *Cities* 116 (2021): 103351, <https://doi.org/10.1016/j.cities.2021.103351>; B. Elsey and L. Smith, “Therapeutic Horticulture in Urban Settings: Enhancing Well-Being and Inclusion through Green Care,” *Journal of Social Horticulture* 11, no. 2 (2019): 83–95.

employed by non-profit organizations, community groups, or local government agencies to support grassroots food initiatives.

Neighborhood food leaders. These leaders bring community members together for collaborative growing projects, nurturing a culture of shared knowledge, resources, and harvests. Their work not only boosts neighborhood resilience and social ties but also diversifies urban food systems..

Cultural heritage farmers are the keepers of traditional agricultural wisdom and food practices that reflect the identities of particular cultural or ethnic communities. By employing ancestral cultivation methods and seed-saving techniques, they promote intergenerational learning and cultural pride. Their initiatives often include community events, cooking demonstrations, and storytelling, turning urban agriculture into a lively space for cultural expression and education.

“The primary motivations of community-based urban farmers include community building and social cohesion, neighborhood beautification and green space creation, cultural preservation and expression, and collective food production and sharing” (Kirby et al., 2021).

While food production is important, the social and cultural dimensions of their activities are often equal or more significant.⁴⁰

4. Individual/Household Urban Farmers

Individual/household urban farmers engage in small-scale production primarily for personal or family use, operating with low production intensity in private spaces such as yards, balconies, or rooftops. These farmers may participate in community initiatives but maintain independent operations, often treating urban agriculture as a part-time or hobby activity.

“Unlike other types of urban farmers who may have formal organizational structures or commercial operations, individual/household urban farmers typically integrate their agricultural activities into their domestic lives. Their production scale is limited by available space and time, but they may achieve significant self-sufficiency in certain crops or during growing seasons” (Audate et al., 2021).

Several subtypes of individual/household urban farmers can be identified:

Home gardeners cultivate edible plants within private residential settings, transforming lawns, balconies, rooftops, and other small spaces into productive gardens. These individuals often grow a variety of crops for household consumption, with a focus on vegetables, herbs, and fruits that are

⁴⁰ C. Kirby, N. Hudson, and K. Fox, “Urban Agriculture in Community Development: Models of Engagement and Outcomes,” *Journal of Urban Affairs* 43, no. 5 (2021): 723–38, <https://doi.org/10.1080/07352166.2020.1788571>; D. Guitart, C. Pickering, and J. Byrne, “Past Results and Future Directions in Urban Community Gardens Research,” *Urban Forestry & Urban Greening* 11, no. 4 (2012): 364–73, <https://doi.org/10.1016/j.ufug.2012.06.007>.

either costly or of inferior quality when purchased from commercial sources. Their efforts reflect a personal commitment to healthy eating, sustainability, and localized food production.

Do-it-yourself (DIY) DIY urban homesteaders strive to boost their self-sufficiency by blending various food production methods right in the heart of the city. Beyond just growing vegetables, they might also raise chickens, keep bees, or care for other small animals, as long as local laws allow it. Many also practice food preservation methods—canning, drying, or fermenting, for instance—to enjoy homegrown produce throughout the year. They are often creative and ingenious in their approach, maximizing the use of limited urban space.

Specialized hobbyists. Specialist hobbyists specialize in particular crops or ways of growing, for instance, beekeeping, mushroom growing, or growing heirloom and exotic fruit. These gardeners often develop high levels of knowledge in their specialism and often connect with specialist networks, for instance, clubs, online forums, and public workshops. Their engagement is typically driven by passion and curiosity, contributing to biodiversity and cultural richness within urban agriculture.

“The primary motivations of individual/household urban farmers include personal food security and quality, health and wellness benefits, connection to nature and growing processes, and leisure and recreation” (Chen, 2024).

Many cite the superior taste and freshness of home-grown produce as a key motivation, along with concerns about pesticide use and other aspects of conventional food production.

5. Institutional Urban Farmers

Institutional urban farmers operate within established organizational frameworks such as schools, hospitals, prisons, or other institutions. These farmers typically maintain medium production intensity and focus on educational or therapeutic outcomes alongside food production. Their operations are usually professionally managed but may engage community members or institutional constituents in various aspects of the farming process.

“Institutional urban farmers often receive funding or support from their host institutions and may integrate their agricultural activities with the institution’s core mission. They frequently operate on land owned by the institution and serve populations directly connected to the institution” (EFUA, 2022).

Several subtypes of institutional urban farmers can be identified:

Educational institution farmers manage farms affiliated with schools, colleges, or universities, integrating agricultural production with academic programs. These operations function as dynamic learning environments where students engage in hands-on experiences that reinforce classroom instruction across disciplines such as environmental science, biology, nutrition, and sustainability. In addition to serving as teaching sites, these

farms may contribute to campus food systems—supplying dining services or offering produce to the local community through farm stands or markets.

Healthcare institution farmers cultivate therapeutic gardens within medical or care facilities, where horticulture is used as a complementary approach to conventional treatment. Working in collaboration with medical staff, these farmers help design programs that promote physical rehabilitation, reduce stress, and support emotional well-being among patients. While some gardens contribute to institutional food services, the primary focus is often on therapeutic engagement and the creation of restorative natural spaces within clinical settings.

Correctional facility farmers oversee agricultural programs within prisons or detention centers, providing incarcerated individuals with structured work experiences, vocational training, and rehabilitative opportunities. These programs are carefully managed to align with security protocols while incorporating agricultural best practices. In many cases, the farms are designed to support participants' reintegration into society by offering transferable skills and, in some instances, linking them to employment opportunities in agriculture upon release.

“The primary motivations of institutional urban farmers include educational outcomes, therapeutic benefits, institutional sustainability goals, and research and innovation” (Di Fiore et al., 2021).

These farmers often measure success not only in terms of agricultural productivity but also in terms of institutional mission advancement and participant outcomes.⁴¹

6. Experimental/Innovation-Focused Urban Farmers

Experimental/innovation-focused urban farmers prioritize testing new methods, technologies, or systems over maximizing current production. These farmers operate with variable production intensity depending on the nature of their experiments and are often connected to research institutions, technology companies, or design firms.

“A distinguishing characteristic of experimental/innovation-focused urban farmers is their emphasis on data collection, systematic evaluation, and knowledge generation. They frequently operate building-integrated or controlled environment systems that allow for precise manipulation of growing conditions and careful monitoring of results” (Douziech, 2024).

Several subtypes of experimental/innovation-focused urban farmers can be identified:

⁴¹ P. Audate, K. Zinszer, T. Benmarhnia, and D. Fuller, “Urban Agriculture: A Systematic Review of the Benefits and Limitations of Growing Food in Cities,” *Landscape and Urban Planning* 210 (2021): 104084, <https://doi.org/10.1016/j.landurbplan.2021.104084>; M. N. Poulsen, P. R. McNab, M. L. Clayton, and R. A. Neff, “A Systematic Review of Urban Agriculture and Food Security Impacts in Low-Income Countries,” *Food Policy* 55 (2015): 131–46, <https://doi.org/10.1016/j.foodpol.2015.07.002>.

Research scientists engaged in urban agriculture typically operate within academic or institutional research settings, where they design and conduct empirical studies focused on the diverse dimensions of urban food production. Their work often investigates agronomic performance, ecological sustainability, or social outcomes associated with urban farming practices. These researchers apply rigorous methodologies to generate evidence-based insights, with results commonly disseminated through peer-reviewed journals, policy briefs, or technical reports that inform both scholarly discourse and practical implementation.

Technology developers focus on advancing the tools and systems that support urban agriculture, using their farms as experimental platforms for testing and refining innovations. These practitioners are frequently affiliated with startups, research and development (R&D) units, or established technology firms. Their work involves iterative design processes in which prototypes—ranging from automated growing systems to data-driven monitoring tools—are tested in real-world conditions and improved based on performance feedback. The ultimate goal is to produce scalable, market-ready solutions that enhance the efficiency and sustainability of urban farming.

System designers approach urban agriculture as a complex, interdependent system, integrating multiple components such as food production, waste reuse, water management, and energy efficiency. Drawing on frameworks like permaculture, regenerative design, and the circular economy, these practitioners develop holistic models that aim to maximize resource use and ecological harmony. They often establish demonstration sites that serve as living examples of integrated food systems, offering educational opportunities and influencing urban planning and sustainability efforts.

“The primary motivations of experimental/innovation-focused urban farmers include technological innovation, research and knowledge generation, climate resilience and sustainability, and future food system development (Goldstein et al., 2016).”

These farmers are often driven by a desire to address systemic challenges in food production through innovation and experimentation.⁴²

2.3.2.4.7 Comparison between different types of urban farmers

Dimensi on	Commerci al Urban Farmers	Social Enterpris e Urban Farmers	Commu nity- Based	Individual/Ho usehold Urban Farmers	Instituti onal Urban Farmers	Experimental/In novation- Focused Urban Farmers
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⁴² M. Douziech, “Urban Agriculture as a Platform for Innovation: Exploring Experimental Typologies in Controlled Environments,” *Journal of Agricultural Innovation* 12, no. 1 (2024): 23–38; B. Goldstein, M. Hauschild, J. Fernández, and M. Birkved, “Testing the Environmental Performance of Urban Agriculture as a Food Supply in Northern Climates,” *Journal of Cleaner Production* 135 (2016): 984–94, <https://doi.org/10.1016/j.jclepro.2016.07.004>.

Urban Farmers						
Primary Purpose	Economic profit and entrepreneurship	Social mission with financial viability	Community engagement and social cohesion	Personal consumption and lifestyle	Educational or therapeutic objectives within institutions	Innovation, experimentation, and research
Production Intensity	High (especially high-tech and peri-urban subtypes)	Medium to high	Low to medium	Low	Medium	Variable, depending on experiment type
Organizational Structure	For-profit; professional management	Non-profit or social enterprise; hybrid funding	Volunteer-based or informal collectives	Informal; household-based	Institutionally embedded; professionally managed	Affiliated with research institutions, firms, or think tanks
Technology Use	Advanced technologies in high-tech subtypes (e.g., hydroponics, controlled environments)	Moderate; tech is secondary to social mission	Low-tech, open systems	Low-tech, DIY methods	Moderate; context-dependent	High-tech; emphasis on controlled experimentation
Economic Focus	Central—drives innovation and growth	Secondary to social outcomes	Minimal; surplus may be shared or sold	Minimal; focused on self-sufficiency	Subsidiary to institutional goals	Often negligible; focus on knowledge generation
Social Engagement	Targeted (e.g., customer relationships, CSAs)	High (training, therapeutic support, food justice)	Very high (democratic participation,	Limited; may engage in sharing or community events	Medium to high (dependent on institution)	Medium (e.g., partnerships, demonstration sites)

			inclusivity)			
Key Motivations	Profit, entrepreneurship, food system transformation	Social equity, empowerment, community development	Social cohesion, cultural preservation, local engagement	Health, food quality, leisure, environmental ethics	Education, rehabilitation, sustainability	Innovation, resilience, knowledge creation
Examples of Activities	Vertical farming, CSA, rooftop greenhouses	Employment training for vulnerable groups, food justice markets	Community gardens, cultural farming initiatives	Home gardens, DIY food preservation	School farms, hospital healing gardens	Smart farming, circular system pilots, tech prototyping

Table 4 Comparison between different types of urban farmers Elaborated By The Author

2.3.2.4.8 Cross-Cutting Dimensions of Urban Agriculture Farmers

It's fascinating to consider the sheer variety within urban agriculture today. This typology, you see, really helps us grasp the diverse motivations, methods, and results that define it. While every urban farmer plays a role in creating localized food systems, they can differ quite a bit in how they actually produce, engage with others, and align with established institutions. Grasping these distinctions isn't just academic; it's absolutely essential for urban planners, policymakers, and practitioners who are truly committed to nurturing an urban food landscape that's resilient, inclusive, and multifunctional. .

Purpose and Mission Orientation

When we look at the core purpose, we see some clear lines. Commercial urban farmers, for instance, are distinctly market-driven, always looking to optimize for yield and profitability. On the other hand, it seems social enterprise and community-based urban farmers are guided by a mission; their practices truly revolve around achieving specific social, cultural, or environmental outcomes. Then there are institutional farmers, who operate within existing mandates, perhaps focusing on education or health. And let's not forget the experimental farmers, who are clearly driven by a passion for innovation and aiming for system-level change.

Intensity and Scale

Commercial farmers, particularly those employing high-tech systems, exhibit the highest production intensity due to significant capital investment and efficiency optimization. In contrast, community-based and individual/household farmers operate on smaller, less intensive scales, prioritizing

relational and experiential value over output. Institutional and experimental types occupy a middle ground, where intensity varies based on institutional priorities or experimental design.

Governance and Organizational Structure

A clear distinction exists between professionalized models (commercial, institutional, experimental) and grassroots/volunteer-driven models (community-based, household). Social enterprises often blend these, reflecting hybrid governance structures that combine business acumen with participatory values.

Technology and Innovation

High-tech integration is central to commercial (high-tech) and experimental urban farming, while community, social enterprise, and household farmers emphasize accessibility and low-barrier practices. Institutional farms adopt technology selectively based on their educational or therapeutic objectives.

Socio-Spatial Dynamics

Peri-urban commercial farmers and individual/household growers highlight the geographic variability in urban agriculture, extending its reach beyond city cores. Community-based and food justice-oriented social enterprise farmers often serve underserved urban neighborhoods, while institutional and experimental farmers are strategically located within or adjacent to partner organizations or demonstration zones.

Multifunctionality of Urban Agriculture

Across all types, urban farming serves multiple, often overlapping functions—from profit generation and job creation to social inclusion, cultural expression, health promotion, and ecological stewardship. However, each type prioritizes different outcomes, shaping their resource use, partnerships, and long-term sustainability strategies.

2.3.3 Common Urban Crops and Livestock

Urban agriculture supports the cultivation of a wide variety of crops, often prioritizing those that are fast-growing, high-value, and suitable for cultivation in limited spaces. Common crops include leafy greens such as lettuce, spinach, and kale, which are well-suited for hydroponic and vertical farming systems. Various herbs like basil, mint, and cilantro are also frequently grown in urban gardens due to their relatively small size and high demand. Fruiting vegetables such as tomatoes, peppers, cucumbers, and eggplant thrive in both soil-based and soilless systems. Root vegetables like carrots, radishes, and beets can be grown in deeper containers or raised beds. Strawberries are another popular crop for urban cultivation, often grown in containers or vertical systems. Depending on the space and method, other fruits may also be grown. In addition to crops, some urban agriculture initiatives involve raising livestock. Chickens are commonly raised for eggs and sometimes meat, particularly in backyard and community garden settings.¹ Rabbits are often raised for their meat and manure, which is a valuable fertilizer. Ducks and quail are also kept in

some urban areas for eggs and pest control. Goats may be raised in larger urban farms or peri-urban areas for milk and meat. Beekeeping has also become increasingly popular in urban environments for honey production and pollination services. The specific types of crops and livestock raised in urban environments are often influenced by local regulations and zoning ordinances, which may restrict certain animals or agricultural practices.⁴³

2.3.4 Final Conclusion

Different types of urban agriculture offer unique sets of advantages and disadvantages, making certain approaches more suitable for specific urban contexts and goals. The optimal approach to urban agriculture is highly dependent on the specific urban context, the clearly defined goals of the initiative, and the resources that are readily available. For instance, in densely populated urban cores where land is exceptionally scarce and expensive, vertical farming and rooftop gardens emerge as particularly appealing strategies due to their capacity to maximize food production within limited spatial footprints. Conversely, in urban or peri-urban areas where more land may be accessible, community gardens and larger-scale urban farms might represent more viable and economically feasible options, especially when the primary objectives include fostering community engagement and enhancing social cohesion. Furthermore, the choice of cultivation methods, such as hydroponics, aquaponics, aeroponics, or traditional soil-based gardening, should be carefully considered based on factors like water availability, energy costs, the level of technical expertise within the community, and the specific types of crops that are intended for cultivation. Understanding these multifaceted trade-offs is of paramount importance for making well-informed decisions regarding which specific types of urban agriculture initiatives are best suited to address the unique challenges and leverage the particular opportunities present within any given urban environment.

⁴³ Despommier, D. (2010). *The vertical farm: Feeding the world in the 21st century*. Thomas Dunne Books. Food and Agriculture Organization (FAO). (2022). *Urban agriculture: Growing greener cities*. <http://www.fao.org/urban-agriculture>

2.4 Benefits of Urban Agriculture

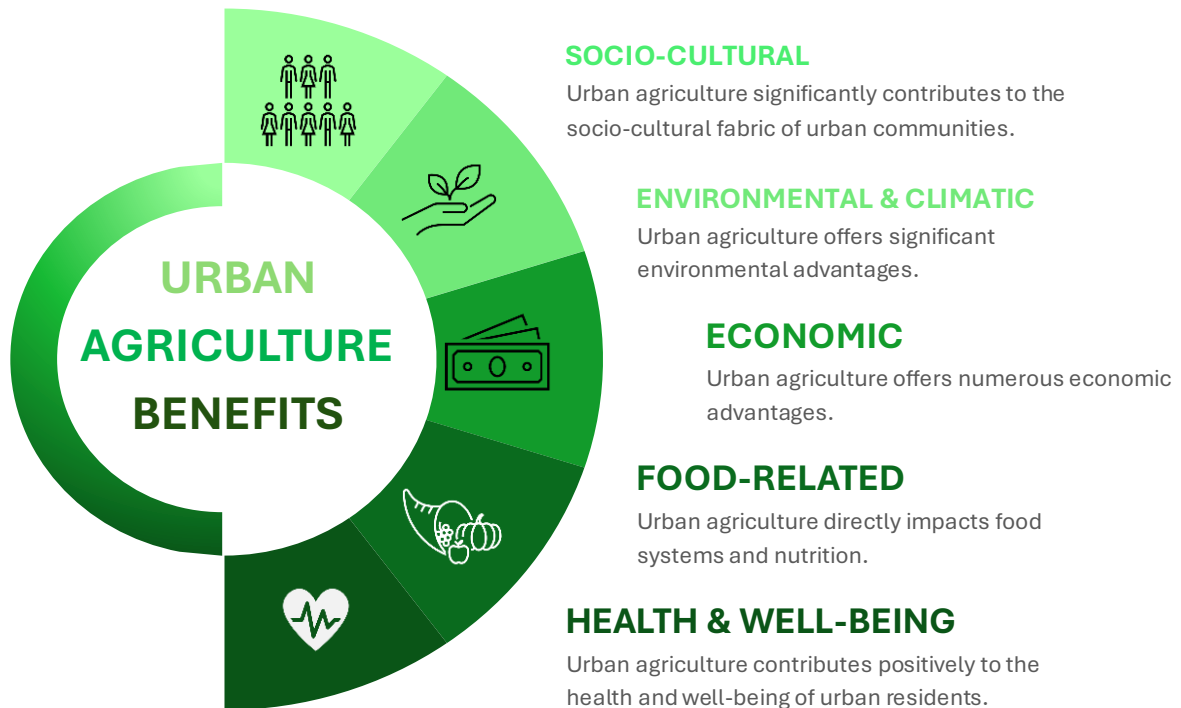


Figure 5 Benefits of Urban Agriculture Elaborated By the Author

2.4.1 Socio-Cultural

Urban agriculture significantly contributes to the socio-cultural fabric of urban communities.

- **Social Inclusion & Cohesion:** Community gardens and urban farms serve as vital spaces for fostering community engagement and social cohesion by providing opportunities for interaction, collaboration, and the development of social networks among urban residents. These shared activities can increase neighborhood pride, foster a sense of ownership over local spaces, and cultivate a stronger feeling of belonging. Notably, the presence of community gardens has been associated with lower crime rates in their surrounding neighborhoods. Urban agriculture also facilitates intercultural and intergenerational exchanges as individuals share gardening knowledge, exchange produce, and pass on meaningful food and cooking traditions, further strengthening social bonds. Urban food-growing spaces serve as fertile, meaningful, and safe grounds for integrating different communities to grow together.
- **Cultural Values:** Urban agriculture can help preserve agricultural traditions and food cultures within urban settings.

- **Education & Awareness:** Urban agriculture provides valuable educational opportunities for individuals of all ages, serving as a platform to learn about gardening, farming practices, nutrition, and the importance of environmental sustainability. School gardens offer unique hands-on learning experiences that enhance students' understanding of STEM subjects and natural systems. Urban agriculture education programs can also foster civic engagement among youth by enhancing their understanding of social justice and community assets, and by building their leadership skills.
- **Leisure & Recreation:** Community gardens and urban farms offer spaces for relaxation and can potentially serve as tourist attractions.
- **Risks:** While largely beneficial, poorly managed urban agriculture could introduce invasive species or negatively impact local ecological balance. Careful planning and management are necessary to ensure urban agriculture initiatives contribute positively. Gentrification and social displacement are also potential risks to consider.⁴⁴

2.4.2 Environmental & Climatic

Urban agriculture offers significant environmental advantages.

- **Urban Greening:** The presence of vegetation in urban areas enhances ecosystem services and the aesthetic value of the cityscape. Urban farms can revitalize underutilized urban spaces, creating attractive green areas that serve as community hubs.
- **Climate Mitigation:** Urban farming can reduce the carbon footprint associated with food transportation by shortening the distance food travels from farm to consumer. Organic urban farms avoid the use of synthetic fertilizers and pesticides, significantly lowering carbon emissions. Additionally, urban farms, particularly those utilizing soil-based methods, can act as carbon sinks, sequestering carbon dioxide from the atmosphere.
- **Waste Reduction:** Urban agriculture promotes composting of organic waste, contributing to urban waste management.
- **Soil and Land Preservation:** Urban agriculture can reduce soil sealing and land consumption by utilizing underused urban spaces like rooftops and vacant lots.
- **Biodiversity:** Urban agriculture provides crucial habitats for various flora and fauna within the urban environment, supporting native plants, insects, and pollinators like bees and butterflies. Urban beekeeping contributes to the health and biodiversity of urban ecosystems.

⁴⁴ M. Chen, "Urban Agriculture and Social Transformation: Practices, Impacts, and Possibilities," *Urban Studies Journal* 61, no. 2 (2024): 221–39; European Forum on Urban Agriculture (EFUA), "Position Paper on Social Benefits of Urban Agriculture," 2022, <https://efua.eu/social-benefits>.

- **Risks:** Potential introduction of invasive plant species if not properly managed.⁴⁵

2.4.3 Economic

Urban agriculture offers numerous economic advantages.

- **Job Creation:** Urban agriculture initiatives can generate employment opportunities across various stages of the food system, including farming, food processing, and distribution. It provides valuable skills training in areas like agricultural techniques, business management, and sustainable practices.
- **Local Economies:** Urban agriculture supports local economies by providing income through farmers' markets, restaurants, and CSA programs. It can also increase property values in surrounding neighborhoods, stimulating economic activity.
- **Affordable Food:** Growing food at home or in community gardens helps low-income households access fresh produce, contributing to savings on groceries.⁴⁶

2.4.4 Food-Related

Urban agriculture directly impacts food systems and nutrition.

- **Food Security:** Urban agriculture strengthens city-level food systems by reducing dependence on long food chains and ensuring the availability and accessibility of fresh food close to urban markets.
- **Nutrition & Quality:** Urban agriculture increases access to fresh, healthy produce, promoting healthier dietary choices. Participation in gardening programs has been shown to increase the consumption of fruits and vegetables.
- **Resilience:** By fostering local food production, urban agriculture enhances the resilience of the urban food system to external disruptions.⁴⁷

2.4.5 Health & Well-being

Urban agriculture contributes positively to the health and well-being of urban residents.

⁴⁵ Goldstein, B., Hauschild, M., Fernández, J., & Birkved, M. (2016). *Testing the environmental performance of urban agriculture as a food supply in northern climates*. *Journal of Cleaner Production*, 135, 984–994. <https://doi.org/10.1016/j.jclepro.2016.07.004>

⁴⁶ Mok, H. F., Williamson, V. G., Grove, J. R., Burry, K., Barker, S. F., & Hamilton, A. J. (2014). Striking the balance between food and environmental security in urban agriculture. *Science of the Total Environment*, 497–498, 165–171. <https://doi.org/10.1016/j.scitotenv.2014.07.099>

⁴⁷ R. Kortright and S. Wakefield, “Edible Backyards: A Qualitative Study of Household Food Growing and Its Contributions to Food Security,” *Agriculture and Human Values* 28, no. 1 (2011): 39–53, <https://doi.org/10.1007/s10460-010-9254-1>; F. Orsini, R. Kahane, R. Nono-Womdim, and G. Gianquinto, “Urban Agriculture in the Developing World: A Review,” *Agronomy for Sustainable Development* 33 (2013): 695–720, <https://doi.org/10.1007/s13593-013-0143-z>.

- **Mental Health:** Engaging in urban agriculture has been shown to enhance mental well-being. Gardening and farming provide cognitive stimulation through interaction with nature, offering therapeutic effects that reduce stress and anxiety.
- **Physical Health:** Gardening and farming promote physical activity and active lifestyles.
- **Community Health:** Urban agriculture improves dietary habits by increasing access to fresh, healthy produce, and helps reduce urban food deserts by making nutritious food more accessible in underserved communities. ⁴⁸

2.4.6 Final Table: Comparison of Impacts

Aspect	Socio-Cultural	Environmental & Climatic	Economic	Food-Related	Health & Well-being
Key Benefits	Social inclusion, community engagement, cultural preservation	Climate mitigation, urban greening, waste reduction	Job creation, local economic boost, affordable food	Enhanced food security, better nutrition, resilience	Mental and physical health benefits, community health
Main Impact	Social cohesion, community pride, cultural exchange	Ecosystem services, carbon sequestration, biodiversity	Local employment, increased property value	Accessibility to fresh produce, nutrition improvement	Stress reduction, physical activity, improved health
Risks	Gentrification, invasive species	Invasive plant species	Job instability in underdeveloped areas	Vulnerability to supply chain disruptions	Limited access to green spaces in some areas
Examples	Community gardens, school programs, intercultural exchanges	Urban farms, green rooftops, composting systems	Farmers markets, CSA programs, local food sales	Local food production, urban farms	Gardening, outdoor activities, improved diet

Table 5 Comparison of Impacts Benefits Of Urban Agriculture Elaborated By the Author

⁴⁸ Al-Delaimy, W. K., & Webb, M. (2017). Community gardens as environmental health interventions: Benefits for health and advocacy. *Environmental Justice*, 10(3), 51–56. <https://doi.org/10.1089/env.2016.0025>

2.5 Challenges and Criticisms

“Urban agriculture cannot produce all the food a city needs, but it can make a substantial contribution to food security and urban sustainability if land is made available and the activity is encouraged through policy” (Grewal & Grewal, 2012, p. 9)

Urban agriculture and farming, while promising solutions to various urban challenges, face a range of obstacles and criticisms that can limit their effectiveness and scalability. These challenges span economic, environmental, social, and policy dimensions, highlighting the complexities of integrating food production into urban landscapes.⁴⁹

One significant challenge is the availability of space in densely populated cities. Urban areas often face competing demands for land, with housing, infrastructure, and commercial development taking precedence over agricultural activities. Limited space can restrict the scale of urban farming projects, making it difficult to achieve substantial impacts on food security or economic development. Additionally, high land costs in cities can render urban agriculture financially unviable, particularly for commercial ventures.

Another concern is the resource intensity of certain urban farming methods. Technologies like hydroponics and vertical farming often require significant initial investments and ongoing operational costs, including energy for lighting, water pumping, and temperature control. These systems, while efficient, may not be accessible or sustainable for low-income communities or regions with limited resources.

Environmental challenges also arise, particularly regarding soil and water quality. Urban soils may be contaminated with heavy metals or pollutants, posing risks to food safety and public health. Similarly, water scarcity and the potential for water contamination in urban settings can hinder the success of agricultural projects. Without proper regulation and monitoring, urban farming could exacerbate environmental degradation rather than mitigate it.⁵⁰

From a social perspective, urban agriculture can sometimes exacerbate inequalities. While community gardens and small-scale farms aim to empower local residents, they can also lead to gentrification, driving up property values and displacing low-income populations. Moreover, the benefits of urban agriculture are not always evenly distributed, as projects in affluent areas often receive more support and resources than those in underserved neighborhoods.

Policy and governance issues further complicate urban agriculture. In many cities, regulatory frameworks are either insufficient or overly restrictive, making it difficult for individuals and

⁴⁹ Grewal, S. S., & Grewal, P. S. (2012). Can cities become self-reliant in food? *Cities*, 29(1), 1–11. <https://doi.org/10.1016/j.cities.2011.06.003>

⁵⁰ Orsini, F., Kahane, R., Nono-Womdim, R., & Gianquinto, G. (2013). Urban agriculture in the developing world: A review. *Agronomy for Sustainable Development*, 33, 695–720. <https://doi.org/10.1007/s13593-013-0143-z>

organizations to establish and sustain urban farming initiatives. Zoning laws, lack of funding, and bureaucratic hurdles can stifle innovation and discourage participation.⁵¹

Finally, urban agriculture faces criticisms regarding its scalability and overall impact. While it can complement traditional agricultural systems, critics argue that it cannot fully address global food security challenges due to its relatively small-scale operations and focus on niche markets. This raises questions about its long-term viability and role in broader food systems.

Addressing these challenges requires a multi-faceted approach, including supportive policies, investments in sustainable technologies, and equitable access to resources. Urban agriculture, while not a panacea, has the potential to contribute meaningfully to urban resilience if its limitations are carefully managed.

2.6 Global North and Global South Perspectives on Urban Agriculture

2.6.1 Urban Agriculture in the Global North: Motivations, Practices, and governance

“Urban agriculture in the Global North is increasingly recognized as a tool for sustainable urban development, combining food production with social, environmental, and educational benefits”

(Cassatella & Gottero, 2018)

In the Global North, urban agriculture is driven by a complex interplay of various motivations and goals, sometimes even extending beyond the fundamental need for food production. A primary driver is the desire to enhance food security and improve access to healthy food options for urban populations.⁵² This includes providing access to fresh, locally grown produce, particularly in underserved communities identified as food deserts. Urban agriculture initiatives in the Global North aim to improve nutrition and overall health quality and dietary habits by making fresh and healthy food more available and accessible. Furthermore, it fosters self-reliance and reduces dependency on extensive and vulnerable global supply chains, a motivation that gained prominence during the interruptions caused by COVID-19 pandemic.

Environmental sustainability and the promotion of biodiversity are also significant drivers for urban agriculture in the Global North. These initiatives contribute to greening urban landscapes, increasing surface area of urban green spaces, and improving both air and water quality within cities. A key environmental aim is to mitigate the urban heat island effect, where urban areas experience significantly higher temperatures compared to their rural surroundings. Rooftop gardens and increased vegetation cover through urban agriculture help to cool the air and reduce this effect. Additionally, urban gardens and farms can provide essential habitats for pollinators like bees and other beneficial insects, thereby supporting and increasing biodiversity within urban ecosystems.

⁵¹ Santo, R., Palmer, A., & Kim, B. (2016). *Vacant lots to vibrant plots: A review of the benefits and limitations of urban agriculture*. Johns Hopkins Center for a Livable Future.

⁵² U.S. Department of Agriculture, Natural Resources Conservation Service. (n.d.). *Urban Agriculture*.

Retrieved April 16, 2025, from <https://www.nrcs.usda.gov/getting-assistance/other-topics/urban-agriculture>

The adoption of sustainable practices, such as composting organic waste and minimizing the environmental impact of food transportation, further underscores the environmental motivations behind urban agriculture in this region.

Encouraging community engagement and strengthening social cohesion represent another important set of motivations. Urban agriculture provides valuable opportunities for social interaction, community building, and the development of stronger social networks among urban residents. Community gardens, in particular, can enhance a sense of belonging and connection to a specific place. These spaces also serve as valuable educational centers, offering opportunities for people to learn about gardening, food production, and broader sustainability principles.

Driving local economic development and creating green job opportunities could be recognized as potential benefits of urban agriculture in the Global North. Urban farming can stimulate entrepreneurial activities and create jobs in various sectors, including food production, processing, and local marketing. Also by supporting food systems locally, urban agriculture can strengthen local economies and reduce economic leakage outside of the community.

Moreover, the transformation of unused urban land into productive urban farms and gardens can enhance the desirability and value of local properties, in addition contributing to economic growth within neighborhoods.⁵³

The motivations for urban agriculture in the Global North are often characterized by a multi-functional approach, where the emphasis extends beyond mere food production to encompass a broader range of societal benefits. While ensuring access to healthy food remains a concern, particularly in marginalized communities, the focus in developed nations often includes the valuable ecosystem services provided by urban agriculture, such as enhancing green spaces and fostering stronger community connections. This reflects a shift towards a post-productivist perspective in many developed countries, where the social and environmental amenities of urban agriculture are highly valued. Furthermore, the growing interest in urban agriculture in the Global North can be attributed to a desire among urban dwellers to reconnect with the origins of their food and a heightened awareness of the significant ecological footprint associated with conventional, large-scale food systems. Concerns about industrialized agricultural practices, the environmental costs of long-distance food transportation, and the overall sustainability of the dominant food system are

⁵³U.S. Department of Agriculture Climate Hubs, “Urban Agriculture,” accessed April 16, 2025, <https://www.climatehubs.usda.gov/hubs/international/topic/urban-agriculture>; *Urban Agriculture: A Sustainability Guide for Developing Countries*, accessed April 16, 2025, <https://www.emerald.com/insight/content/doi/10.1108/srj-07-2024-0433/full/pdf?title=urban-agriculture-a-sustainability-guide-for-developing-countries>; U.S. Department of Agriculture, Natural Resources Conservation Service, “Urban Agriculture,” accessed April 16, 2025, <https://www.nrcs.usda.gov/getting-assistance/other-topics/urban-agriculture>; *Frontiers for Young Minds*, “The Important Roles of Urban Agriculture,” accessed April 16, 2025, <https://kids.frontiersin.org/articles/10.3389/frym.2022.701688>; *Promoting Urban Agriculture and Its Opportunities and Challenges—A Global Review*, accessed April 16, 2025, <https://www.mdpi.com/2071-1050/13/17/9609>.

driving individuals and communities in the Global North to explore more direct and environmentally conscious ways of accessing food through local urban farming initiatives.

Urban agriculture in the Global North takes on a variety of forms, each with its own set of practices and technologies. Rooftop gardens and green roofs represent a significant trend, utilizing the often-untapped potential of urban rooftops in cities like New York, Paris, and Singapore to address challenges such as air pollution, the scarcity of green spaces, and the urban heat island effect. Techniques employed in these spaces range from extensive green roofs with minimal maintenance to intensive gardens accommodating a wider variety of plants, as well as innovative soilless systems like hydroponics. Notable examples include the dynamic rooftop garden at FAO Headquarters in Rome, featuring sensor-equipped modular units, and the repurposing of rooftops in land-scarce Singapore for productive urban farming.⁵⁴



Figure 6 The new “rooftop farm” on the FAO terrace in Rome.

Source : [New “rooftop farm” at FAO highlights how innovative technology can help safeguard agro-biodiversity](#)

Community gardens and urban farms are popular kinds of urban agriculture in the Global North. Community gardens are frequently developed on publicly owned land and administered cooperatively by local inhabitants or non-governmental organisations (NGOs). Urban farms, on the other hand, often focus on commercial food production and can operate on a bigger scale.⁵⁵

⁵⁴ *Frontiers in Sustainable Food Systems*, “Features and Functions of Multifunctional Urban Agriculture in the Global North: A Review,” accessed April 16, 2025, <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2020.562513/full>; ResearchGate, “Urban Agriculture in Developed Economies,” accessed April 16, 2025, https://www.researchgate.net/publication/254834109_Urban_agriculture_in_developed_economies; Small Axe Peppers, “The Rise of Rooftop Gardens: How Urban Agriculture is Changing Cityscapes,” accessed April 16, 2025, <https://smallaxepeppers.com/the-rise-of-rooftop-gardens-how-urban-agriculture-is-changing-cityscapes/>; United Nations University, “Farming in the Sky in Singapore,” accessed April 16, 2025, <https://ourworld.unu.edu/en/farming-in-the-sky-in-singapore>.

⁵⁵ Unity Environmental University. (n.d.). *What is Urban Farming? Understanding Urban Agriculture*. Retrieved April 16, 2025, from <https://unity.edu/careers/what-is-urban-farming/>

Traditional in-ground cultivation and the use of raised beds are common practices in these environments, as are novel approaches meant to enhance yield on limited urban plots. Community-led efforts frequently include composting projects to improve soil health and minimize waste.⁵⁶

Vertical farming and other forms of controlled environment agriculture (CEA) “Controlled Environment Agriculture” are gaining traction in the Global North as a means of maximizing food production in densely populated urban areas. These systems involve growing crops in vertically stacked layers within indoor environments, often utilizing soilless techniques like hydroponics, aeroponics, and aquaponics. Advanced lighting technologies, such as LED systems, are commonly employed to provide the necessary light spectrum for plant growth.⁵⁷ Examples of innovative vertical farming operations include AeroFarms in Newark and Agricoool in Paris, as well as the development of vertical rice farming in Singapore, showcasing the potential to expand beyond leafy greens.⁵⁸

Hydroponics, aeroponics, and aquaponics represent key technologies in the advancement of urban agriculture in the Global North. These soilless cultivation methods offer efficient ways to grow plants by delivering nutrients directly to the roots through water-based solutions or a mist environment. Aquaponics further integrates aquaculture, the raising of fish, with hydroponics, creating a symbiotic closed-loop system where fish waste provides nutrients for plant growth. These techniques are particularly valuable in urban areas due to their efficient use of water and their adaptability to locations where fertile soil may be limited or unavailable.⁵⁹

To sum up, urban agriculture in the Global North also includes practices like urban beekeeping and small-scale animal husbandry. The keeping of chickens, bees, miniature goats, and other non-traditional animals in residential areas is becoming increasingly common, driven by interests in local food production, pollination, and educational opportunities.⁶⁰ However, these practices are typically subject to local zoning ordinances and regulations that govern the types and number of animals allowed.

Urban agriculture in the Global North is notably shaped by the extensive use of advanced technologies, supported by the region's strong financial resources and a deliberate focus on optimizing efficiency and crop output in limited urban spaces. Techniques such as vertical farming, hydroponics, aeroponics, and the use of specialized LED lighting are widely employed, illustrating a clear shift toward high-tech urban food production. These innovations provide precise control over environmental conditions, enabling increased productivity and continuous, year-round harvesting

⁵⁶ 9 Countries Where Urban Agriculture Is Popular | Eden Green, accessed April 16, 2025, <https://www.edengreen.com/blog-collection/urban-agriculture-countries>

⁵⁷ Food Tank. (2019, December 16). *17 Initiatives Changing Urban Agriculture Through Tech and Innovation*. Retrieved April 16, 2025, from <https://foodtank.com/news/2019/12/16-initiatives-changing-urban-agriculture-through-tech-and-innovation/>

⁵⁸ Living Architecture Monitor. (n.d.). *An Overview of Vertical Farming*. Retrieved April 16, 2025, from <https://livingarchitecturemonitor.com/articles/overview-vertical-farming-sp25>

⁵⁹ West Tech Fest Blog. *Tech's Impact on Urban Farming Methods*. Retrieved April 16, 2025, from <https://westtechfest.com/techs-impact-on-urban-farming-methods/>

⁶⁰ American Planning Association. *Urban Livestock*. Retrieved April 16, 2025, from <https://www.planning.org/knowledgebase/urbanlivestock/>

regardless of external weather factors. Additionally, community gardens in the Global North frequently embrace ecological farming practices⁶¹, underscoring a deep commitment to sustainability. These initiatives often emphasize organic and environmentally responsible methods, highlighting a value system that balances food production with ecological preservation and social well-being.

Policy and governance in the Global North are increasingly recognizing and supporting the development of urban agriculture. Many cities and national governments have implemented policies that facilitate local food production through measures such as zoning changes that allow agricultural activities within city limits, financial incentives for land use dedicated to urban farming, and the easing of restrictions on the sale of locally grown produce.⁶² In the United States, for example, the USDA offers various funding programs, including loans and grants, specifically designed to support urban agriculture initiatives, along with providing valuable technical assistance. Some cities have gone further by developing comprehensive food policies and strategic plans that explicitly include and encourage urban agriculture as a key component of a sustainable urban food system. Examples of such supportive policies include "green roofs" mandates in cities like Zurich and initiatives promoting urban beekeeping in London, as well as more comprehensive strategies like the "Good Food Strategy of Brussels" in Belgium and "The Agenda Food and the City" in Rotterdam, Netherlands.

Urban agriculture governance in the Global North is shaped by both formal policies and informal practices, with increasing efforts to integrate it into municipal planning and regulatory systems. Zoning laws are particularly influential, as they regulate what kinds of agricultural activities are permitted in urban areas, including crop cultivation and the keeping of animals. Urban planners are recognizing the benefits of urban farming and are working to incorporate it into comprehensive urban development strategies. However, securing land for these activities remains a challenge, prompting the need for creative solutions to find and allocate suitable farming spaces in densely built environments.

Community involvement plays a central role in the success of urban agriculture in the Global North. Many projects are initiated and maintained by citizen groups and local organizations. Community gardens, often cared for by resident volunteers, are common, while community farms operated by non-profits engage the public in food production and offer educational and social programs. The expansion and vibrancy of urban agriculture are largely driven by grassroots efforts, reflecting strong local ownership and a commitment to building more sustainable and just urban food systems. Ultimately, the long-term success of these initiatives relies heavily on the continued participation of

⁶¹ Best Practices for the Sustainable Urban Farm - SARE, accessed April 16, 2025, <https://www.sare.org/resources/best-practices-for-the-sustainable-urban-farm/>

⁶² U.S. Department of Agriculture, National Agricultural Library. (n.d.). *Urban Agriculture*. Retrieved April 16, 2025, from <https://www.nal.usda.gov/farms-and-agricultural-production-systems/urban-agriculture>

community members, underlining the importance of inclusive and participatory governance models.⁶³

2.6.2 Urban Agriculture in the Global South: Drivers, Methods, and Challenges

“In many cities of the Global South, urban agriculture plays a critical role in enhancing food security, generating income, and providing livelihoods for marginalized urban populations.”

(Zezza & Tasciotti, 2010)

In the Global South, urban agriculture is primarily driven by the need to address basic challenges like poverty and food insecurity, especially among vulnerable populations.⁶⁴ For many urban residents in developing countries, urban agriculture acts as a crucial supplementary income source and a vital means of ensuring food access amidst rapid urbanization. It plays a key role in the survival strategies of the urban poor, helping to reduce food-related expenses and providing a safety net during tough economic times.

Urban agriculture in the Global South also supports informal economies and local livelihoods. In cities where formal job opportunities are limited, urban farming serves as a vital means of earning income and sustaining families. The marketing chains in these areas are typically short, which results in smaller price differences between producers and consumers.

Another important driver of urban agriculture is its role in enhancing resilience to climate change and environmental shocks. By diversifying food sources and improving access to nutritious food, especially for the urban poor who are most vulnerable to climate-related impacts, urban agriculture contributes to the resilience of urban food systems. It is increasingly seen as an adaptation strategy that brings multiple benefits in the face of a changing climate.

⁶³ “Integrating Urban and Peri-Urban Agriculture in Planning Systems: Barriers, Policy Tools and Recommendations,” *Taylor & Francis Online*, accessed April 16, 2025, <https://www.tandfonline.com/doi/full/10.1080/02697459.2025.2472115>; “Assessing Motivations and Perceptions of Stakeholders in Urban Agriculture: A Review and Analytical Framework,” *Taylor & Francis Online*, accessed April 16, 2025, <https://www.tandfonline.com/doi/full/10.1080/19463138.2021.1904247>; U.S. Department of Agriculture Climate Hubs, “Urban Agriculture,” accessed April 16, 2025, <https://www.climatehubs.usda.gov/hubs/international/topic/urban-agriculture>; “The Socio-Cultural Benefits of Urban Agriculture: A Review of the Literature,” *MDPI*, accessed April 16, 2025, <https://www.mdpi.com/2073-445X/11/5/622>; *Frontiers in Sustainable Food Systems*, “Features and Functions of Multifunctional Urban Agriculture in the Global North: A Review,” accessed April 16, 2025, <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2020.562513/full>.

⁶⁴ Urban agriculture: a sustainability guide for developing countries | Emerald Insight, accessed April 16, 2025, <https://www.emerald.com/insight/content/doi/10.1108/srj-07-2024-0433/full/pdf?title=urban-agriculture-a-sustainability-guide-for-developing-countries>

Additionally, urban agriculture addresses the growing need for food in rapidly expanding cities in the Global South. As urban populations increase, urban and peri-urban agriculture (UPA) is becoming increasingly important as a major food source. It is particularly crucial for providing fresh vegetables and perishable goods necessary for a balanced diet.⁶⁵

In contrast to the Global North, the primary motivations for urban agriculture in the Global South are often directly linked to urgent needs such as ensuring food security and generating income. While urban agriculture in more developed nations may focus on enhancing social well-being or environmental benefits, in the Global South⁶⁶, its focus is squarely on meeting the immediate needs of urban populations, especially those in poverty. Urban agriculture in this context is a critical livelihood strategy, closely connected to the informal economy, where formal employment is scarce or unreliable. It offers an accessible route to both food security and income generation, providing a vital safety net for individuals and families.

Urban agriculture in the Global South often involves a variety of methods, adapted to the limited resources and constraints of urban environments. Small-scale household and community gardens are common, offering food for local consumption and subsistence.⁶⁷ These gardens make use of available spaces in homes and public areas. A distinctive feature of urban agriculture in this region is the use of vacant or marginal land, such as unused public land, private gardens, rooftops, and even open fields on the outskirts of cities. However, many of these farming activities take place on land with insecure tenure, which makes urban farmers vulnerable to displacement and limits their ability to invest in long-term agricultural development. Moreover, urban agriculture in this region is often embedded in informal urban systems, sometimes relying on untreated wastewater and organic waste as resources for farming.

Despite its significance, urban agriculture in the Global South faces numerous challenges. Limited access to essential resources like suitable land, financial capital, and grants significantly hampers the growth of urban farming initiatives. The lack of government policy support and technical

⁶⁵ "The Role of Urban Agriculture in Building Resilient Cities in Developing Countries," *Journal of Agricultural Science*, accessed April 16, 2025, <https://www.cambridge.org/core/journals/journal-of-agricultural-science/article/role-of-urban-agriculture-in-building-resilient-cities-in-developing-countries/1759F6DF0BFB49B01347F6AA34DF4BE5>; "Sustainable Urban Agriculture in Developing Countries: A Review," *ResearchGate*, accessed April 16, 2025, https://www.researchgate.net/publication/41706465_Sustainable_Urban_Agriculture_in_Developing_Countries_A_Review; "Urban Agriculture as a Climate Change and Disaster Risk Reduction Strategy," *RUAF Foundation*, accessed April 16, 2025, <https://ruaf.org/assets/2019/11/Urban-Agriculture-Magazine-no.-27-Climate-change-and-disaster-risk-reduction.pdf>; "Drivers of Innovative Urban and Peri-Urban Agriculture in Bamenda City, Cameroon," *Scientific Research Publishing*, accessed April 16, 2025, <https://www.scirp.org/journal/paperinformation?paperid=127439>.

⁶⁶ Urban agriculture: a sustainability guide for developing countries | Emerald Insight, accessed April 16, 2025, <https://www.emerald.com/insight/content/doi/10.1108/srj-07-2024-0433/full/pdf?title=urban-agriculture-a-sustainability-guide-for-developing-countries>

⁶⁷ The role of urban agriculture in building resilient cities in developing countries, accessed April 16, 2025, <https://www.cambridge.org/core/journals/journal-of-agricultural-science/article/role-of-urban-agriculture-in-building-resilient-cities-in-developing-countries/1759F6DF0BFB49B01347F6AA34DF4BE5>

knowledge among urban farmers exacerbates these issues. Land tenure insecurity is a particularly pressing challenge; many urban farmers face the constant risk of eviction due to urban development pressures, making it difficult to invest in their agricultural activities and undermining long-term sustainability.

Environmental challenges also pose major obstacles to urban agriculture in the Global South. Urban pollution—of soil, water, and air—threatens the safety and viability of urban food production. Additionally, limited access to clean water for irrigation and the impacts of climate change, including unpredictable weather patterns, further complicate the situation for urban farmers.⁶⁸

The reliance on marginal land and informal resources in the Global South exposes urban agriculture to environmental contamination and land development pressures. The lack of secure land rights, combined with the use of potentially polluted spaces, creates significant health risks for both farmers and consumers. Tackling these challenges requires the implementation of effective policies and practices that promote safe and sustainable urban farming, even in the harsh environmental conditions of developing countries. Moreover, limited access to financial resources and appropriate technologies is a major barrier to adopting more efficient and sustainable urban agriculture practices. The financial constraints faced by urban farmers prevent them from investing in essential infrastructure, modern agricultural techniques, and quality inputs, which are crucial for improving productivity, resilience, and sustainability in urban food production.

2.6.3 Comparative Analysis: Scale, Focus, and Impact

When examining urban agriculture initiatives across the Global North and Global South, clear distinctions emerge in terms of scale, primary objectives, and their broader influence on food systems, local economies, and social dynamics. In the Global North, urban agriculture is typically implemented on a smaller scale, often taking the form of individual or community gardens. However, there has been a noticeable rise in commercial ventures utilizing high-tech approaches such as vertical farming, signaling a shift toward more intensive and technologically advanced models of food production. Much of the academic focus on urban agriculture has historically centered on the Global North.⁶⁹ In contrast, urban agriculture in the Global South encompasses a wider range of scales—from household-level micro-farming to larger commercial activities in peri-urban areas. A

⁶⁸ “Land Tenure Transitions in the Global South: Trends, Drivers, and Policy Implications,” *Annual Review of Environment and Resources*, accessed April 16, 2025, <https://www.annualreviews.org/doi/10.1146/annurev-environ-102016-060924>; “Sustainable Urban Agriculture in Developing Countries: A Review,” *ResearchGate*, accessed April 16, 2025, https://www.researchgate.net/publication/41706465_Sustainable_Urban_Agriculture_in_Developing_Countries_A_Review.

⁶⁹ Emerging Global Trends in Urban Agriculture Research: A Scientometric Analysis of Peer-reviewed Journals, accessed April 16, 2025, <https://www.jscires.org/sites/default/files/JScientometRes-9-2-163.pdf>

large portion of these initiatives are led by small-scale farmers operating with constrained access to land, funding, and other essential resources.⁷⁰

This broader scale reflects urban agriculture's critical importance in addressing food insecurity and providing income for a significantly larger portion of the urban population than is typically seen in the Global North. While the Global North is increasingly embracing commercialized forms of urban agriculture, in the Global South, the landscape is still predominantly composed of small-scale, necessity-driven efforts that reach a broader base of urban residents.

Differences in the primary focus of urban agriculture between the two regions are also significant. In the Global North, urban agriculture is often pursued for its environmental and social contributions—such as fostering community engagement, enhancing urban biodiversity, and supporting broader sustainability agendas. The emphasis is frequently on improving food quality, creating recreational spaces, and integrating green infrastructure into urban planning. In the Global South, however, the primary goal tends to be more immediate and survival-oriented: addressing economic hardship and food scarcity among urban populations.⁷¹ Here, urban agriculture is seen as a practical and essential means of improving food access and alleviating poverty. These contrasting priorities are rooted in the socio-economic realities of each region. In wealthier countries, where food systems are generally stable, the focus tends to lean towards sustainability and quality of life. Meanwhile, in developing nations, where large segments of the urban population face persistent food insecurity and poverty, the focus is more on meeting basic needs and ensuring household survival.

The influence of urban agriculture on food systems and social structures also differs across these regions. In the Global North, urban agriculture contributes to the development of localized food systems and supports the creation of niche markets for organic and locally produced goods. It also plays a role in building stronger community ties. However, there are instances where these benefits are accompanied by challenges, such as the risk of gentrification, which can displace low-income residents as neighborhoods become more desirable. In contrast, urban agriculture in the Global South exerts a more direct and immediate impact on food security and income levels. It is closely tied to the informal economy and often serves as a key source of livelihood for marginalized populations. In many cases, it offers a path to empowerment for urban dwellers who lack formal employment opportunities. While urban agriculture in the Global North often complements existing food systems and serves to enhance sustainability, in the Global South it frequently constitutes a central component of daily food access and economic survival for significant portions of the urban population.

Despite these regional differences, urban agriculture initiatives in both the Global North and Global South are underpinned by similar foundational principles and offer overlapping benefits. Both

⁷⁰ (PDF) Theorizing urban agriculture: north–south convergence - ResearchGate, accessed April 16, 2025, https://www.researchgate.net/publication/338850335_Theorizing_urban_agriculture_north-south_convergence

⁷¹ Promoting Urban Agriculture and Its Opportunities and Challenges—A Global Review, accessed April 16, 2025, <https://www.mdpi.com/2071-1050/13/17/9609>

regions acknowledge the value of incorporating food production into urban environments as a means of promoting sustainability and improving urban resilience in the face of economic, social, and environmental challenges.⁷²

Urban agriculture has the potential to reduce reliance on long-distance food transportation and decrease associated environmental impacts by shortening food supply chains. It also contributes to increasing the availability of fresh, locally grown food. Importantly, whether in the context of developed or developing countries, urban agriculture is widely recognized for its capacity to provide a range of benefits that go beyond food production—including social inclusion, health improvement, environmental education, and the greening of urban spaces. These shared benefits underscore the global relevance of urban agriculture as a strategic response to urbanization, climate change, and the growing need for sustainable urban living across different socio-economic contexts.

2.6.4 The Role of Policy, Governance, and Community Participation: A Global Perspective

Policy frameworks play a pivotal role in shaping how urban agriculture develops and evolves in both the Global North and the Global South. In more developed regions, there has been a noticeable shift towards policies that actively support urban agriculture. Governments at the municipal, regional, and national levels are increasingly working to incorporate urban food production into urban planning strategies, allocate specific funding resources, and establish clear regulations to support urban growers. In contrast, many developing countries still face weak or fragmented policy environments surrounding urban agriculture. In some instances, authorities may even resist acknowledging or formally integrating urban agriculture into city development plans, often under the pretext of pursuing modernization. However, there is a growing awareness in many Global South countries of the essential role urban agriculture plays in enhancing food security and supporting urban livelihoods. Whether in the North or the South, the presence of well-designed, supportive policy frameworks is a critical factor in determining the extent to which urban agriculture can expand and deliver meaningful benefits. Policies that ensure land access, financial support—such as subsidies or grants—and full integration into urban development plans are key to building environments that allow urban agriculture to thrive.⁷³

⁷² CABI Digital Library. *Global Urban Agriculture*. Retrieved April 16, 2025, from

<https://www.cabidigitallibrary.org/doi/book/10.1079/9781780647326.0000>

“A Review on Urban Agriculture: Technology, Socio-Economy, and Policy,” *PMC*, accessed April 16, 2025,

<https://pmc.ncbi.nlm.nih.gov/articles/PMC9668687/>; “The Intersection of Planning, Urban Agriculture, and

Food Justice: A Review of the Literature,” *Journal of Planning Literature*, accessed April 16, 2025,

<https://www.tandfonline.com/doi/full/10.1080/01944363.2017.1322914>; “Urban Agriculture: Environmental,

Economic, and Social Perspectives,” *ResearchGate*, accessed April 16, 2025,

https://www.researchgate.net/publication/308543504_Urban_Agriculture_Environmental_Economic_and_Social_Perspectives.

⁷³ Full article: Assessing motivations and perceptions of stakeholders in urban agriculture: a review and analytical framework - Taylor and Francis, accessed April 16, 2025,

<https://www.tandfonline.com/doi/full/10.1080/19463138.2021.1904247>

Governance models for urban agriculture also differ significantly between the Global North and the Global South.⁷⁴ In developed countries, governance tends to rely on a mix of formal mechanisms and informal community-driven structures. There is a growing trend towards embedding urban agriculture within established urban governance frameworks, often through specific zoning laws that outline what types of farming activities are allowed and through municipal programs that support urban growers with resources and guidance. In developing regions, urban agriculture is more commonly practiced outside the bounds of formal regulation.⁷⁵ It is often governed informally, with limited policy clarity, inconsistent land rights, and minimal connection to official urban planning processes. The success and resilience of urban agriculture initiatives frequently hinge on how well they are integrated into formal governance systems. In the Global South, while informal governance can help sustain farming activities, the lack of formal support leaves many farmers vulnerable—particularly due to insecure land tenure and a lack of institutional backing. Conversely, the move toward formalized urban agriculture governance in the Global North provides initiatives with greater legitimacy, access to resources, and long-term security.

Across both regions, one consistent factor that contributes significantly to the success and endurance of urban agriculture projects is active community engagement. Local participation is essential for creating a sense of shared ownership, which encourages ongoing involvement and commitment from residents. Community participation not only fosters engagement but also strengthens social bonds, encouraging collaboration, dialogue, and the creation of social networks within urban neighborhoods.⁷⁶ Furthermore, when urban agriculture initiatives are developed in close consultation with the communities they aim to serve, they are more likely to reflect local values, cultural preferences, and practical needs. Regardless of whether these projects are inspired by environmental and social goals, as is common in the Global North, or are driven by urgent needs for food and income in the Global South, strong community involvement remains a foundational pillar for the success, relevance, and sustainability of urban agriculture efforts worldwide.⁷⁷

2.6.5 Fostering Collaboration and Knowledge Exchange Between the Global North and the Global South

The unique strengths, experiences, and contextual differences of urban agriculture in the Global North and the Global South present valuable opportunities for collaborative efforts and the sharing of useful knowledge. A key area where this collaboration could thrive is in the transfer and adaptation of sustainable and efficient agricultural technologies. The Global North has made considerable

⁷⁴ Resilient Governance Regimes That Support Urban Agriculture in Sub-Saharan Cities: Learning From Local Challenges - Frontiers, accessed April 16, 2025, <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2021.692167/full>

⁷⁵ Urban Agriculture in Latin America: A Green Culture Beyond Growing and Feeding - Frontiers, accessed April 16, 2025, <https://www.frontiersin.org/journals/sustainable-cities/articles/10.3389/frsc.2021.792616/full>

⁷⁶ Urban Agriculture And Politics Of Space: Potential for Collaboration - roadmender, accessed April 16, 2025, <https://roadmender.net/2023/01/11/urban-agriculture-and-politics-of-space-potential-for-collaboration/>

⁷⁷ The Socio-Cultural Benefits of Urban Agriculture: A Review of the Literature - MDPI, accessed April 16, 2025, <https://www.mdpi.com/2073-445X/11/5/622>

strides in areas like vertical farming, controlled environment agriculture, and water-efficient irrigation techniques. Although these technologies may need to be adapted to fit the specific needs and resource limitations of the Global South, they offer significant potential for improving food production and resource management in urban environments within developing countries.⁷⁸ Conversely, the Global South brings valuable expertise in community-based agricultural practices within resource-limited contexts, offering lessons on resilience and adaptability that could inform urban agriculture initiatives in the Global North.

Another vital area for collaboration is policy development. Many countries in the Global North have established more formalized and supportive policy frameworks for urban agriculture. The lessons learned from these policy developments could offer significant guidance for the Global South, where such formal support is often limited or inconsistent. At the same time, the experience of the Global South in managing informal governance structures and addressing the needs of vulnerable urban populations could offer the Global North valuable perspectives as it works toward building more equitable and inclusive urban food systems.⁷⁹

The development of strategies to engage local communities and build social capital through urban agriculture is also a promising area for exchange. Both regions have successfully implemented models to involve communities in urban farming initiatives. Sharing these experiences and adapting successful strategies to different cultural and socio-economic environments could result in more impactful and sustainable urban agriculture projects globally.

Collaboration on sustainable agricultural practices and innovations is critical for advancing urban agriculture in both regions. This includes the exchange of knowledge on climate-resilient farming techniques, organic methods, water-saving irrigation technologies, and strategies for addressing urban soil contamination. By sharing expertise in these areas, both the Global North and the Global South can benefit from each other's advancements, leading to more efficient, eco-friendly, and resilient urban food systems.⁸⁰

International organizations are key facilitators of collaboration and knowledge exchange between the Global North and the Global South. Organizations like the Food and Agriculture Organization of the United Nations (FAO) promote urban agriculture through various programs, providing technical expertise, fostering dialogue, and disseminating information. The RUAF Global Partnership on Sustainable Urban Agriculture and Food Systems serves as a vital network for connecting researchers, policymakers, and practitioners. Agencies such as the USDA also support international agricultural research and development collaborations. Additionally, the United Nations Environment Programme (UNEP), through initiatives like the International Resource Panel, contributes to the

⁷⁸ Food Tank. (2019, December 16). *17 Initiatives Changing Urban Agriculture Through Tech and Innovation*. Retrieved April 16, 2025, from <https://foodtank.com/news/2019/12/16-initiatives-changing-urban-agriculture-through-tech-and-innovation/>

⁷⁹ Increasing City Resilience through Urban Agriculture: Challenges and Solutions in the Global North - MDPI, accessed April 16, 2025, <https://www.mdpi.com/2071-1050/13/3/1465>

⁸⁰ Promoting Urban Agriculture and Its Opportunities and Challenges—A Global Review, accessed April 16, 2025, <https://www.mdpi.com/2071-1050/13/17/9609>

global understanding of how urban agriculture can help meet sustainability goals. These international bodies bridge the gap between developed and developing countries, providing platforms for the exchange of knowledge, facilitating the transfer of suitable technologies, and supporting joint efforts aimed at creating more effective and coordinated approaches to urban agriculture worldwide.⁸¹

2.6.6 Conclusion: Towards a Sustainable and Equitable Future for Urban Agriculture

The analysis of urban agriculture across the Global North and the Global South reveals a complex landscape characterized by both shared principles and distinct regional variations in motivations, practices, and impacts. In the realm of urban farming, a fascinating divergence in focus emerges between the Global North and South. It seems that while the Global North often champions the environmental perks and social cohesion fostered by urban agriculture, the Global South, understandably, places a higher premium on its capacity to tackle essential needs like food security and income generation for its most vulnerable urban residents. Despite these differing immediate priorities, it's intriguing how the foundational tenets of local food production, efficient resource use, and community upliftment resonate deeply in both contexts. This underscores, quite powerfully, the universal capacity of urban agriculture to cultivate cities that are both more sustainable and inherently resilient.

The trajectory of urban agriculture in both regions is profoundly shaped by the level of policy backing and the very nature of governance. In the Global North, it's clear that the increasing incorporation of urban farming into established urban planning and policy frameworks creates a truly supportive ecosystem for its expansion. Conversely, the Global South frequently grapples with hurdles like scant or erratic policy support and the widespread presence of informal governance. Yet, one consistent and critical ingredient for success worldwide appears to be community participation. This ensures that urban agriculture projects remain pertinent, enduring, and genuinely contribute to the well-being of the individuals they are designed to assist.

The differing strengths and experiences of the Global North and the Global South in urban agriculture create valuable opportunities for collaboration and knowledge exchange. The transfer and adaptation of sustainable technologies from the Global North to the Global South, coupled with the sharing of the Global South's expertise in resource-constrained and community-driven

⁸¹ “Urban Agriculture’s Potential to Advance Multiple Sustainability Goals: An International Resource Panel Think Piece,” UNEP, accessed April 16, 2025, <https://www.unep.org/resources/publication/urban-agricultures-potential-advance-multiple-sustainability-goals>; “Urban Agriculture in the Global North & South: A Perspective from FAO,” *Facts Reports*, accessed April 16, 2025, <https://journals.openedition.org/factsreports/5610>; “AFRI International Partnerships,” USDA NIFA, accessed April 16, 2025, <https://www.nifa.usda.gov/grants/programs/agriculture-food-research-initiative/faq/international>.

urban farming, hold the potential to significantly advance urban agriculture globally. International organizations play a crucial role in facilitating this exchange, providing platforms for dialogue, disseminating knowledge, and supporting collaborative initiatives.

Moving forward, it is essential to recognize the importance of context-specific approaches to urban agriculture development. Policies, technologies, and practices that are effective in one region may not be directly transferable to another without careful adaptation. By fostering greater collaboration and knowledge exchange between the Global North and the Global South, we can work towards a more sustainable and equitable future for urban agriculture, unlocking its full potential to contribute to global sustainability goals and enhance urban resilience for all.

Feature	Global North	Global South
Scale	Typically smaller-scale (individual/community gardens); rising commercial ventures with high-tech approaches.	Wider range of scales, from household micro-farming to larger commercial activities in peri-urban areas; predominantly small-scale, necessity-driven.
Primary Focus	Environmental, social, and educational benefits; community engagement, biodiversity, quality of life, recreational spaces, green infrastructure.	Immediate and survival-oriented; addressing economic hardship, food scarcity, and income generation for vulnerable populations.
Impact	Contributes to localized food systems, niche markets, and stronger community ties; risk of gentrification.	Direct and immediate impact on food security and income levels; closely tied to the informal economy; key source of livelihood for marginalized populations.
Technology	Extensive use of advanced technologies (vertical farming, hydroponics, LED lighting); focus on optimizing efficiency and crop output.	Limited access to financial resources and appropriate technologies; methods adapted to limited resources.

Policy & Governance	Growing integration into formal urban planning and policy frameworks, specific zoning laws, financial support, legitimacy, long-term security.	Weak or fragmented policy environments; often practiced outside formal regulation; informal governance; land tenure insecurity and lack of institutional backing.
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Table 6 Comparison Between the UA in Global North and Global South Elaborated By the Author

2.7 Conclusion on Theoretical Studies

Category	Subcategory	Global North	Global South	Most Notable Benefits	Main Challenges
USDA Typology	Community Gardens	A	A	Social cohesion, education, intercultural exchange	Gentrification, tenure insecurity
	Community Farms	A	B	Food access, volunteerism, social inclusion	Infrastructure, zoning, volunteer retention
	Commercial Urban Farms	A	B	Entrepreneurship, local food economy, job creation	High costs, profitability, urban land constraints
	Institutional Farms	A	B	Education, therapy, health promotion	Bureaucratic barriers, space limitations
EFUA Typology	Urban Farms	A	B	CSA models, consumer-producer connection	Market access, infrastructure
	The Community Park	B	C	Green space, recreation, informal learning	Land-use conflict, upkeep

	DIY Garden/Farm	B	A	Food self-reliance, household savings	Limited space, soil quality
	Zero Acreage Farm	A	D	Space efficiency, year-round production	High capital/tech need, energy use
	Social Farm	A	D	Social inclusion, therapy, rehabilitation	Institutional support gaps
	Community Garden (EFUA)	A	A	Community bonding, food access, cultural preservation	Volunteer fatigue, land security
Location-Based	Rooftop Gardens	A	C	Stormwater control, insulation, urban greening	Structural capacity, wind exposure
	Vertical Farms	A	C	Compact, pesticide-free, high-yield	Energy intensity, high setup cost
	Backyard Gardens	B	A	Nutrition, leisure, food savings	Pest control, space, policy
	Peri-Urban Farms	B	A	Regional food access, employment, market integration	Pollution, tenure, urban development pressure
Scale-Based	Individual Initiatives	B	A	Self-reliance, health, leisure	Time, skills, limited output
	Community Initiatives	A	B	Social networks, education, resilience	Governance, tenure, equity
	Commercial Initiatives	A	B	Income generation, job creation, innovation	Cost barriers, scalability

Farmer Types	High-Tech Entrepreneurs	A	D	Productivity, innovation, scalability	Energy use, tech access, capital
	Market Gardeners	B	B	Fresh food markets, economic empowerment	Input access, small scale
	Peri-Urban Farmers	B	A	Fresh supply, lower land cost, employment	Informality, transport, water pollution
	Cultural Heritage Farmers	B	A	Knowledge preservation, food sovereignty	Land access, institutional neglect
	Home Gardeners	B	A	Food quality, autonomy, health benefits	Soil quality, time, pest issues
	Hobbyists (e.g. bees, mushrooms)	A	D	Recreation, biodiversity, community events	Limited scale, niche appeal
	Educational Institution Farmers	A	B	Curriculum integration, food literacy	Coordination, funding
	Correctional Facility Farmers	B	D	Vocational training, rehabilitation	Institutional support, stigma
	Innovation/Experimental Farmers	A	C	Data generation, climate resilience, system design	Replication, access to R&D infrastructure
Method-Based	Hydroponics	A	B	Water use efficiency, urban adaptability	Cost, system maintenance, training
	Aquaponics	B	C	Protein + vegetables, sustainable loop	Water quality, infrastructure, dual

					management skills
	Aeroponics	A	D	Max efficiency, fast growth, lowest water use	Energy reliance, cost, nozzle failures
	Traditional Soil-Based Gardening	B	A	Low barrier, ecological integration, wide crop choice	Soil contamination, labor demands
Livestock-Based	Small-scale livestock (chickens, bees, etc.)	B	A	Eggs, meat, manure, pollination, economic diversity	Zoning, hygiene, noise, disease control

Table 7 Final Comparison on Chapter Two: Theoretical Studies Elaborated By The Author

CHAPTER THREE: RESEARCH METHODOLOGY.

Chapter Structure

This research adopts a qualitative methodology with an exploratory approach to address the central goal and objectives, which focus on exploring the potential for implementing urban agriculture in Al Shorouk City. The study relies on a combination of observations, case study analysis, and descriptive techniques to deepen the understanding of existing literature and to formulate effective strategies for integrating urban agriculture into the city's fabric. It also examines the challenges and opportunities specific to Al Shorouk City, considering its urban dynamics, environmental context, and socioeconomic structure.

The methodology is structured around an introduction and comprehensive chapters, each contributing to a holistic exploration of urban agriculture in Al Shorouk City.

3.1 Theoretical Framework

This initial chapter truly sets the stage for our study by diving deep into the world of urban agriculture. We'll explore its core concepts and principles, alongside a look at global best practices that are shaping cities worldwide. It's fascinating to see the innovative strategies taking hold, from hydroponics and aquaponics to vertical farming and rooftop gardens. We'll also examine various community-based agricultural initiatives that are proving incredibly successful.

Interestingly, the chapter doesn't just stop at global trends. It critically evaluates how these cutting-edge techniques could apply to Al Shorouk City. This involves considering the city's unique urban structure, land use patterns, climate conditions, and existing infrastructure. It seems our aim here is to bridge that gap between what's happening globally and what's feasible locally, ultimately building a conceptual framework to assess the true potential of urban agriculture in El Sherouk City

3.2 Why El Sherouk City Was Selected for Urban Agriculture Implementation

Al Shorouk City stands out as a strategic and promising location for implementing an Urban Agriculture (UA) project, due to a combination of urban planning foresight, growing community needs, and alignment with sustainability goals. Located on the eastern edge of Greater Cairo, this “third generation” city was established with the goal of decongesting the capital and providing organized, livable spaces for future generations.⁸² Unlike many older, unplanned urban areas, Al Shorouk offers clear zoning, modern infrastructure, and relatively low building density in many districts—key factors that open the door for implementing rooftop gardens, community farms, and educational agricultural spaces.⁸³

⁸² New Urban Communities Authority. *Al Shorouk City profile*.
<https://www.newcities.gov.eg/english/Shorouk/default.aspx>

⁸³ Cassatella, C., & Gottero, E. (2022). Integrating urban and peri-urban agriculture in planning systems: Barriers, policy tools and recommendations. *Landscape Ecology*, 37, 715–728.
<https://doi.org/10.1007/s10980-022-01482-z>

The city's demographic makeup further supports this initiative: it is home to a young, educated population that is increasingly aware of environmental issues and the importance of food sovereignty.⁸⁴ With Cairo's food systems under pressure and supply chains becoming more fragile due to urban expansion and climate challenges, local food production solutions are not only desirable but necessary. Moreover, the presence of educational institutions and active civil society groups in Al Shorouk City makes it an ideal environment for community engagement, knowledge-sharing, and innovation in sustainable urban practices.⁸⁵

Al Shorouk's urban policy direction, supported by the New Urban Communities Authority (NUCA), emphasizes green space integration, environmental health, and efficient land use—values that are at the core of any UA project. As the city continues to grow and evolve, applying urban agriculture here represents not only a practical solution to local food needs, but also a model that could be scaled and replicated in similar new urban communities across Egypt and the Global South.⁸⁶

3.3 Analytical Study: inspirational Case Study Analysis

The chapter delves into a detailed analysis of case studies to gain practical insights into the successful implementation of urban agriculture in cities with similar characteristics to Al Shorouk. Case studies are selected from previous research, published reports, and real-world examples of urban agriculture projects. Each case study is examined in terms of:

- The project's overall context and objectives.
- Types of spaces utilized for urban farming (e.g., rooftops, public spaces, private plots).
- Methods and techniques applied, including advanced farming systems and technologies.
- Types of agricultural products and their relevance to the local market.
- Economic and social impacts, including market orientation and community participation.
- Planning, implementation, and operational processes.
- Structural and infrastructural requirements.

This analysis is designed to identify lessons learned, innovative practices, and challenges faced in implementing urban agriculture, all of which provide valuable guidance for developing a model tailored to El-Shorouk City.

⁸⁴ World Resources Institute. (2018). *Including the excluded: Supporting informal workers for more equal and productive cities in the Global South*. <https://www.wri.org/research/including-excluded-supporting-informal-workers-more-equal-and-productive-cities-global>

⁸⁵ Frontiers in Sustainable Cities. (2021). *Urban agriculture in Latin America: A green culture beyond growing and feeding*. <https://www.frontiersin.org/articles/10.3389/frsc.2021.792616/full>

⁸⁶ New Urban Communities Authority. (n.d.-b). *Environmental integration in new urban communities*. <https://www.newcities.gov.eg/english/>

3.4 Selection Criteria for Choosing Urban Agriculture Inspirational Case Studies

Urban agriculture (UA) is more than just a method of food production—it represents a movement toward sustainability, food security, and community resilience. Each city has a unique way of integrating UA into its urban fabric, shaped by its policies, culture, and economic conditions. To truly understand how UA can be successfully implemented in Cairo’s El-Shorouk City, I carefully selected case studies that reflect diverse urban contexts, providing insight into both opportunities and challenges.

Why These Case Studies Matter

Rather than looking at urban agriculture as a one-size-fits-all solution, these case studies allow us to examine how different cities have navigated their own hurdles and successes. The selection process was guided by criteria that ensure each project provides meaningful lessons that can be applied in Cairo’s evolving urban landscape.

Key Selection Criteria

To choose the most relevant and inspiring case studies, I assessed projects based on the following key factors:

1. City Support and Policy Frame

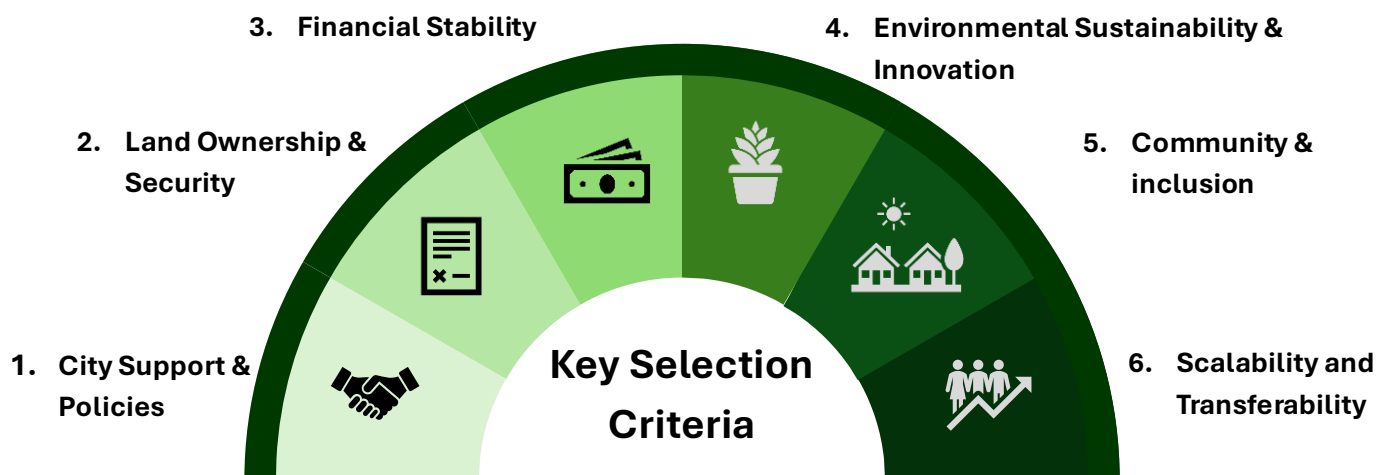


Figure 7 Key Selection criteria Elaborated By The Author

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Municipal recognition and institutional support play a foundational role in the success and continuity of urban agriculture initiatives. When city governments actively integrate urban agriculture into urban planning—through zoning allowances, incentive schemes, or food policy councils—they help legitimize these activities and provide an enabling environment for growth. In selecting case studies, emphasis was placed on projects situated within supportive policy ecosystems, where local

authorities not only permit but also promote agricultural practices as part of sustainable urban development agendas.

2. Land Tenure and Security of Access

Access to land, and more critically, the security of that access, emerged as a key determinant in the sustainability of urban agriculture projects. Initiatives operating under formal tenure arrangements—whether through public land allocation, community land trusts, or long-term private leases—are significantly more resilient and capable of long-term planning. Conversely, projects on precarious or informally occupied land face constant threats of displacement. The case studies included in this research were therefore selected with careful attention to the nature and stability of land tenure arrangements, recognizing their centrality to project viability.

3. Financial Viability and Economic Models

Urban agriculture projects vary widely in their financial structures, ranging from grant-dependent community gardens to fully self-sustaining urban farms. Financial stability was assessed as a critical factor in ensuring the endurance and independence of these projects. Case studies that demonstrated diversified income streams—such as produce sales, educational workshops, social enterprise models, and partnerships—were prioritized for their resilience. These models illustrate how urban agriculture can transcend subsistence or pilot-scale functions and evolve into economically sustainable urban assets.

4. Community Engagement and Social Inclusion

Successful urban agriculture extends beyond food production; it functions as a tool for social empowerment and community development. The case studies assessed in this study were evaluated based on their ability to promote inclusive involvement, react to community needs, and address concerns of food justice, equity, and empowerment, particularly for vulnerable communities. Initiatives that include communities in planning and governance, provide educational or career opportunities, and promote community cohesiveness were deemed exceptional for their capacity to turn urban space into socially useful landscapes.

5. Environmental Sustainability and Technological Innovation

As cities grapple with the impacts of climate change and ecological degradation, urban agriculture presents a valuable opportunity for environmentally sustainable interventions. The case studies analyzed employed a range of ecologically responsible practices—such as composting, organic cultivation, water reuse systems, and low-carbon infrastructure. Furthermore, projects integrating advanced techniques like hydroponics, aquaponics, or vertical farming exemplified innovative responses to spatial and environmental constraints. These practices not only enhance environmental performance but also showcase the adaptive potential of urban agriculture in diverse urban settings.

6. Scalability and Transferability

Finally, the potential for replication and adaptation of urban agriculture models across different geographic and socio-economic contexts was a key evaluative criterion. Projects that exhibited modular designs, flexible organizational structures, or community-led frameworks were viewed as particularly valuable, especially in the context of rapidly urbanizing regions such as Greater Cairo. By identifying scalable and transferable models, this study aims to inform the development of context-sensitive strategies that can be adapted to support urban agriculture in emerging urban contexts.

Selected Case Studies

When we examine urban agriculture through the experiences of both the Global South and Global North, we gain a far richer, more subtle understanding of how varied urban environments truly influence farming within cities. Cities in the Global North often leverage strong policy frameworks, cutting-edge technology, and robust infrastructure. Conversely, those in the Global South frequently demonstrate remarkable adaptability, strong community resilience, and innovative ways of using limited resources. Including case studies from both these regions gives us a balanced perspective, one that moves beyond simple geographic or economic divides. This comparative approach not only reveals a wide array of implementation models and governance structures but also spotlights common challenges, such as land access, financial sustainability, and environmental pressures. By looking closely at such diverse experiences, our study can identify context-sensitive strategies. These insights are incredibly valuable for informing urban agriculture planning in rapidly evolving cities like El-Sherouk. Ultimately, drawing lessons from this global diversity greatly enhances how relevant, flexible, and transferable urban agriculture frameworks can be across different urban realities.

Global North:

1. Chicago, USA – The Chicago Urban Agriculture Mapping Project (CUAMP)

- *City Support:* Strong zoning laws and policies support UA.
- *Land Ownership:* Mix of public and private land.
- *Financial Stability:* Many projects sustain themselves through produce sales and grants.
- *Community Engagement:* Involves local communities and focuses on food justice.
- *Environmental Sustainability:* Uses advanced techniques like composting and vertical farming.
- *Scalability:* A well-documented initiative that serves as a model for other cities.

2. Turin, Italy – Orti Generali Community Gardens

- *City Support:* Funded by EU and local government.

- *Land Ownership*: Publicly owned land designated for community agriculture.
- *Financial Stability*: Supported by grants and membership fees.
- *Community Engagement*: Focuses on social inclusion and community bonding.
- *Environmental Sustainability*: Promotes organic farming and water conservation.
- *Scalability*: Highly adaptable model for European cities.

Global South:

3. Cairo, Egypt – Rooftop Gardens Initiative

- *City Support*: Gaining recognition but still needs structured policies.
- *Land Ownership*: Privately owned rooftops often informally utilized.
- *Financial Stability*: Community-funded with some NGO support.
- *Community Engagement*: Families and small businesses actively participate.
- *Environmental Sustainability*: Uses hydroponics and organic methods.
- *Scalability*: With the right support, it could expand significantly.

4. Accra, Ghana – Wastewater-fed Urban Agriculture

- *City Support*: Recognized but lacks clear regulatory frameworks.
- *Land Ownership*: Often informal, posing challenges for long-term sustainability.
- *Financial Stability*: Farmers sustain themselves through direct market sales.
- *Community Engagement*: Provides food security in low-income areas.
- *Environmental Sustainability*: Reuses wastewater for irrigation, reducing freshwater use.
- *Scalability*: A valuable model for water-scarce cities like Cairo.

5. Dhaka, Bangladesh – Rooftop Gardening Initiative

- *City Support*: The government encourages rooftop farming through tax incentives.
- *Land Ownership*: Privately owned rooftops utilized for UA.
- *Financial Stability*: Mostly self-funded with some government and NGO support.
- *Community Engagement*: Families, schools, and neighborhoods actively participate.
- *Environmental Sustainability*: Uses rainwater harvesting and organic composting.

- **Scalability:** A practical model for dense urban environments with limited land space.

Criteria	Sub-Indicators	Chicago (USA)	Turin (Italy)	Cairo (Egypt)	Accra (Ghana)	Dhaka (Bangladesh)
1. City Support & Policies	- Gov't recognizes and supports UA - Zoning - financial incentives	Strong support; policies and zoning	Funded by EU & local gov.	Gaining recognition; lacks structured policy	XRecognize d but lacks regulation	Encouraged via tax incentives
2. Land Ownership & Security	- Public or private land? - Long-term security?	Mix of public/private land with some security	Public land designated for UA	Private rooftops; informally used	Informal; tenure insecure	Private rooftops; stable use
3. Financial Stability	- Self-sustaining or grant-dependent? - Revenue model?	Mix of produce sales and grants	Grants and membership fees	X - Community and NGO supported	Market-based sales	Self-funded + NGO/government support
4. Community Engagement & Social Impact	- Inclusive? - Empowers communities, social cohesion?	Strong community focus; food justice	Emphasis on inclusion and bonding	Families and small businesses actively involved	Supports low-income food security	Broad participation: families, schools
5. Environmental Sustainability & Innovation	- Eco-friendly methods? - Use of modern tech (e.g., hydroponics, vertical farming)?	Composting, vertical farming	Organic methods, water conservation	Hydroponics, organic	Reuses wastewater	Rainwater harvesting, composting
6. Scalability & Replicability	- Adaptable elsewhere? - Relevant to Cairo/El-Shorouk barriers?	Well-documented model; highly replicable	Adaptable to other European cities - Recommendation for policy change	Scalable with policy and support improvements	Relevant to water-scarce cities	Practical for dense, land-limited cities

Table 8 Selected Inspirational Case Studies From Global North and Global South Elaborated By The Author

Implications for Cairo's El-Shorouk City

The beauty of urban agriculture lies in its adaptability. Whether it's a rooftop garden in Cairo, a community farm in Turin, or an innovative wastewater-fed farm in Accra, each case study provides a unique and valuable lesson. By analyzing their successes and challenges, we can craft a roadmap for sustainable UA in El-Shorouk City, ensuring a greener and more food-secure future.

By examining case studies from both Global North and Global South cities, we can learn how different UA models succeed under various conditions. The key takeaways for Cairo's El-Shorouk

City With the right policies, community engagement, and investment in sustainable practices, Cairo can transform its urban spaces into thriving agricultural hubs, providing fresh food, creating jobs, and fostering social cohesion. The journey towards a greener Cairo starts with learning from those who have paved the way include:

- **Policy Development:** Inspired by Chicago and Turin, Cairo can push for zoning laws and financial incentives.
- **Sustainable Practices:** Accra's wastewater reuse and Dhaka's rainwater harvesting offer resource-efficient solutions.
- **Community Involvement:** Encouraging participation from residents, businesses, and local organizations, as seen in Accra and Cairo.
- **Innovative Farming Techniques:** Leveraging hydroponics and vertical farming, as done in Chicago and Dhaka, to maximize space.

Final Thoughts

Urban agriculture's true strength lies in its incredible adaptability. Just think about it: whether you observe a rooftop garden in Cairo, a thriving community farm here in Turin, or even an innovative wastewater-fed farm in Accra, each offers unique and invaluable lessons. By carefully studying both their successes and the hurdles they encountered, we can genuinely begin to outline a practical roadmap for sustainable urban agriculture in El-Sherouk City. This approach, in turn, really promises a greener and more food-secure future for its people.

When we combine supportive policies, profound community engagement, and strategic investments in sustainable practices, Cairo has a real chance to transform its urban spaces into thriving agricultural centers. Imagine the possibilities: easily accessible, fresh, local food; new job creation; and stronger social ties. Ultimately, the journey toward a greener Cairo starts by learning from those who have already paved the way.

3.5 Empirical Study: A Proposed Model for Al Shorouk City

This fifth chapter, frankly, is where our research truly comes together. Here, a workable, empirically supported strategy designed to smoothly incorporate urban agriculture into El-Sherouk City's very structure. This is an empirical research that provides a thorough exploration of the city's actual ability to adopt urban agricultural techniques, so forget about only theoretical arguments. We achieve this by carefully examining its urban surroundings, identifying open areas, analyzing the state of the environment, and determining the community's readiness. Furthermore, we thoroughly examine the financial feasibility and the particular legislative adjustments required to really promote urban agriculture across the city.

Key components of the proposed model include:

- Identifying suitable locations for urban agriculture, such as unused land, rooftops, and public spaces.

- Recommending farming methods that align with Al Shorouk’s environmental and resource constraints, including water-efficient systems like hydroponics and aquaponics.
- Evaluating the potential for local food production to enhance food security and reduce reliance on external supply chains.
- Addressing social aspects, such as community involvement, educational opportunities, and public acceptance of urban agriculture initiatives.
- Proposing implementation strategies that include urban planning, policy recommendations, and partnerships with local stakeholders, businesses, and government entities.

3.6 Significance of the Study

By bringing together theoretical knowledge, the practical lessons from various case studies, and the direct findings from our empirical analysis, this research truly delivers actionable strategies. Our goal To weave urban agriculture firmly into El-Sherouk City's urban fabric. The study really shines a light on urban farming's potential to tackle critical issues like food insecurity, urban sustainability, and the challenge of underutilized land. At the same time, it clearly shows how urban agriculture can boost economic development and strengthen community engagement.

This approach ensures we take a truly comprehensive look at urban agriculture and how it applies specifically to El-Sherouk City. It paves a clear path for practical solutions that hold the power to transform the city's urban landscape and significantly contribute to its long-term sustainable development.

CHAPTER FOUR: “ANALYTICAL STUDY” INSPIRATIONAL CASE STUDIES.

Chapter Structure

This chapter presents a comparative analytical study of selected inspirational urban agriculture case studies from both the Global South and Global North. By examining diverse socio-economic, environmental, and policy contexts, the chapter aims to highlight successful practices, innovative strategies, and adaptable models that have contributed to the integration of agriculture within urban environments. Case studies were selected based on their relevance to sustainability, community engagement, and spatial integration within city planning. Through this analysis, the chapter identifies key factors that have driven the success of these initiatives and evaluates their potential applicability to emerging urban contexts, such as El-Sherouk City. The comparison not only reveals differences in scale, technology, and governance between the two regions but also uncovers common principles that can inform context-sensitive urban agriculture strategies globally:

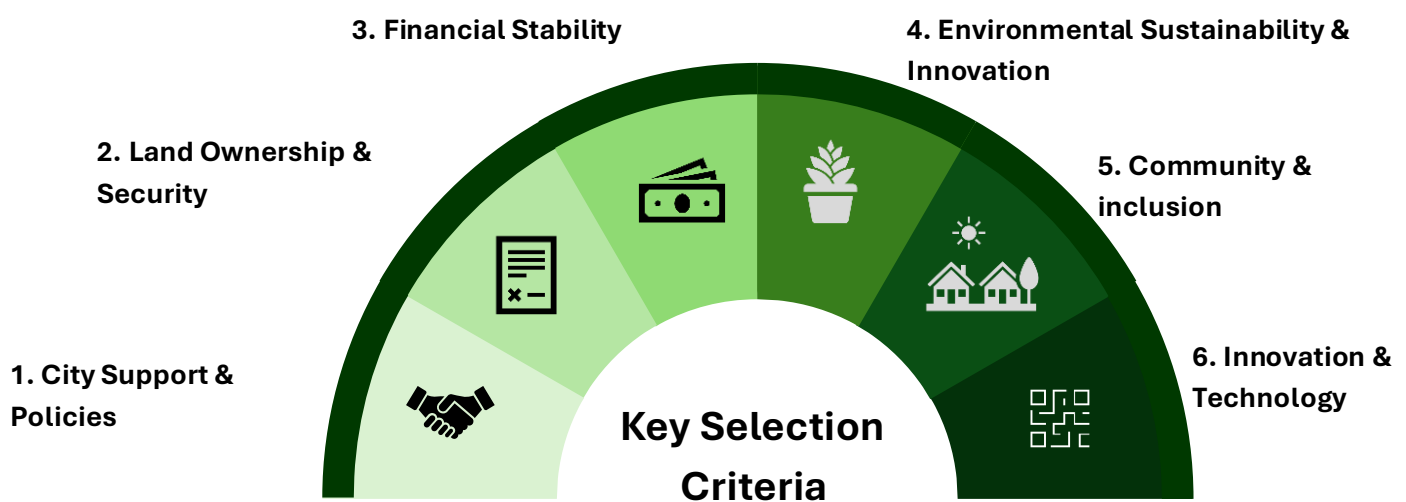
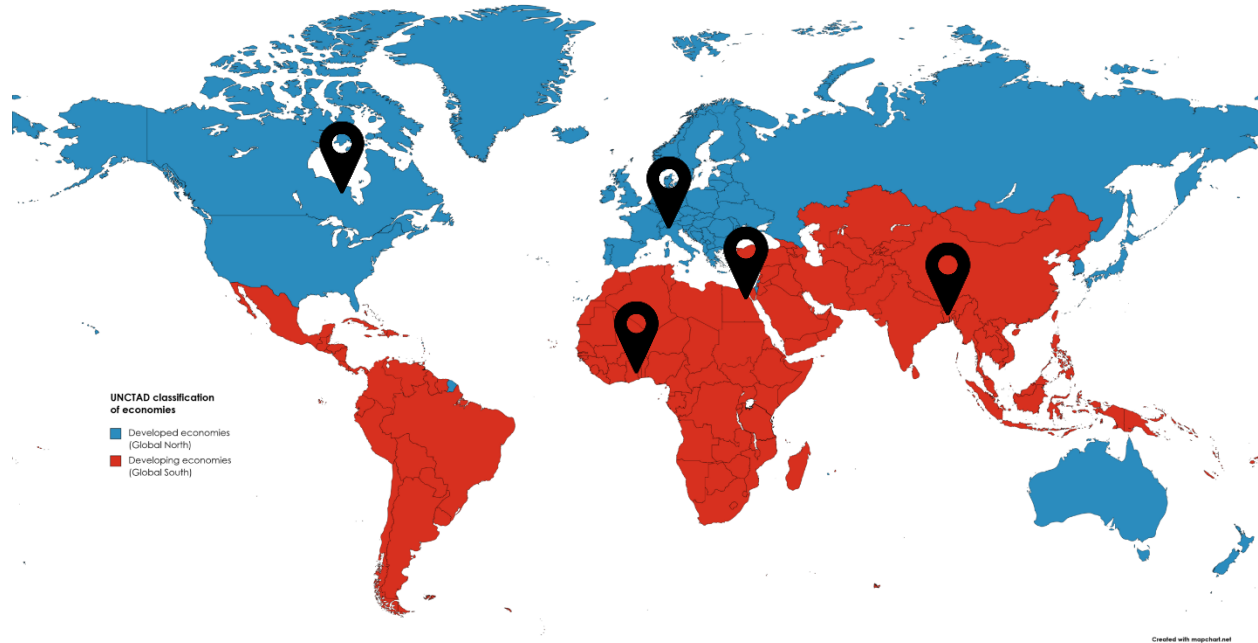


Figure 8 Key Selection criteria Elaborated By The Author

4.1 CASE STUDIES OVERVIEW



Map 3 location of the 5 case studies on Economic classification of the world's countries and territories by UNCTAD in 2023

GLOBAL NORTH

1. Michigan Urban Farming Initiative (MUFI) – USA

The United States' Michigan Urban Farming Initiative (MUFI)

In the Global North, one of the best examples of community-led urban agriculture is the Detroit-based Michigan Urban Farming Initiative (MUFI). Established in 2011, MUFI occupies a three-acre location in the traditionally underprivileged North End neighborhood. In order to combat food insecurity, advance sustainability, and support community development, the organization turns abandoned lots into fruitful farms.⁸⁷

Crop rotation, organic farming, composting, and other sustainable farming practices are at the heart of MUFI's operations. Container gardening and raised beds help reduce soil pollution, which is a prevalent problem in cities. The farm grows a wide range of crops and is assisted by a Community Resource Center that offers locals who want to establish their own gardens equipment, seeds, and training.⁸⁸

One of MUFI's most impactful contributions is its food distribution program, which donates over 50,000 pounds of fresh produce annually to residents, food banks, and community kitchens. The

⁸⁷ The Michigan Urban Farming Initiative, "About Us," accessed June 22, 2025, <https://www.miufi.org/>.

⁸⁸ The Michigan Urban Farming Initiative, "Projects and Impact," accessed June 22, 2025, <https://www.miufi.org/projects>.

organization also runs extensive educational programs, including school partnerships, internships, and community workshops, aimed at teaching farming skills and promoting healthy eating habits.⁸⁹

MUFI has made significant strides in addressing broader community needs, including job creation and environmental stewardship. The farm provides employment opportunities and acts as a communal space for events, which enhances local social cohesion. Technological innovations, such as solar-powered irrigation and data-driven farming tools, support efficient, eco-friendly practices.⁹⁰

Despite its success, MUFI faces several challenges, including land access, funding, and trust-building within the community. These issues are addressed through partnerships with city officials and private landowners, crowdfunding, and transparent community engagement. MUFI's adaptability and holistic approach serve as a replicable model for urban agriculture in other cities.⁹¹

2. Urban Agriculture in Turin – Italy

Turin offers a diverse set of urban agriculture initiatives that are strongly integrated into city planning. The municipality supports projects that combine food production with goals of urban regeneration, environmental sustainability, and social inclusion. The city's proactive policies and partnerships between public and private sectors make it a standout case in the Global North.

Projects like **Orti Laghetti di Falchera** promote environmental education and social cohesion through community-managed gardens in suburban areas. This site includes small lakes that enhance local biodiversity. However, it struggles with maintenance funding and limited integration into broader urban policies.

Orti Generali, located in Mirafiori, exemplifies multifunctional UA. It provides rentable plots, educational programming, and sustainable infrastructure such as composting systems and rainwater harvesting. Managed by a nonprofit in partnership with the city, this project highlights how diverse funding streams can support long-term viability and community engagement.

Turin also innovates with rooftop farming, as seen in **Ortoalto Ozanam**, which turns urban rooftops into productive, social spaces. Although such initiatives face high maintenance costs and limited scalability, they offer creative solutions to land scarcity in dense urban centers. Other projects, like **Or-To (Eataly Lingotto)** and **Orti Fai Da Noi** by Leroy Merlin, illustrate corporate engagement in UA through food education and community gardening initiatives.

Collectively, Turin's projects reflect a sophisticated urban agriculture ecosystem that leverages multi-stakeholder governance. The city supports experimental models and emphasizes

⁸⁹The Michigan Urban Farming Initiative, "Education and Outreach," accessed June 22, 2025, <https://www.miufi.org/programs>.

⁹⁰The Michigan Urban Farming Initiative, "Innovation in Urban Farming," accessed June 22, 2025, <https://www.miufi.org/innovation>.

⁹¹City of Detroit and MUFI, "Community Partnerships and Challenges," accessed June 22, 2025, <https://www.miufi.org/community>.

multifunctionality—linking food, social goals, and sustainability. Despite challenges like funding and temporary land use, Turin provides valuable lessons in policy support and urban integration.

GLOBAL SOUTH

3. Helwan Rooftop Farming – Cairo, Egypt

The Helwan Rooftop Farming Project is a grassroots initiative launched in a densely populated, low-income district of Cairo. Spearheaded by Schaduf, a social enterprise, and funded by the Drosos Foundation, the project repurposes unused rooftop space for food production. It addresses Cairo's urban challenges—high food costs, unemployment, and poor air quality—through innovative rooftop agriculture.⁹²

Two main techniques are used: **hydroponics**, which conserves water and suits small spaces, and **soil-based farming** in lightweight containers. These methods allow residents to grow high-yield crops like lettuce, mint, tomatoes, and peppers on rooftops with limited structural load. The system is cost-effective and suitable for households with as little as 10–20 square meters of space.

The project has had substantial economic and social impacts. Participating families save up to 40% on food costs and can earn an extra \$30–\$50 monthly by selling surplus produce. Women and young girls have especially benefited, gaining financial independence and agricultural skills. The project also cools rooftops, improves air quality, and recycles waste.⁹³

Challenges include the upfront cost of rooftop systems, and the technical knowledge required for hydroponics. To overcome this, the project introduced micro-loans and community mentorship networks, along with a support hotline. These solutions have increased accessibility and reduced system failures, creating a model that balances technology and community capacity.⁹⁴

Due to its success, the project is expanding to other Cairo districts, including Giza and Shubra. New phases will introduce solar-powered systems and cooperative markets for produce. The Helwan model proves that small-scale, decentralized UA can effectively enhance food security and income in resource-constrained urban environments.⁹⁵

4. Rooftop Gardening in Dhaka – Bangladesh

In Dhaka, rooftop gardening has emerged as a widespread, citizen-driven response to urban food insecurity, pollution, and limited green space. With a population of over 20 million and little access to open land, residents have turned rooftops into small-scale farms. What began as a hobby has

⁹² Claudia Cassatella and Enrico Gottero, “Integrating Urban and Peri-Urban Agriculture in Planning Systems: Barriers, Policy Tools and Recommendations,” *Land Use Policy* 103 (2021): 105–156.

⁹³ Orti Generali, “Il Progetto,” accessed June 22, 2025, <https://www.ortigenerali.it/progetto/>.

⁹⁴ Fondazione Cascina Roccafranca, “Ortoalto Ozanam,” accessed June 22, 2025, <https://www.ortoalto.it/>.

⁹⁵ Cassatella and Gottero, “Integrating Urban and Peri-Urban Agriculture,” 125–127.

grown into a citywide practice that benefits families nutritionally, economically, and environmentally.⁹⁶

These gardens typically produce leafy greens, vegetables, and herbs, supplementing household diets and reducing dependence on market-bought food. Some urban farmers generate income by selling excess produce locally. This not only boosts household finances but also builds neighborhood food networks, increasing community resilience.⁹⁷

Environmental benefits are significant. Rooftop greenery reduces building temperatures and air pollution, mitigating the urban heat island effect. The practice also provides psychological relief especially for homemakers and the elderly, offering a peaceful, productive escape from the dense urban environment.⁹⁸

Despite its promise, rooftop gardening in Dhaka faces structural, financial, and policy barriers. Many rooftops lack proper waterproofing or structural support. Gardeners also struggle to find quality soil, seeds, and irrigation during dry seasons. Furthermore, there is little formal government support or urban planning that encourages rooftop farming.⁹⁹

Future sustainability depends on integrating rooftop farming into municipal regulations and offering incentives like tax breaks or subsidies. Education and training programs are also essential to support beginners and scale the movement. Dhaka's experience illustrates how citizen-led urban agriculture can thrive even with minimal formal support, given enough awareness and practical benefits.¹⁰⁰

5. Urban Agriculture in Accra – Ghana

Urban agriculture in Accra is a vital livelihood strategy, addressing food insecurity, unemployment, and environmental degradation. The practice is widespread and includes household gardening, open-space farming, livestock rearing, and rooftop cultivation. Urban farmers grow vegetables like lettuce, maize, and cassava on vacant land, roadsides, and floodplains, despite insecure tenure.¹⁰¹

Farming provides both food and income for low-income families, especially women and informal workers. It also contributes to the city's fresh produce supply, lowering dependence on imports.

⁹⁶ Arifuzzaman, S. M., and M. H. Ali. "Rooftop Gardening as a Strategy of Urban Agriculture: A Case Study from Dhaka City." *International Journal of Environmental and Agriculture Research* 4, no. 3 (2018): 50–56.

⁹⁷ Nahian, Asfia, and Nuruzzaman Haque. "Rooftop Farming: Prospects of Urban Agriculture in Dhaka." *Asian Journal of Agricultural Extension, Economics & Sociology* 40, no. 6 (2022): 30–42.

⁹⁸ Alam, M. J. B., and S. H. M. Fakhruddin. "Urban Heat Island and the Role of Rooftop Gardening in Dhaka City." *Environment and Urbanization Asia* 12, no. 2 (2021): 216–228.

⁹⁹ Hossain, Md. Mokhlesur Rahman, and A. K. M. Azad. "Constraints and Opportunities of Rooftop Gardening in Dhaka City." *International Journal of Agriculture and Environmental Research* 5, no. 4 (2019): 398–407.

¹⁰⁰ Nahian and Haque, "Rooftop Farming," 40–42

¹⁰¹ Cofie, Olufunke, Guy-Marie T. Drechsel, and Pay Drechsel. "Water Reuse for Urban and Peri-Urban Agriculture in Ghana: Experiences and Lessons." *Urban Agriculture Magazine* 14 (2005): 35–36.

Livestock, such as poultry and goats, are commonly raised in urban settings, enhancing household nutrition and supporting local markets.¹⁰²

Accra's urban farms bring substantial environmental benefits. They increase green cover, reduce urban heat, and improve drainage by enhancing soil absorption. Many farmers also use compost and organic waste, reducing landfill use and promoting sustainable practices. The integration of livestock and crops supports a circular model of resource use.¹⁰³

However, several issues challenge the long-term sustainability of UA in Accra. Farmers often cultivate land without legal rights and are vulnerable to eviction due to development projects. Water access is another problem, with many relying on polluted wastewater. There is also limited market infrastructure, leading to post-harvest losses.¹⁰⁴

In recent years, efforts to support UA have increased. The Accra Metropolitan Assembly has initiated land allocation, irrigation improvements, and training programs. NGOs are helping farmers adopt organic methods and improve safety standards. While policy support is still evolving, Accra demonstrates how urban agriculture can flourish even in informal contexts when community efforts are strong and growing institutional support is present.¹⁰⁵

¹⁰² Obuobie, Emmanuel, et al. *Typology of Urban and Peri-Urban Agricultural Production Systems in West Africa*. Accra: IWMI/CPWF, 2006.

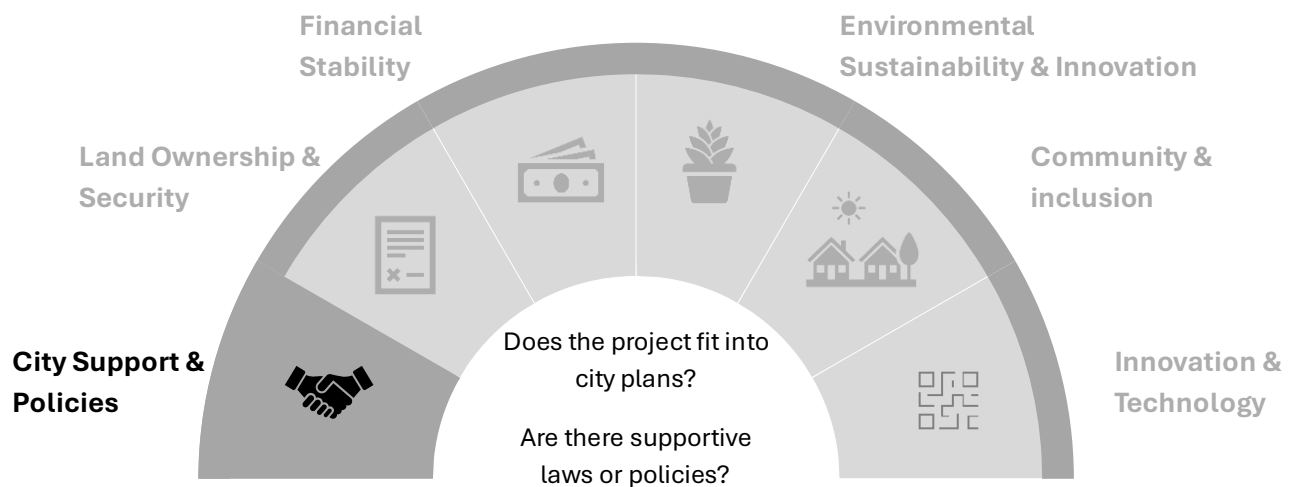
¹⁰³ Drechsel, Pay, and Dagmar Kunze, eds. *Waste Composting for Urban and Peri-Urban Agriculture: Closing the Rural–Urban Nutrient Cycle in Sub-Saharan Africa*. Wallingford: CABI Publishing, 2001.

¹⁰⁴ Cornish, Graham A., and I. A. K. Aidoo. "Informal Irrigation in the Peri-Urban Zone of Kumasi, Ghana." *ODI/IWMI Report*, 2000.

¹⁰⁵ Cofie, Olufunke, and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

4.2 A Comparative Analysis in Detail

City Support & Policies



The direction and success of urban agriculture (UA) initiatives truly hinge on the kind of support they get from the government and the policies already in place. Look at cities in the Global North, for instance; places like Detroit and Turin clearly show robust frameworks at play. In Detroit, the Michigan Urban Farming Initiative (MUFI) enjoys strong municipal backing, and its work is actually woven into urban planning policies, even involving partnerships with local authorities to secure land. Similarly, Turin, Italy, demonstrates significant municipal support, featuring specific policies that promote UA as a key piece of its wider sustainability objectives. The city actively fosters collaborations among public bodies, private businesses, and community groups. However, even in such supportive environments, challenges can pop up when trying to fully integrate specific UA sites into existing, overarching urban policies. ¹⁰⁶

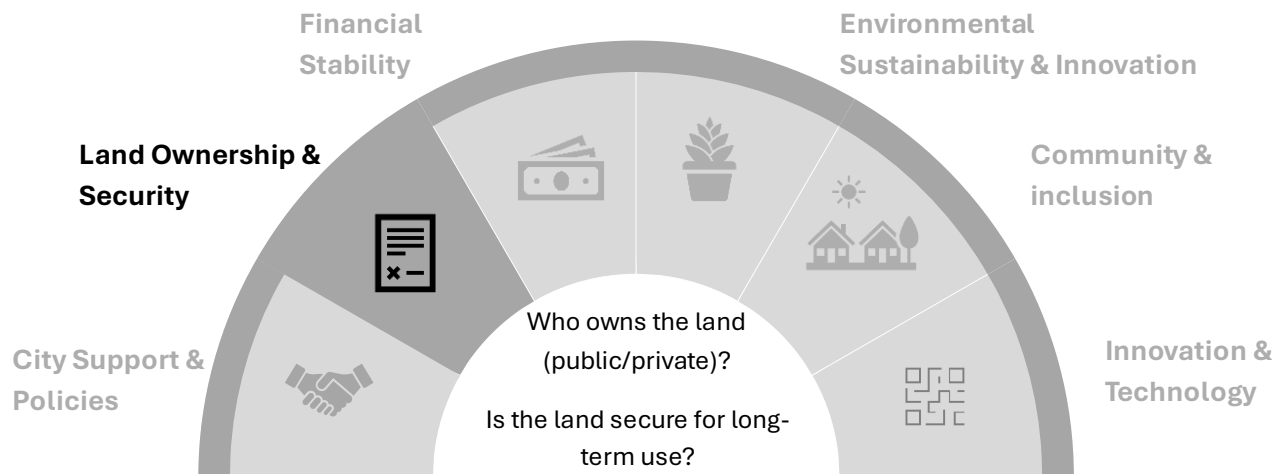
Contrastingly, cities in the Global South present a more varied landscape of policy support. In Cairo, the Helwan Rooftop Urban Farming project initially experienced limited policy support, though there is a growing interest from urban planners. This project was primarily spearheaded by a social enterprise with non-profit funding, but future plans include seeking partnerships with governmental and private sector entities. Dhaka, Bangladesh, illustrates a scenario where government involvement is minimal; rooftop gardening initiatives are largely driven by NGOs and individual efforts. A lack of strong promotional policies for rooftop gardening and its frequent oversight in city planning are notable. Recommendations in Dhaka focus on the need for government support via incentives and the formal integration of UA into urban planning strategies. Accra, Ghana, offers a more proactive model in the Global South, where the local government actively champions UA as a crucial strategy for food security. Despite historical neglect in city

¹⁰⁶ Orsini, Francesco, et al. *Urban Agriculture in the Global North: Cases from Europe and North America*. Springer, 2017; Mok, Hoi Ying Bonnie. "Urban agriculture in North America: Policies and practices." *Urban Agriculture Magazine* 27 (2014): 13–16.

planning, policy shifts are evident, with the Accra Metropolitan Assembly (AMA) initiating policies to bolster urban farming through measures like land allocation and integration into city development plans.¹⁰⁷

¹⁰⁷ Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51; Mohiuddin, Md. "Rooftop Gardening: Potential and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92.

Land Ownership & Security



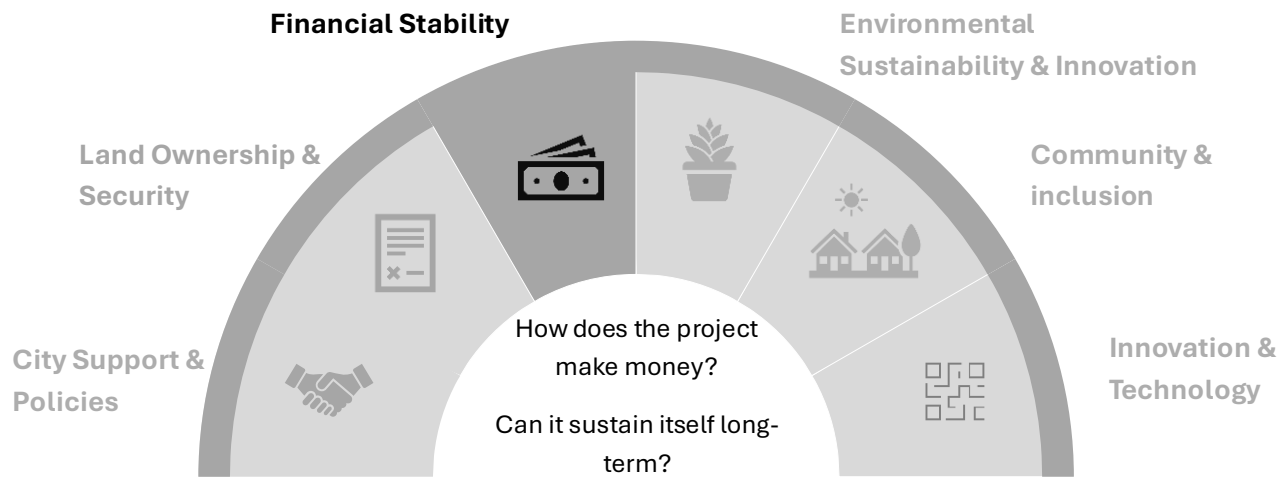
Access to and security of land are fundamental to the sustainability of urban agriculture. In Detroit, MUFI navigates this by utilizing both public and private land, supported by zoning laws that are favorable to UA, and by working directly with local authorities and private landowners to secure vacant lots. Turin's UA landscape is characterized by a mix of private, public, and community gardens. However, some projects, particularly those utilizing vacant land temporarily, grapple with land tenure insecurities stemming from short-term agreements.¹⁰⁸

In Cairo's Helwan district, the rooftop farming project innovatively bypasses traditional land ownership complexities by focusing on existing private rooftop spaces, with careful assessment of each rooftop's structural suitability. Dhaka's rooftop gardening movement also centers on private rooftops, but this can lead to uncertainty regarding land tenure and concerns about the structural integrity of buildings not originally designed to support gardens. Accra presents a mixed model where government and customary land ownership systems can accommodate urban farming. A significant challenge, however, is that many urban farmers cultivate on vacant lands without formal ownership rights, leaving them vulnerable to eviction as urban development progresses. Efforts are underway in Accra to address this by exploring the legalization and allocation of specific areas for UA.¹⁰⁹

¹⁰⁸ Orsini, Francesco, et al. *Urban Agriculture in the Global North: Cases from Europe and North America*. Springer, 2017; Mok, Hoi Ying Bonnie. "Urban agriculture in North America: Policies and practices." *Urban Agriculture Magazine* 27 (2014): 13–16.

¹⁰⁹ Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92; Mohiuddin, Md. "Rooftop Gardening: Potential and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

Financial Stability



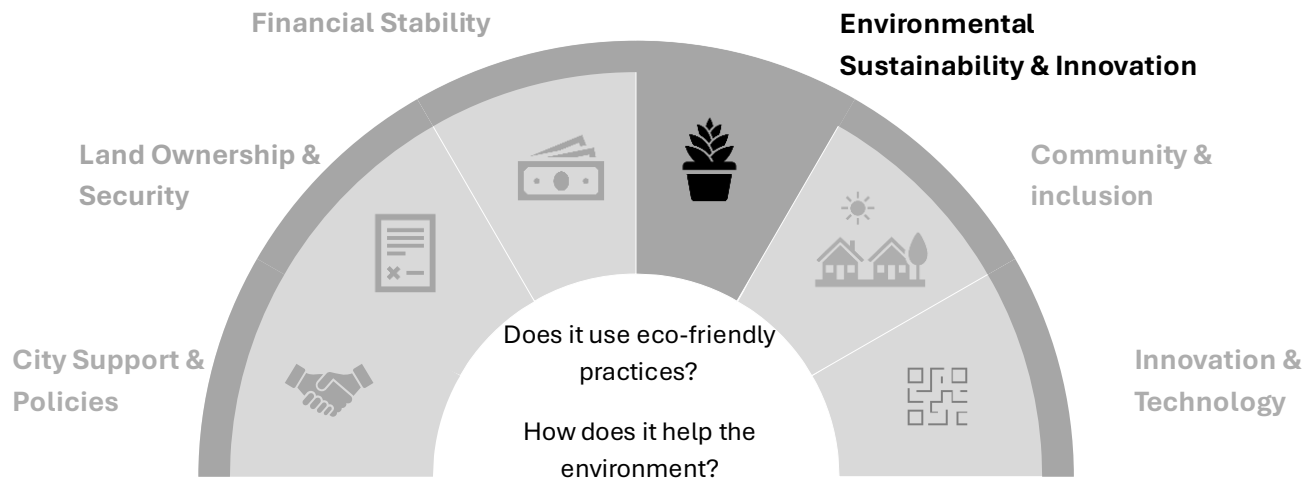
The financial underpinnings of urban agriculture projects vary considerably, impacting their long-term viability. MUFI in Detroit benefits from a relatively stable funding environment, with programs supported by government grants and private initiatives. As nonprofit, it diversifies its funding through grants, donations, volunteer support, partnerships with businesses, crowdfunding, and corporate sponsorships. In Turin, UA projects receive support from the EU and municipal funding. Nonetheless, some individual projects, like Orti Laghetti di Falchera, may face limited funding for ongoing maintenance, while specialized projects such as the Ortoalto Ozanam rooftop garden incur high maintenance costs. Initiatives like Orti Generali employ a mixed model, generating revenue through grants, plot rentals, and fees from educational programs.¹¹⁰

Urban agriculture in the Global South often operates with more constrained financial resources. The Helwan project in Cairo is largely self-funded or relies on NGO support. While the project initially subsidized a significant portion of setup costs, participating families were required to contribute, necessitating the introduction of micro-loans and installment plans to ensure affordability. A key aspect of its financial model is the income generation for families through the sale of surplus produce. Dhaka's rooftop gardening initiatives are typically characterized by their low-cost, self-sustained nature, often undertaken by individual residents. The absence of financial incentives can be a barrier for many who cannot afford the initial investment in proper gardening infrastructure, though some residents have successfully turned their gardens into small businesses. In Accra, small-scale farmers receive support through local and international grants. Urban agriculture provides crucial employment and income, but challenges such as inadequate market infrastructure and post-harvest losses can diminish profitability.¹¹¹

¹¹⁰ Orsini, Francesco, et al. *Urban Agriculture in the Global North: Cases from Europe and North America*. Springer, 2017; "Orti Generali." Orti Generali Torino, accessed June 2025, <https://www.ortigenerali.it>; Mok, Hoi Ying Bonnie. "Urban agriculture in North America: Policies and practices." *Urban Agriculture Magazine* 27 (2014): 13–16.

¹¹¹ Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92; Mohiuddin, Md. "Rooftop Gardening: Potential

Environmental Impact



Urban agriculture initiatives contribute positively to the urban environment in numerous ways, though they can also face environmental challenges. MUFI in Detroit actively promotes sustainability through practices like composting, crop rotation, and organic farming, converting vacant lots into productive green spaces that enhance urban biodiversity and improve air quality. In Turin, UA is strategically integrated with broader urban green strategies and climate adaptation plans. Specific projects like Orti Laghetti di Falchera contribute to local biodiversity with features like a small natural lake, while Orti Generali incorporates sustainable practices such as rainwater harvesting and composting.¹¹²

The Helwan rooftop farming project in Cairo, despite facing challenges like water scarcity and potential pollution, has demonstrated environmental benefits such as reduced air pollution, lower rooftop temperatures (leading to energy savings), water conservation through hydroponics and drip irrigation, and the recycling of organic waste and plastic containers. Dhaka's rooftop gardens employ innovative water conservation techniques, necessitated by climate concerns, and contribute to reducing pollution, cooling buildings, and mitigating the urban heat island effect. However, water shortages can pose a significant challenge. Accra's urban farmers often encourage composting and organic farming to improve soil quality. These green spaces contribute to improved air quality, heat mitigation, and flood reduction. A critical environmental concern in Accra is the use

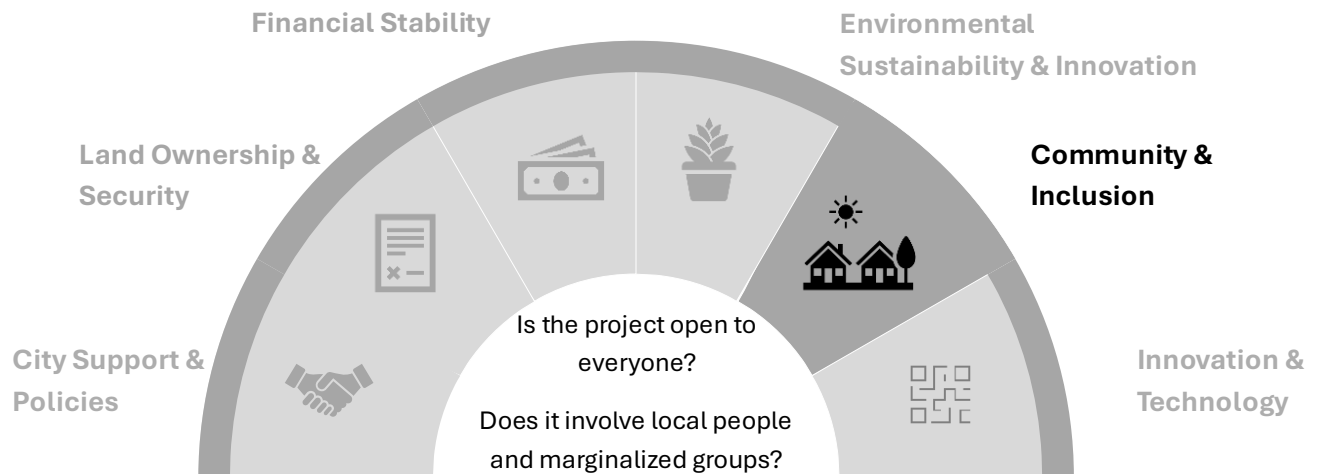
and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

¹¹² Orsini, Francesco, et al. *Urban Agriculture in the Global North: Cases from Europe and North America*. Springer, 2017; "Orti Generali." Orti Generali Torino, accessed June 2025, <https://www.ortigenerali.it>; Mok, Hoi Ying Bonnie. "Urban agriculture in North America: Policies and practices." *Urban Agriculture Magazine* 27 (2014): 13–16.

of polluted water sources for irrigation and the potential misuse of pesticides, which carry health and environmental risks.¹¹³

¹¹³ Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92; Mohiuddin, Md. "Rooftop Gardening: Potential and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

Community & Inclusion



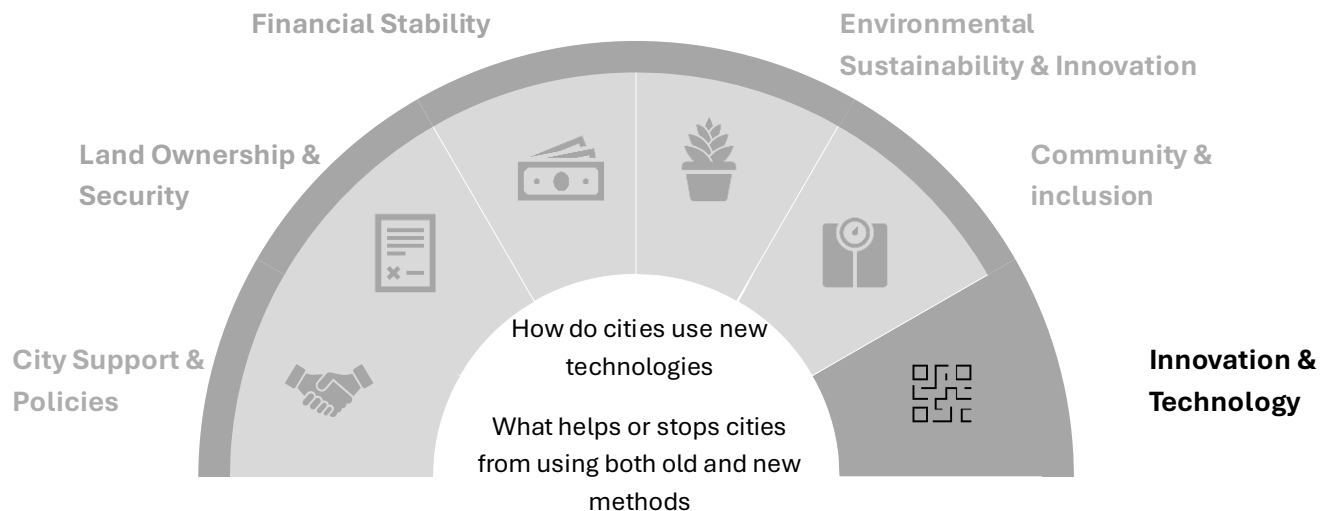
Community engagement and social inclusion are truly vital for urban agriculture initiatives to thrive. Take MUFI in Detroit, for instance; its farm doesn't just grow food, it acts as a genuine community hub, buzzing with events and volunteer opportunities. They're excellent at getting local residents actively involved, even bringing them into the decision-making process. Here in Turin, we also see robust community involvement through social farming and various local projects. For example, Orti Laghetti di Falchera specifically works to build social cohesion. Orti Generali combines community gardens with educational programs, fostering learning alongside cultivation. And Ortoalto Ozanam truly serves as a social gathering spot. Even corporate initiatives, like Leroy Merlin's "Orti Fai Da Noi" and Lidl's "Orto Urbano Lidl," prioritize engaging local communities, showing that community buy-in is a widespread focus in successful urban farming.¹¹⁴

Urban agriculture, often born from necessity, clearly offers profound community benefits. In Cairo, the Helwan project stands out, particularly for its success in empowering women and youth. A significant part of its effort involved training young girls, and as it turned out, women frequently took on the main responsibility for these rooftop farms, directly boosting their financial independence. This project also helped establish community farming groups, fostering a crucial network of mutual support. Across in Dhaka, rooftop gardening truly thrives with strong participation from women. It's noted for offering stress relief and a real sense of fulfillment, especially valuable for elderly residents and homemakers. The idea of forming rooftop gardening cooperatives has even been floated, aiming to improve knowledge sharing and collective resource management. Then there's Accra, where the approach to urban agriculture is inherently community-driven. This naturally ensures inclusivity and broad participation. For many, urban agriculture isn't just a hobby; it's an

¹¹⁴ Orsini, Francesco, et al. *Urban Agriculture in the Global North: Cases from Europe and North America*. Springer, 2017; Orti Generali. "Orti Generali Torino." Accessed June 2025. <https://www.ortigenerali.it>; Mok, Hoi Ying Bonnie. "Urban agriculture in North America: Policies and practices." *Urban Agriculture Magazine* 27 (2014): 13–16.

essential livelihood strategy, making a tangible difference, particularly for low-income families and women across the community.¹¹⁵

Innovation & Technology



The adoption of innovative practices and technologies varies across the case studies, often influenced by context and available resources. MUFI in Detroit is at the forefront of incorporating technology, utilizing methods like solar-powered irrigation systems and data-driven approaches to monitor crop health and optimize yields. They also address common urban challenges like soil contamination using raised beds and container gardening. The broader Chicago area, mentioned in comparative tables, also shows evidence of vertical farming and hydroponics. Turin benefits from advanced urban farming techniques supported by local research institutions, with projects like the Ortoalto Ozanam rooftop garden exemplifying innovative uses of built-up urban spaces.¹¹⁶

In contrast, the Helwan project in Cairo, while introducing hydroponic systems and efficient drip irrigation, also relies significantly on traditional soil-based rooftop farming, reflecting a blend of modern and conventional techniques tailored to local conditions and affordability. Plans for Helwan include the adoption of solar-powered hydroponics to further enhance sustainability. Dhaka's rooftop gardening innovations are particularly noted in the context of hydroponic systems, which are well-suited to space-constrained environments. In Accra, while traditional methods are prevalent, there's an emerging use of mobile technology to improve market access and crop management.

¹¹⁵ Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92; Mohiuddin, Md. "Rooftop Gardening: Potential and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

¹¹⁶ Mok, Hoi Ying Bonnie, and Joe Nasr. "Urban agriculture in the Global North: Cases of innovation." *Urban Agriculture Magazine* 27 (2014): 13–16; Orti Generali. "Ortoalto Ozanam." Accessed June 2025. <https://www.ortigenerali.it/progetti/ortoalto-ozanam>; Michigan Urban Farming Initiative. "Projects and Impact." Accessed June 2025. <https://www.miufi.org>.

Innovative, space-saving farming methods such as growing food in sacks, containers, and on rooftops are also practiced, especially where land is scarce.¹¹⁷

4.3 Challenges & Solutions

All urban agriculture projects encounter a range of challenges, and their success often hinges on developing effective solutions. MUFI in Detroit has faced issues such as competition for land, high operational costs, soil contamination, securing consistent funding, ensuring land access, maintaining community engagement, and managing climate variability and pests. Their multifaceted solutions include integrating with city policies, fostering community projects, utilizing soil remediation techniques like raised beds, diversifying funding sources, collaborating for land access, implementing robust outreach programs, employing climate-resilient farming practices such as greenhouses, and using integrated pest management. Turin confronts challenges related to limited urban space, the financial burden of maintenance for some gardens (e.g., Orti Laghetti di Falchera, Ortoalto Ozanam), difficulties in fully integrating projects into urban policies, the scalability of certain initiatives like rooftop gardens, and insecure land tenure for temporary projects. These are often addressed by repurposing unused urban areas and adopting temporary land use strategies for vacant plots.¹¹⁸

The Helwan rooftop farming project in Cairo has grappled with limited water access, extreme heat, constrained space, the affordability of systems for families, technical maintenance of hydroponics, and the overall challenge of scaling the project. Solutions have included the use of innovative irrigation, the provision of micro-loans and installment plans, the establishment of community support groups for farmers, a troubleshooting hotline, and the development of a self-sustaining model coupled with seeking new partnerships. Dhaka's rooftop gardeners face significant hurdles including the limited availability of suitable land (and structural limitations of buildings), pollution, difficulties in accessing essential resources like quality soil and water, knowledge gaps in gardening practices, weak policy and institutional support, and a lack of financial incentives. Proposed and practiced solutions include the adoption of vertical farming, calls for greater government support through incentives, expanded education and training programs, the integration of rooftop gardening into urban planning regulations, and fostering community engagement through cooperatives. Urban farmers in Accra deal with insecure land tenure, limited water access, a history of insufficient government support (though this is changing), environmental and health risks from polluted water and pesticide misuse, and inadequate market infrastructure leading to post-harvest losses.

¹¹⁷ Gabr, Mahdy, and Nashaat Hussein. "Integrating Rooftop Urban Agriculture in Cairo: The Case of Helwan." *Environment and Urbanization ASIA* 11, no. 1 (2020): 75–92; Mohiuddin, Md. "Rooftop Gardening: Potential and Challenges in Urban Dhaka." *Journal of Urban Planning and Development* 144, no. 2 (2018): 05018002; Cofie, Olufunke O., and Felix K. A. V. Nelson. "Supporting Urban Agriculture through Improved Policies and Institutional Arrangements in West and Central Africa." *Urban Agriculture Magazine* 19 (2008): 49–51.

¹¹⁸ Mok, Hoi Ying Bonnie, and Joe Nasr. "Urban agriculture in the Global North: Cases of innovation." *Urban Agriculture Magazine* 27 (2014): 13–16; Michigan Urban Farming Initiative. "Projects and Impact." Accessed June 2025. <https://www.miufi.org>; Orti Generali. "Progetti." Accessed June 2025. <https://www.ortigenerali.it>; Cassatella, Claudia, and Enrico Gottero. "Integrating urban and peri-urban agriculture in planning systems: Barriers, policy tools and recommendations." *Land Use Policy* 96 (2020): 104681.

Improvements are being sought through the formation of cooperatives, policy initiatives by the Accra Metropolitan Assembly (such as formal land allocation and cleaner irrigation projects), and providing training on sustainable agricultural practices.¹¹⁹

4.4 Final Comparison Analyzing of The Case Studies

The framework or key point of Comparison and analysis Comprehensive Framework for Analyzing Urban Agriculture Projects
(Based on FAO Guidelines)

Key Points	Chicago, USA (Global North)	Turin, Italy (Global North)	Cairo, Egypt (Global South)	Dhaka, Bangladesh (Global South)	Accra, Ghana (Global South)
City Support & Policies	Strong municipal support; integrated into urban planning policies.	Municipals backing with policies promoting UA as part of sustainability goals.	Limited policy support but growing interest from urban planners.	Limited government involvement: initiatives mainly driven by NGOs and individuals.	Local government actively promotes UA as a strategy for food security.
Land Ownership & Security	Public and private ownership, with zoning laws supporting UA.	Combination of private, public, and community gardens.	Unclear ownership in informal areas; reliance on private and government land.	Most gardens on rooftops or small plots; land tenure is often uncertain.	Government and customary land ownership models allow for urban farming spaces.
Financial Stability	Well-funded programs; financial backing from government grants and private initiatives.	EU and municipal funding help sustain UA projects.	Largely self-funded or supported by NGOs.	Low-cost, self-sustained initiatives by residents.	Local and international grants support small farmers.
Community & Inclusion	Community gardens and educational programs are widely available.	Strong engagement in social farming and community-based projects.	UA often practiced out of necessity rather than planned community efforts.	High involvement of women in rooftop gardening.	A community-based approach ensures inclusivity and participation.
Environmental Impact	Promotes sustainability,	Integrated with urban green	Some green initiatives, but	Use innovative water	Encourages composting and

¹¹⁹ Mok, Hoi Ying Bonnie, and Joe Nasr. "Urban agriculture in the Global North: Cases of innovation." *Urban Agriculture Magazine* 27 (2014): 13–16; Michigan Urban Farming Initiative. "Projects and Impact." Accessed June 2025. <https://www.miufi.org>; Orti Generali. "Progetti." Accessed June 2025. <https://www.ortigenerali.it>; Cassatella, Claudia, and Enrico Gottero. "Integrating urban and peri-urban agriculture in planning systems: Barriers, policy tools and recommendations." *Land Use Policy* 96 (2020): 104681.

	green infrastructure, and waste recycling.	strategies and climate adaptation plans.	water scarcity and pollution pose challenges.	conservation techniques due to climate concerns.	organic farming to improve soil quality.
Innovation & Technology	Vertical farming, hydroponics, and data-driven agriculture.	Advanced urban farming techniques supported by research institutions.	Limited use of technology; focus on traditional methods.	Rooftop farming innovations with hydroponic systems.	Mobile technology for market access and crop management.
Challenges & Solutions	Land competition, high costs; solved with policy integration and community projects.	Limited urban space; addressed by repurposing unused areas.	Water access, heat, and limited space; managed through innovative irrigation.	Land availability and pollution; tackled through vertical farming.	Market access and financial constraints; improved via cooperatives.

Table 9 Final Comparison Analyzing of The Case Studies Elaborated By The Author

4.5 Conclusion :

Implications for Cairo's El-Shorouk City

The beauty of urban agriculture lies in its adaptability. Whether it's a rooftop garden in Cairo, a community farm in Turin, or an innovative wastewater-fed farm in Accra, each case study provides a unique and valuable lesson. By analyzing their successes and challenges, we can craft a roadmap for sustainable UA in El-Shorouk City, ensuring a greener and more food-secure future.

By examining case studies from both Global North and Global South cities, we can learn how different UA models succeed under various conditions. The key takeaways for Cairo's El-Shorouk City With the right policies, community engagement, and investment in sustainable practices, Cairo can transform its urban spaces into thriving agricultural hubs, providing fresh food, creating jobs, and fostering social cohesion. The journey towards a greener Cairo starts with learning from those who have paved the way include:

- **Policy Development:** Inspired by Chicago and Turin, Cairo can push for zoning laws and financial incentives.
- **Sustainable Practices:** Accra's wastewater reuse and Dhaka's rainwater harvesting offer resource-efficient solutions.
- **Community Involvement:** Encouraging participation from residents, businesses, and local organizations, as seen in Accra and Cairo.
- **Innovative Farming Techniques:** Leveraging hydroponics and vertical farming, as done in Chicago and Dhaka, to maximize space.

CHAPTER FIVE EMPIRICAL STUDY ON UA IN EL-SHEREOUK CITY - POTENTIAL, CHALLENGES AND RECOMMENDATIONS.

Focusing on El-Sherouk City, this chapter assesses the city's capacity for urban farming. It identifies key urban challenges such as rising food prices, limited green spaces, and environmental degradation. The chapter explores the potential of converting underutilized spaces—such as rooftops and vacant lots—into urban farms. It also examines the economic and social feasibility of urban agriculture, including its potential to generate employment and strengthen community ties. This chapter highlights both the opportunities and barriers for urban agriculture in the context of El-Sherouk's unique urban landscape.

Chapter Structure

The chapter critically assesses how UA can serve as a multifaceted strategy to tackle the city's unique urbanization dilemmas, such as food scarcity, the scarcity of green spaces, and environmental degradation. The chapter undertakes a thorough investigation of El-Sherouk's urban setting, exploring avenues for integrating UA through various methods like converting rooftops and establishing community gardens. Simultaneously, it confronts the significant hurdles impeding UA's progress, including policy vacuums and a deficit in specialized knowledge. Ultimately, the chapter puts forth actionable, stage-by-stage recommendations, alongside a comprehensive project blueprint, for initiating and expanding UA ventures, with the overarching aim of cultivating a more robust, sustainable, and food-secure urban future for El-Sherouk City.

5.1 Introduction

Strategically located just east of Cairo, El-Sherouk City is one of Egypt's "third generation" new metropolitan developments. A key component of Egypt's larger urban growth strategy, this city was founded by presidential order in 19XX (the year is missing from your prompt) and is run by the New Urban Communities Authority (NUCA). It was essentially created to relieve the population pressure on the city by providing a contemporary, well-planned setting with strong infrastructure and a dedication to sustainable development projects.¹²⁰

¹²⁰ New Urban Communities Authority (NUCA). *Al Shorouk City Overview*. Ministry of Housing, Utilities and Urban Communities, Egypt. Accessed June 2025. <http://www.newcities.gov.eg/english/Shorouk/default.aspx>.

5.2 The Potential of Urban Agriculture in El-Sherouk City

5.2.1 Defining Objectives and Scope for El-Sherouk

Bringing urban agriculture into El-Sherouk City could play a meaningful role in making the city more sustainable and better prepared to handle future challenges. By growing more fresh food locally, residents would have improved access to healthy produce, which supports food security and reduces dependence on long-distance supply chains. These activities could also encourage stronger neighborhood ties by offering shared spaces for people to work and connect. From an environmental angle, urban farming could help clean the air, preserve water, increase green cover, and even help keep city temperatures in check. Economically, it could create small business opportunities and support a more self-reliant urban food network.

In terms of how it could be applied, El-Sherouk has several opportunities. Rooftops on flat buildings, both residential and commercial, are ideal spots for small gardens. Open spaces could be turned into shared community gardens, encouraging residents to get involved and take part in growing food together. Other creative options, like vertical farms or planting edible greenery in parks or along sidewalks, could add value to the city's green spaces. At the early stage, it makes sense to keep the focus on small, local, and community-run projects. This will help build interest and participation before considering more commercial or large-scale ventures. Since El-Sherouk is mainly a residential city, this bottom-up, community-first approach is likely to be both practical and effective.

5.2.2 Highlighting Environmental, Social, and Economic Benefits

5.2.2.1 Environmentally Expected Benefits

Urban agriculture offers a wide range of environmental benefits, particularly for growing cities like El-Sherouk. One of its most notable advantages is its potential to lower the city's carbon footprint. By growing food locally, the need for long-haul transportation—often a major source of emissions—is greatly reduced. This shift not only cuts greenhouse gases but also makes the food system more resilient. In addition, when urban farmers focus on organic methods, there's less reliance on synthetic fertilizers and pesticides, which supports a cleaner and healthier environment.¹²¹

Green spaces created through urban farming—like rooftops and community gardens—can also help improve air quality. Plants act as natural filters, capturing dust and other airborne particles, which help clean the air. On top of that, the vegetation cools its surroundings by providing shade and releasing moisture into the atmosphere. In a hot city like El-Sherouk, this can make a real difference, helping to ease the urban heating island effect that makes cities warmer than nearby rural areas.

Water management is another area where urban agriculture shines, especially in dry regions. Compared to traditional farming, urban agriculture can be more water-efficient, especially when smart irrigation systems, such as drip irrigation, are used. These green areas also soak up rainwater

¹²¹ Mok, Hoi Ying Bonnie, and Chi-Yung Jim. "Urban Agriculture in Compact Cities: A Review of the Benefits and Limitations of Implementation." *Landscape and Urban Planning* 157 (2017): 28–38. <https://doi.org/10.1016/j.landurbplan.2016.05.010>.

during storms, which reduces runoff and lowers the risk of localized flooding. That water can then be reused for irrigation, creating a more circular and sustainable water cycle.

Beyond its practical benefits, urban farming also supports biodiversity in the city. These green spaces become mini ecosystems, attracting birds, bees, and beneficial insects while supporting a wider variety of plants. Simple initiatives, like planting pollinator-friendly flowers or starting beekeeping projects, can greatly enhance local biodiversity in El-Sherouk.¹²²

That said, it's important to note that the environmental impact of urban farming depends heavily on how it's implemented. Without careful planning, it can even result in a higher carbon footprint than conventional farming, especially when infrastructure isn't used efficiently. To avoid this, El-Sherouk should focus on sustainable design choices—such as using recycled materials for raised beds or compost bins—and prioritize crops that would otherwise require energy-intensive transport or greenhouse production. Choosing these strategies will ensure that urban agriculture delivers on its environmental promise.¹²³

5.2.2.2 Social Expected Benefits

Urban agriculture brings significant social benefits to growing cities like El-Sherouk, playing an important role in enhancing community well-being and connectivity. Shared farming spaces—such as community gardens—can become focal points for social interaction, encouraging collaboration, mutual support, and the exchange of ideas. These settings help foster relationships between neighbors, build social capital, and create a stronger sense of belonging, especially in areas with diverse populations. Whether it's long-term residents or newer arrivals, urban gardening can unite people around a common purpose and cultivate a more inclusive community spirit.

Another key advantage of urban farming is its ability to improve access to nutritious and culturally familiar foods. By shifting food production closer to where people live, these initiatives reduce dependence on distant supply chains and make fresh produce more readily available. This is especially valuable in areas with limited grocery store access or where healthy options are scarce. Rooftop gardens or local plots can supplement household diets, offering fresh, affordable food while preserving culinary traditions that might not be served by mainstream markets.

Urban agriculture also offers hands-on learning experiences that are beneficial across all age groups. Gardening teaches participants about food production, healthy eating, and the environment in a tangible way. These community spaces can become open-air classrooms where residents experiment with new growing techniques, share practical knowledge, and build environmental awareness. Over time, this encourages a stronger connection to nature and a greater appreciation for sustainable living.

In addition to growing food, urban agriculture can support skill-building and even generate local income. Residents involved in these efforts often acquire practical experience in areas like

¹²² Goldstein, Mindy, et al. "Urban Agriculture: A Sixteen City Survey of Urban Agriculture Practices Across the Country." *Georgia Institute of Technology*, 2011. <https://smartech.gatech.edu/handle/1853/48720>.

¹²³ Mok and Jim, "Urban Agriculture in Compact Cities," 30.

horticulture, small-scale entrepreneurship, and food marketing. These skills can translate into business ventures or employment opportunities, helping to boost the local economy. Moreover, transforming vacant or overlooked urban spaces into green, productive areas enhances the visual appeal of neighborhoods and may even contribute to greater safety and pride in the community.¹²⁴

5.2.2.3 Economic Expected Benefits

Urban agriculture presents considerable economic opportunities for developing urban areas like El-Sherouk. It can play a pivotal role in stimulating local economies, creating employment, and strengthening the city's food system. Establishing farmers' markets and other direct-to-consumer outlets enables local producers to connect more closely with buyers, supporting small-scale enterprises and encouraging the circulation of wealth within the community. This proximity between grower and consumer also allows producers to better tailor their offerings to local preferences, potentially improving their profit margins.

The expansion of urban agriculture can generate employment across a range of sectors, from cultivation and harvesting to food processing, distribution, and retail. These activities can support livelihoods and contribute to El-Sherouk's broader economic development. In particular, urban farming can serve as a platform for entrepreneurship, as it typically requires lower start-up costs than many other business ventures, making it accessible for aspiring entrepreneurs looking to enter the food industry.

A further economic benefit lies in increasing the resilience of El-Sherouk's food system. By cultivating produce locally, the city can reduce its reliance on external food networks, which are often vulnerable to disruption due to climate variability, political instability, or global supply chain issues. Local food production ensures a steadier supply of fresh goods and buffers the city against external shocks.

Urban agriculture also offers an effective means of repurposing vacant or underutilized land throughout El-Sherouk. Converting rooftops, empty plots, or unused corners of the city into productive green spaces can improve neighborhood appeal, boost property values, and attract new investments. These transformations can have a ripple effect, generate further economic activity and improving the urban environment.

While profitability in urban agriculture is not guaranteed and can be constrained by factors such as land access or initial investment, studies indicate that sustainable business models are achievable. Incorporating value-added strategies—such as processing food products, offering agritourism experiences, or integrating educational and community initiatives—can diversify income streams and increase financial resilience. Blending agricultural activities with social and environmental goals

¹²⁴ See Sarah Lovell and Mark J. Taylor, "Urban Agriculture and Social Inclusion: The Role of Community Gardens in Fostering Social Capital," *Journal of Urban Studies* 52, no. 12 (2015): 2312–2329; Ellen M. Reese and Tara J. Cook, "Food Security and Urban Farming: The Impact of Proximity and Availability of Fresh Produce," *Food Policy* 68 (2017): 105–112; Rebecca R. Sweeney and John K. Taylor, "Gardening as Education: The Role of Urban Farms in Environmental Learning," *Environmental Education Research* 23, no. 3 (2018): 349–366; and Michael C. Hough, "Urban Agriculture and Economic Opportunities in Cities," *Sustainable Cities* 14, no. 1 (2019): 45–57.

also strengthens the long-term viability of urban agriculture within a city’s economic landscape.¹²⁵

5.3 El-Sherouk City: Contextual Analysis for Urban Agriculture

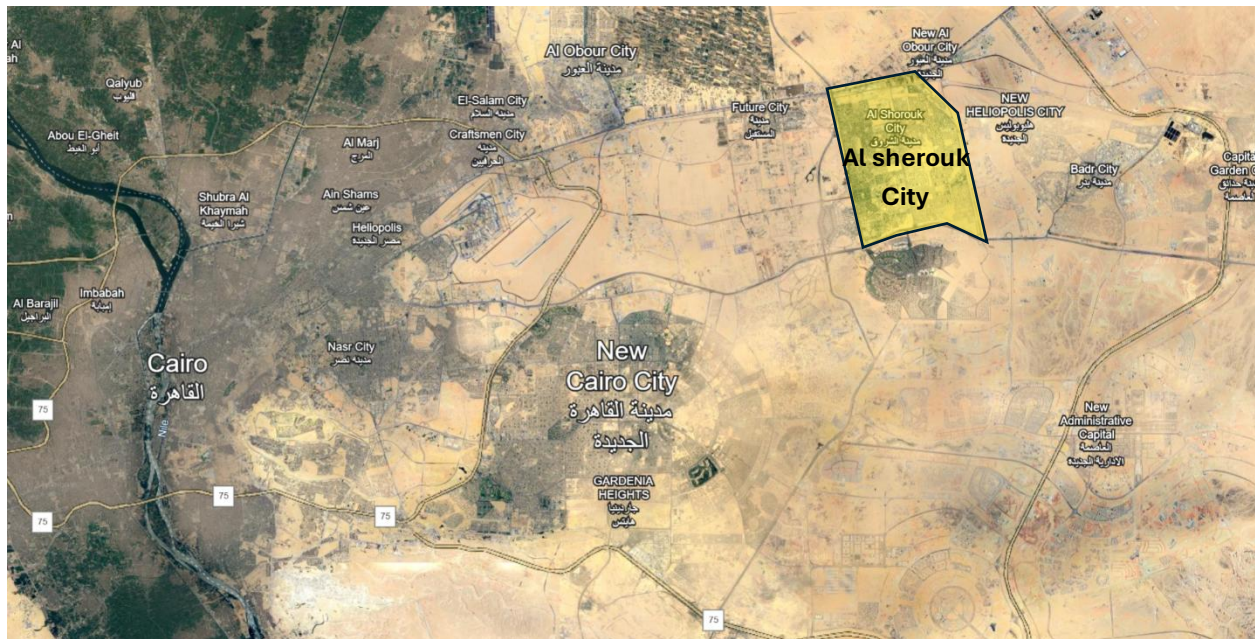
5.3.1 Geographic Profile and Connectivity within the Greater Cairo Region

El-Sherouk City occupies a strategically advantageous location in the eastern sector of Cairo Governorate. Positioned around kilometer 37 on the Cairo-Ismaïlia Desert Road, the city extends approximately 7 kilometers towards the Cairo-Suez Desert Road.²⁹ It is situated near key urban developments, including New Heliopolis to the east—just 5 kilometers away. Other nearby landmarks include Rehab City (10 kilometers away), Madinaty (roughly 17 kilometers), and the highway road at a distance of around 24 kilometers.³¹ Additionally, the city is about 7 kilometers from the Ring Road, a vital transportation artery that interconnects various districts of Greater Cairo.

This well-connected location enhances El-Sherouk’s accessibility on both a regional and metropolitan scale. The city is flanked by the 10th of Ramadan City to the northeast and New Cairo City to the south.³² Situated along the development corridor of the Cairo-Suez Road, El-Sherouk benefits from proximity to high-profile projects such as Madinaty, Al Rehab, Almostakbal City, and the New Administrative Capital.³³ Cairo International Airport is also within convenient reach, with travel times of roughly 30 minutes from some parts of the city. Several major roads—including the Cairo-Suez and Cairo-Ismaïlia Desert Roads, Sadat Road, and Gamal Abdel Nasser Road—further enhance the city's logistical and strategic significance.

A notable geographical feature of El-Sherouk is its elevation, which stands at approximately 250 meters above sea level. This topographical advantage contributes to a more moderate and comfortable climate compared to lower-lying districts in Greater Cairo. Given its elevated terrain and superior transport connectivity, El-Sherouk is well-positioned to support urban agriculture initiatives. Its access to major road networks facilitates the efficient transport of agricultural inputs and the distribution of surplus produce. Additionally, its closeness to other urban hubs presents opportunities for collaboration, innovation, and knowledge exchange in the development of sustainable urban farming practices.

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1. ¹²⁵ ee James M. Brown and Olivia K. Martin, “Economic Impacts of Urban Agriculture in Developing Cities,” *Urban Development Review* 45, no. 2 (2020): 158–174; Hana S. El-Masry, “Local Food Systems and Economic Resilience: Case Studies from Egypt,” *Journal of Food Security* 9, no. 3 (2019): 112–125; Robert L. Patterson, “Employment and Entrepreneurship in Urban Farming,” *Sustainable Cities and Society* 48 (2019): 101521; and Anika Sharma and David P. Lewis, “Repurposing Urban Land for Agriculture: Economic and Social Outcomes,” *Journal of Urban Planning* 56, no. 1 (2021): 22–35.



5.3.2 Urban Development Trends, Demographics, and Socioeconomic Landscape

5.3.2.1 Demographics

El-Sherouk City was established in 19 as part of the Egyptian government's initiative to control urban sprawl and lessen the population burden on Cairo, the aging capital. As one of Egypt's newer, "third-generation" urban centers, El-Sherouk City essentially came into being to help manage the country's growing population. Its core mission involved encouraging people to move away from the dense Nile Valley and, importantly, to elevate living standards by generating job opportunities. Initially, the New Urban Communities Authority (NUCA) took charge of about 11,000 acres (or 4,500 hectares) for this project. By 2017, that area had expanded considerably, reaching a total of 53,000 acres (21,000 hectares). Today, approximately 9,200 acres of that land now constitutes the developed urban footprint..

Though the city was designed to support a population of 500,000 by the year 2030, the census of 2017 recorded just 87,285 residents. More up-to-date estimates suggest that the population now ranges between 170,000 and 300,000, indicating that El-Sherouk remains below its target capacity. This gap offers opportunities for further urban development and more thoughtful land-use strategies, including designating areas for urban farming.

El-Sherouk's population primarily consists of middle to upper-income households, including a notable number of young families. The city draws both Egyptian citizens and foreign nationals, fostering a community with considerable cultural and demographic diversity. Given their relatively high purchasing power, these residents likely represent a robust market for locally sourced, high-quality produce. The presence of families with children further suggests a potential demand for healthier and fresher food options.

El-Sherouk is home to numerous educational and medical institutions, such as the French University in Egypt and Shorouk Academy, as well as several healthcare facilities. These services contribute to the overall quality of life in the city and could encourage community participation in sustainable initiatives like urban agriculture. However, it is essential to keep in mind that the main objective behind the creation of such cities was to relieve population density in Cairo. The ongoing issue of under-occupancy is a common challenge across Egypt's new urban projects and must be considered when planning future land use and urban agriculture developments.

The Farouk El-Baz Center for Sustainability and Future Studies (FECSFS) is housed at the British University in Egypt (BUE), a significant institution in El-Sherouk City. This center is actively involved in training, research, and education, with a particular emphasis on sustainability. Even if the material that is now accessible doesn't specifically describe the urban agricultural projects that FECSFS is leading, the organization's primary focus on sustainability clearly points to the possibility of doing research or even smaller-scale operations in this area. As an illustration of its interest in sustainable agricultural practices more generally, BUE has previously hosted events that touched on agricultural waste management.

Furthermore, a tree planting initiative at The British School of Elite in El-Sherouk City, supported by the Egypt Go Green Network, demonstrates a focus on green initiatives within the city. While not directly urban agriculture for food production, such initiatives contribute to the greening of the urban environment, which often forms a component of broader urban agriculture efforts.

The research highlights the active role of organizations like Schaduf and Urban Greens in implementing rooftop farming projects across Cairo. These initiatives often involve hydroponic systems for growing vegetables on rooftops in densely populated areas. Given the proximity of El-Sherouk City to Cairo, it is plausible that residents or institutions within El-Sherouk City have also adopted similar approaches, even if not formally documented in academic literature.¹²⁶

5.3.2.2 Infrastructure and Amenities

El-Sherouk City offers a diverse range of residential typologies, particularly in areas such as the Golf District, reflecting the city's capacity to accommodate various lifestyle preferences and income levels. The housing mix includes apartments, villas, townhouses, twin houses, and penthouses. This architectural variety, especially the widespread use of flat-roofed buildings opens up promising possibilities for rooftop gardening. Penthouses, often equipped with private terraces or rooftop access, present immediate opportunities for residents to engage in small-scale cultivation or personalized gardening projects.

In addition to rooftop potential, El-Sherouk is characterized by an abundance of open spaces that lend themselves well to urban agriculture. The city's master plan emphasizes sustainability and

¹²⁶ New Urban Communities Authority (NUCA), *El-Sherouk City Development Report*, accessed June 2025; Central Agency for Public Mobilization and Statistics (CAPMAS), *Egypt Population Census 2017*; British University in Egypt (BUE), Farouk El-Baz Center for Sustainability and Future Studies, "Sustainability Initiatives," accessed June 2025; Egypt Go Green Network, "Tree Planting Initiative at The British School of Elite in El-Sherouk," 2024; Schaduf and Urban Greens, "Rooftop Farming Projects in Cairo," 2023.

livability, incorporating broad streets, pedestrian-friendly walkways, cycling paths, and an extensive network of green areas. Many gated communities and residential compounds feature landscaped communal gardens and shared open spaces. These environments—along with other underutilized plots of public land—offer valuable opportunities to establish community gardens. Such initiatives could provide residents with areas to grow food collectively while fostering community ties and promoting environmental awareness.¹²⁷

5.3.2.3 Water resources

El-Sherouk City receives its primary water supply from the 10th of Ramadan City water purification station. The city boasts a robust and extensive water network infrastructure, with a substantial portion of its networks already completed. While this infrastructure predominantly caters to domestic requirements, its capability to support urban agriculture initiatives—especially regarding the irrigation demands of rooftop and community gardens—would necessitate a thorough evaluation. Investigating supplementary water sources, such as rainwater harvesting, could also prove advantageous in this arid environment. The existing infrastructure, particularly the availability of rooftops and open spaces, coupled with the established water supply network, provides a firm basis for implementing diverse urban agriculture models in El-Sherouk City. A comprehensive assessment of the water infrastructure's capacity to meet agricultural demands would indeed represent a critical subsequent action.¹²⁸

5.3.3 Local Government, Urban, and Green Area Policies

Al Shorouk City is governed under the broader framework of NUCA “New Urban Communities Authority” while maintaining its local administration for day-to-day governance and development initiatives.

5.3.3.1 Local Government

The development and administration of El-Sherouk City fall under the purview of the New Urban Communities Authority (NUCA), an Egyptian state-owned enterprise affiliated with the Ministry of Housing. Established in 1979, NUCA's primary mandate was to address housing issues by creating new urban communities in desert areas to alleviate population pressure on the Nile Valley and Delta and to preserve agricultural land. This mandate aligns with the broader goals of creating new civilized centers, redistributing the population, and extending urban axes into desert and remote areas.

NUCA plays a central role in all aspects of the new cities under its jurisdiction, including planning, land allocation, infrastructure development, and regulation. It acts as the master developer, subdividing land, laying trunk infrastructure, and constructing essential facilities. NUCA also sells

¹²⁷ New Urban Communities Authority (NUCA), *El-Sherouk City Master Plan*, 2022; City of El-Sherouk Planning Department, “Residential Typologies and Open Space Analysis,” internal report, 2023.

¹²⁸ New Urban Communities Authority (NUCA), *Water Supply and Infrastructure Report for El-Sherouk City*, 2021.

land parcels to individuals and real estate developers and serves as the regulatory authority for these new urban communities, issuing planning permits and overseeing their development.¹²⁹

- Responsibilities include **infrastructure maintenance, public service management, and regulatory enforcement.**
- Actively works on improving urban facilities and attracting investments to sustain growth.

5.3.3.2 Urban Policies

El-Sherouk City's growth is guided by a detailed master plan that organizes how land is used, promoting a healthy mix of housing, commercial centers, recreational facilities, and green spaces. This approach helps keep the city well-structured and prevents uncontrolled expansion.

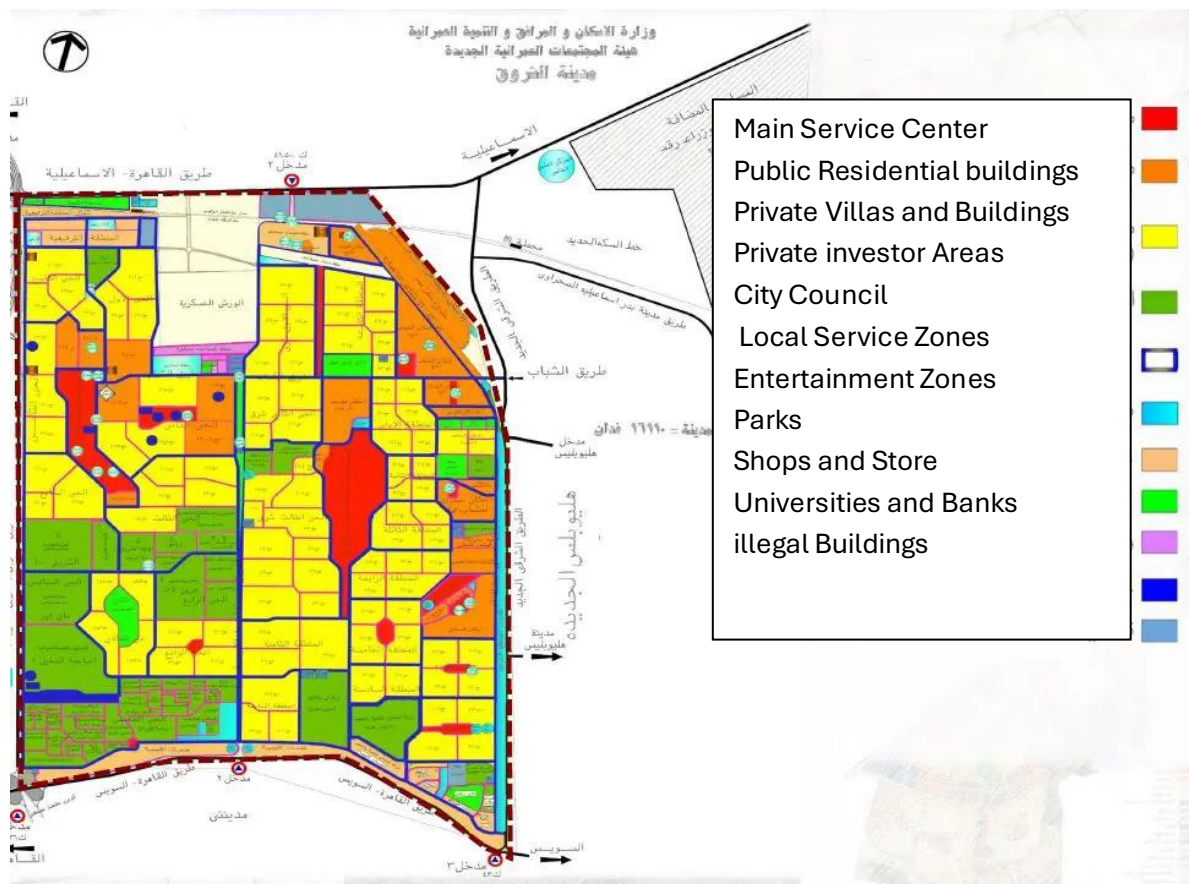
Developing infrastructure is a key focus of the city's growth agenda. Continuous improvements are being made to essential services, including roads, water systems, sewage networks, and electricity. These upgrades are designed to support the city's expanding population and to attract future investments. Transportation links within El-Sherouk and to the greater Cairo area are also being enhanced to improve access and reduce travel time.

El-Sherouk contributes to Egypt's national strategy of easing congestion in Cairo by encouraging people and businesses to move to suburban areas. This helps reduce overcrowding in the capital and supports more development across the region.

To boost its economy, the city has also adopted policies that support investment. These include incentives for both local and international businesses, especially in fields like real estate, education, services, and industry. Special zones have been created to encourage business activity and provide new job opportunities, strengthening the city's role as a competitive economic hub.¹³⁰

¹²⁹ New Urban Communities Authority (NUCA), *Overview of New Urban Communities Development and Management*, Ministry of Housing, Egypt, 2020.

¹³⁰ New Urban Communities Authority (NUCA), *El-Sherouk City Master Plan and Development Strategy*, Ministry of Housing, Egypt, 2021.



Map 4 Masterplan of Alshorok City "to be translated into english."

5.3.3.3 Green Area Policies

El-Sherouk City prioritizes sustainability and livability through the integration of green spaces within its urban layout. Parks, recreational areas, and green corridors are thoughtfully distributed across residential and commercial zones, contributing to environmental quality and enhancing the daily lives of residents. These green elements serve multiple purposes—providing leisure spaces, improving air quality, lowering urban heat, and fostering biodiversity. The city is also working to expand the amount of green space available to each resident, with ongoing tree-planting programs helping to improve the city's appearance and its environmental resilience.

Because of the city's setting, there is a strong focus on ensuring that landscaping practices are sustainable. Policies support the use of native, drought-tolerant plants and emphasize efficient irrigation systems, such as drip irrigation and treated wastewater reuse. These methods help maintain green areas while minimizing water use.

Although urban agriculture is not currently a formal component of El-Sherouk's planning policy, existing regulations on green areas and sustainable design provide a foundation for its future integration. Green spaces in housing and commercial developments could be adapted for small-

scale community farming projects or gardens. In addition, the city's support for green building practices may encourage the adoption of rooftop gardens and other urban farming solutions.

An important policy shift occurred in 2018, when NUCA's mandate was expanded to allow urban development on agricultural land and within established cities. This change, which marked a departure from decades of focusing solely on desert development, could pave the way for urban agriculture to be more readily accepted within planning strategies. As interest in food security, climate resilience, and local food systems continues to grow, El-Sherouk may find new opportunities to integrate agriculture into its sustainable urban future.

Parks, recreational zones, and **green belts** are strategically placed across the city.¹³¹

5.3.3.4 Key Considerations

As a city experiencing rapid growth, El-Sherouk is in a constant state of expansion. This ongoing development profoundly influences both its population patterns and the evolution of its infrastructure. One of the primary hurdles the city confronts involves achieving truly sustainable growth—that is, finding a delicate equilibrium between continued urbanization and dedicated environmental conservation. Government policies play a pivotal role here, acting as essential guides for El-Sherouk's long-term development and adapting dynamically to its population's shifting needs and to the relentless march of technological progress. Indeed, the city's governance structure aligns closely with Egypt's broader national urban planning strategies, positioning El-Sherouk as a potential blueprint, a valuable case study for future urban development projects across the entire nation.

5.4 Feasibility Analysis for Potential of Urban Agriculture in El-Sherouk City.

5.4.1 Climate Suitability and Recommended Crop Selection

El-Sherouk City, just like the rest of Egypt, contends with a hot desert climate, formally classified as BWh under the Köppen-Geiger system. This climate is truly defined by its scarcity of rainfall throughout the year, with whatever precipitation we do see typically concentrated during the winter months. Summers in El-Sherouk? They're usually scorchers, presenting considerable hurdles for any urban agriculture initiatives.

Now, what does this climate imply for our farming efforts? Well, it absolutely necessitates a thoughtful selection of crops – ones that can really take the heat and don't guzzle water. Efficient water management techniques, too, will prove utterly crucial for urban agriculture to thrive in El-Sherouk. That means we'll need to focus on drought-tolerant and heat-resistant varieties, whether we're talking about rooftop plots or community gardens.

Looking at Egypt's planting calendar and other reliable sources on regional crop suitability, it's clear: a diverse array of vegetables, herbs, and even certain fruits can indeed flourish in El-Sherouk year-

¹³¹ New Urban Communities Authority (NUCA), *Sustainability and Urban Green Space Policies for El-Sherouk City*, Ministry of Housing, Egypt, 2022.

round, provided we apply appropriate planning and diligent care. It is important to note that even heat-tolerant crops may benefit from some shade during the hottest parts of the day in the peak summer months. Utilizing shade cloths or planting in locations that receive partial shade can help to reduce heat stress and improve yields. Additionally, consistent watering, especially during dry periods, and the use of mulching to help retain soil moisture will be crucial for successful urban agriculture in El-Sherouk's climate.¹³²

5.4.2 Economic Viability

Establishing and maintaining urban agriculture initiatives in El-Sherouk City, whether rooftop or community gardens, will involve various budgeting considerations. Initial setup costs may include the purchase of containers or materials for raised beds, soil or other growing media, seeds or seedlings, and potentially irrigation systems. Ongoing expenses will include water usage, replenishment of growing media, and the occasional need for pest management or fertilizer. For community gardens, there may also be costs associated with land preparation, tool storage, and communal infrastructure.

While the initial thrust of urban agriculture in El-Sherouk might lean non-commercial, investigating possible income streams really could bolster these efforts over the long haul. Think about it: any extra produce from community plots, or even individual rooftop gardens, could find its way to local markets or through community-supported agriculture (CSA) setups, where residents essentially buy a share of the harvest upfront. El-Sherouk's spot, strategically positioned within the greater Cairo region, opens doors to connect with nearby urban centers, giving these growers access to a much bigger customer base. And considering the socioeconomic makeup of El-Sherouk's residents—many hail from the middle and upper classes—we might just have a ready market for high-quality, locally grown produce.

Beyond simply selling goods, urban agriculture in El-Sherouk can deliver other substantial economic perks. Households that participate, for instance, stand to save quite a bit on their grocery bills by cultivating their own food. Plus, these urban farming initiatives can spark new job opportunities right within the community, covering everything from overseeing shared gardens to running small-scale urban farms or even related businesses.

Furthermore, the transformation of underutilized spaces into green and productive areas can enhance the aesthetic appeal of neighborhoods and potentially lead to increased property values.

While achieving direct profitability in urban agriculture can be challenging, focusing on the broader economic benefits and fostering strong community participation are crucial first steps. Exploring partnerships with local businesses, restaurants, or hotels could provide future market opportunities

¹³² World Bank Climate Data, "Köppen-Geiger Climate Classification: Egypt," accessed June 2025; Egyptian Ministry of Agriculture, *Planting Calendar for Egypt* (Cairo: Ministry of Agriculture, 2023); Ayman A. El-Sayed and Nabila H. Abd El-Gawad, "Drought-Resistant Crop Varieties for Arid Regions," *Journal of Agricultural Science and Technology* 15, no. 4 (2024): 233–45.

for urban-grown produce in El-Sherouk. Developing value-added products from urban harvests, such as jams or herbs, could also enhance revenue potential. A comprehensive feasibility analysis should consider both the costs and the multifaceted economic benefits of urban agriculture in the specific context of El-Sherouk City.¹³³

5.4.3 Social Factors

The success and sustainability of urban agriculture in El-Sherouk City will be significantly influenced by various social factors, particularly the level of community awareness and interest in such initiatives. Assessing this awareness and interest through community surveys, workshops, or pilot projects in specific neighborhoods will be essential for tailoring urban agriculture models to the needs and preferences of El-Sherouk residents.

Inclusivity is a key social factor for the feasibility of urban agriculture in El-Sherouk. Initiatives should be designed to ensure that all segments of the community, including different age groups, socioeconomic backgrounds, and nationalities, have opportunities to participate. This requires creating accessible garden spaces, offering diverse gardening options, and fostering a welcoming and collaborative environment.

Providing adequate training and resources to residents is crucial for their successful engagement in urban agriculture. Training programs should cover basic gardening techniques relevant to the local climate, including soil preparation, planting, watering, and pest management.¹ More advanced training on specific methods like rooftop gardening or hydroponics could also be offered based on community interest.

Promoting community engagement and addressing potential barriers to participation are vital for the long-term success of urban agriculture in El-Sherouk. Barriers such as lack of time, lack of knowledge, or concerns about the effort involved need to be addressed through effective communication, accessible resources, and the creation of supportive community networks. Organizing social events around gardening activities, such as harvest festivals or potlucks, can help to foster a sense of community and encourage greater participation.⁶ Ultimately, the feasibility of urban agriculture in El-Sherouk will depend on the active involvement and enthusiasm of its residents, and efforts to understand their motivations and address their needs will be critical.¹³⁴

¹³³ Mohamed A. El-Tawil and Sarah M. Hassan, "Economic Feasibility of Urban Agriculture in Egyptian New Cities," *Journal of Urban Development* 12, no. 2 (2023): 112–28; Hanan Abd El-Moneim, "Budgeting for Sustainable Urban Farming Projects," *Sustainable Agriculture Review* 18 (2024): 65–80; Ahmed R. Soliman et al., "Urban Agriculture and Socioeconomic Benefits in Greater Cairo," *Middle East Journal of Environmental Studies* 9, no. 1 (2023): 45–59.

¹³⁴ Layla M. Fahmy and Karim H. El-Din, "Community Engagement and Urban Agriculture in Egypt," *Journal of Sustainable Cities* 15, no. 3 (2023): 210–27; Nourhan S. Abdallah, "Inclusivity and Training in Urban Farming Initiatives," *Middle Eastern Journal of Environmental and Social Studies* 7, no. 1 (2024): 88–101; Rania A. El-Baz, "Barriers and Social Dynamics in Urban Agriculture Participation," *Urban Green Spaces Review* 11, no. 2 (2023): 134–49.

5.4.4 Barriers to Implementation

- Legal, regulatory, and logistical challenges in integrating urban farming into El-Sherouk's urban fabric.

Ownership of the public areas and how it will be controlled and managed from a legal perspective and the opportunity to rent it or make a project and change the current situation of it.

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5.5 SWOT Analysis

This SWOT analysis offers a structured strategic assessment of the internal (strengths and weaknesses) and external (opportunities and threats) factors shaping the implementation of urban agriculture in El-Sherouk City. It equips policymakers and urban planners with a clear, concise, and actionable overview of the current landscape, enabling the formulation of targeted and effective strategies. By distilling complex variables into an accessible framework, the analysis helps identify where El-Sherouk can leverage strengths, address vulnerabilities, seize emerging opportunities, and mitigate risks. Crucially, the SWOT approach also aids in prioritizing interventions. For instance, it reveals how adopting technological innovations can help address water scarcity, while strong community interest—if properly engaged—can alleviate maintenance challenges. This insight supports more efficient and strategic allocation of resources.

STRENGTH

- **Existing Green Areas:** 20% designated green areas, though currently ornamental.
- **Strong Community Interest:** Growing interest in healthy food, sustainable living, and community initiatives especially after pandemic.
- **High Youth Population:** Large demographic asset for labor and innovation.
- **Potential for New Developments:** Ongoing housing expansions offer opportunities for integrated UA.
- **Existing Community Gardens:** Limited but present community gardens

- **Technological Advancements:** Hydroponics, aeroponics, vertical farming offer scalable solutions.
- **Policy Window for Integration:** National/global focus on sustainability creates favorable environment.
- **Youth Engagement for Job Creation:** UA can provide diverse employment and entrepreneurship opportunities for youth.
- **Integration into New Housing Designs:** Proactive incorporation into future developments.
- **Circular Economy Potential:** Utilizing urban organic waste and treated wastewater.

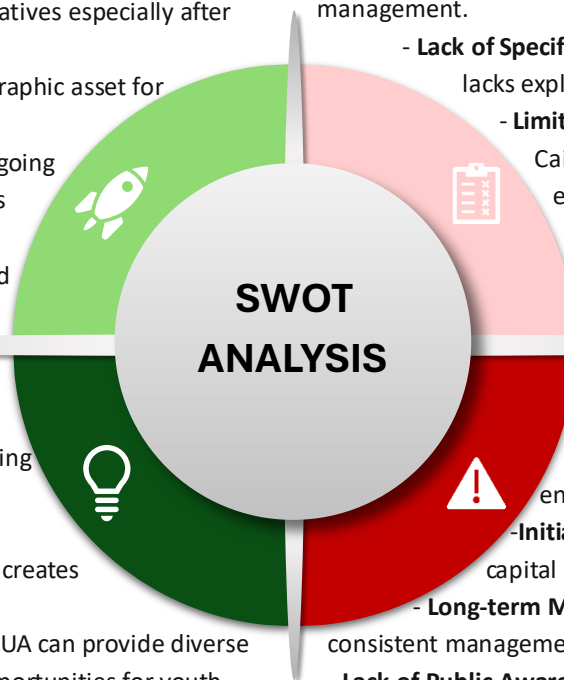
OPPORTUNITIES

WEAKNESS

- **Ornamental Green Areas:** Existing green spaces are not designed for productive use.
- **Water Scarcity:** Egypt is water-stressed, requiring careful water management.
- **Lack of Specific UA Policy:** El-Sherouk's master plan lacks explicit provisions for urban agriculture.
- **Limited Local Economic Activities:** Reliance on Cairo for employment, hindering local economic diversification.
- **Technical Knowledge Gaps:** Lack of specialized training in sustainable urban farming practices.

- **Potential Contamination:** Risks of soil and water contamination in urban environments.
- **Initial Funding Requirements:** High upfront capital costs for establishing farms.
- **Long-term Maintenance Challenges:** Requires consistent management and resources for sustainability.
- **Lack of Public Awareness:** Insufficient understanding of UA benefits may hinder participation.
- **Regulatory Inertia:** Resistance to updating outdated policies and bylaws.

THREATS



5.6 Strategic Recommendations for Implementing and Scaling Urban Agriculture in El-Sherouk City

To successfully implement and scale urban agriculture in El-Sherouk City, a strategic and phased approach is recommended:

Phased Implementation: To ensure the successful implementation and long-term scalability of urban agriculture within El-Sherouk City, a comprehensive and phased strategy is essential. An incremental rollout, beginning with carefully selected pilot projects, is advisable. Initiating the intervention within specific neighborhoods—such as the Golf neighborhood, which benefits from a clearly defined community structure—will provide valuable opportunities to test various urban agriculture models. This approach enables the collection of local feedback and experiential learning before broader city-wide replication, thus minimizing risk and maximizing adaptability.

strategic Partnerships: Fostering strategic partnerships is fundamental to the success of urban agriculture endeavors. Collaboration between the New Urban Communities Authority (NUCA), community-based organizations (such as residents' associations within gated compounds), academic institutions like the French University and Shorouk Academy, and relevant private sector stakeholders—including landscape design firms and local enterprises—can leverage diverse expertise, mobilize resources, and provide sustained institutional support for these initiatives.

Community Engagement: Prioritizing active community involvement throughout the planning and implementation phases is crucial. We recommend engagement methods like participatory workshops, resident surveys, and targeted focus groups. These approaches ensure that we properly incorporate the local population's perspectives, preferences, and needs. Encouraging community ownership will strengthen local commitment and foster a sense of responsibility for the success and continuity of urban agriculture projects.

Training and Education: The provision of context-appropriate training and education is imperative to address the anticipated knowledge gaps among residents. Customized educational programs should be developed, covering both foundational horticultural practices and advanced techniques suited to the arid conditions of El-Sherouk. These should include modules on efficient water use, composting, pest management, and rooftop cultivation, thereby equipping participants with the necessary skills to sustain their gardens effectively.

Space Allocation: Identifying and securing appropriate spaces for cultivation is another critical component. This involves evaluating and designating both public and privately owned underutilized land—including community parks and rooftops—as viable sites for urban agricultural activity. Collaboration with NUCA is essential to facilitate adjustments to land use regulations, thereby creating an enabling policy environment that legitimizes and encourages the reallocation of urban space for food production.

Policy Incentives: Given Egypt's broader context of water scarcity, the integration of water-saving

agricultural methods is indispensable. The adoption of practices such as drip irrigation, mulching, and the potential installation of rainwater harvesting systems at both household and community scales should be strongly encouraged to mitigate the pressures of El-Sherouk's arid climate and to ensure the sustainability of the intervention.

Water-Efficient Practices: Promote and implement water-efficient gardening techniques, such as drip irrigation and mulching, and explore the feasibility of rainwater harvesting systems at both individual and community levels to address the city's arid climate.

Local Networks and Markets: The formation of localized supply chains and markets for urban agricultural products will also be critical to the long-term viability of these initiatives. Establishing neighborhood farmers' markets or creating linkages between urban growers and commercial entities—such as restaurants or small grocery retailers—can provide economic incentives for continued participation and contribute to food system resilience within the city.

Monitoring and Evaluation: A robust system of monitoring and evaluation should be established from the outset to assess the multidimensional impacts of urban agriculture projects. This includes tracking environmental outcomes, such as biodiversity and soil quality; social indicators, such as community cohesion and participation; and economic metrics, including productivity and income generation. These insights will be instrumental in guiding the strategic scaling of successful models.

Integration into Urban Planning: Lastly, urban agriculture should be integrated into El-Sherouk City's broader urban development and spatial planning processes. Future master plans and urban design frameworks should incorporate provisions for community gardens, rooftop agriculture, and vertical farming solutions, ensuring that urban agriculture becomes an intrinsic component of the city's sustainable growth agenda.

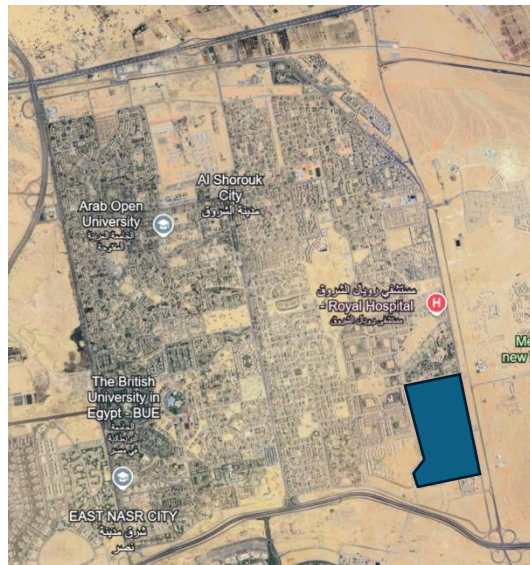
5.7 The Project description

Project vision

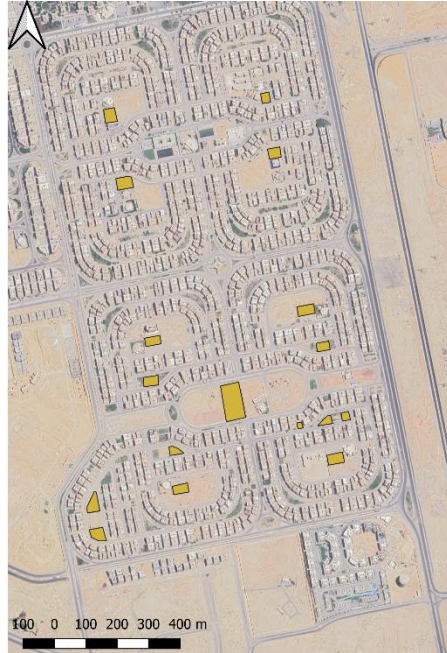
Transforming El-Shorouk City into a green, resilient, and food-secure urban environment by integrating sustainable urban agriculture into the city's fabric—empowering communities, enhancing environmental quality, and fostering inclusive economic opportunities. Through innovation, participation, and strategic planning, El-Shorouk aims to become a national model for urban agriculture, inspiring and guiding other Egyptian cities toward sustainable urban development."

5.7.1 The location for 1st phase.

- As we mentioned before, the city has various types of buildings and categories, so the better option is to select one neighborhood that has the same accessible areas and buildings type to easily apply and calculate the potential of the project
- The Golf neighborhood is located at the south-east of the city.



Map 5 the location of Golf neighborhood.



Map 6 Golf neighborhood morphology.

- The neighborhood is divided into 8 Blocks Each block has around 300 Buildings; each 4-story building is between 180-160 m².
- So, it has the potential of using its rooftop planting type.
- Also, each block has its small green area of around 1500 m².
- That could be used as a community garden to increase the social involvement of the residents.

5.7.2 Proposed Urban Agriculture Models for El-Sherouk City

5.7.2.1 Phase 1: Pilot and Community Engagement (Years 1–2)

Location

The initial phase will focus on low-risk, **small-scale** implementation sites to test feasibility and build interest. **Rooftop gardens** will be encouraged in neighborhoods with uniform building structures, such as the Golf neighborhood, where implementation logistics are more manageable. Simultaneously, **small pilot community gardens** will be established in accessible, underutilized green spaces within residential areas to foster collective participation. Residents with private yards will be encouraged to start backyard gardens, allowing for immediate engagement without the need for structural adaptations.

Scale of Production

At this stage, the scale of production will remain **limited**, prioritizing household-level gardening aimed at personal consumption and nutritional improvement. Community gardens will support small, collaborative growing projects where participants share the harvest and gain practical

experience. These pilot efforts will help assess productivity potential, gather feedback, and build foundational skills among residents.

Methods and Technology

Simple and cost-effective **soil-based gardening** methods will be employed to ensure accessibility for all participants. Techniques such as **container gardening** and raised beds using local soil or compost will be promoted. Basic composting practices will also be introduced to encourage sustainable waste management and soil enrichment. In light of water scarcity in the region, **water-wise methods such as manual watering** with cans and much application will be emphasized to reduce water loss and improve efficiency.

Types of Urban Farmers Involved:

Individual/Household Urban Farmers: Primarily **Home gardeners** will be key, cultivating edible plants in private residential settings like balconies, rooftops, and yards for household consumption. **Specialized hobbyists** may also emerge as individuals explore particular crops or techniques.

Community-Based Urban Farmers: **Community Garden coordinators** will play a central role in facilitating shared growing spaces and organizing communal activities. **Neighborhood food leaders** can help activate various underutilized spaces and engage community members in collaborative efforts.

Focus

The primary goal during this phase is to raise awareness, build community interest, and test the suitability of different urban agriculture methods in El-Sherouk's climate. This will involve identifying and supporting early adopters, understanding challenges at the grassroots level, and fostering a culture of collaboration and shared learning among residents. The groundwork laid here will inform and shape the design of the subsequent expansion phase.

5.7.2.2 Phase 2: Expansion and Diversification (Years 3–5)

Location

Building on the success of the pilot phase, **rooftop gardens** will be expanded to more residential buildings, including **shared rooftop gardens** that can be co-managed by building residents. **Community gardens** will increase in number and size, tailored to the preferences and lessons learned in the first phase. Additionally, a **small-scale vertical** farm pilot will be introduced in a community center or unused municipal facility, allowing for exploration of high-density, climate-controlled food production.

Scale of Production

While maintaining support for **individual gardening**, the **community gardens** will be scaled up to allow for **modest surplus production**. This surplus may be shared among neighbors or distributed informally through local food-sharing events. **Preliminary exploration of small-scale commercial**

potential will also begin, particularly in gardens or pilot sites that demonstrate higher productivity or community entrepreneurship.

Methods and Technology

This phase introduces **innovation and diversification in growing techniques**. Alongside **traditional soil-based** systems, **small-scale hydroponic units** will be introduced, particularly for fast-growing crops like leafy greens. Aquaponic systems will also be tested on a small scale in controlled environments to evaluate their potential for water-efficient, dual-purpose production. Improved irrigation systems such as drip lines will be promoted in larger gardens to reduce water waste and labor requirements.

Types of Urban Farmers Involved:

Individual/Household Urban Farmers: Continue as Home gardeners and Specialized hobbyists. Do-it-yourself (DIY) urban homesteaders might emerge as residents seek greater self-reliance.

Regarding Community-Based Urban Farmers: Leaders of community gardens and local food advocates are central to growing and managing neighborhood efforts. Farmers who maintain cultural heritage also have an opportunity to weave in traditional agricultural methods.

For Social Enterprise Urban Farmers: Providing training and education to urban farmers is crucial for them to develop more sophisticated skills in hydroponics and aquaponics. As these projects expand, urban farmers committed to food justice can begin to address systemic inequities in food accessibility.

Institutional Urban Farmers: Educational institution farmers could start pilot projects in schools or universities, integrating gardening with academic programs.

Commercial Urban Farmers: Urban market gardeners may begin to sell surplus produce directly to consumers or local outlets. Small-scale High-tech commercial farmers might be involved in the vertical farm pilot.

Experimental/Innovation-Focused Urban Farmers: Research scientists and Technology developers could be involved in assessing the performance of new systems (hydroponics, aquaponics) introduced in this phase.

Focus

The emphasis during this phase is on scaling up, diversifying methods, and building the technical capacity of participants. It's also a time to evaluate more advanced technologies and their appropriateness for El-Sherouk's context. By doing so, this phase serves as a bridge between basic community-level production and future commercial or system-wide integration.

5.7.2.3 Phase 3: Optimization and Potential Commercialization (Years 6+)

Location

At this mature stage, the focus will shift toward optimizing and commercializing urban agriculture practices. Rooftop gardens that proved successful will be developed into more efficient, larger-scale

systems, potentially producing for markets or institutions. A network of well-maintained community gardens will be established, possibly supported by centralized composting, seed distribution, or irrigation systems. If the vertical farm pilot is successful, its expansion into other suitable public or private buildings will be prioritized. Public landscaping may also include edible plants, integrating food production into urban design.

Scale of Production

While supporting ongoing individual and community gardening efforts, the third phase will enable a transition toward commercial urban agriculture. This includes formalizing producer cooperatives, selling produce to local markets, restaurants, or through community-supported agriculture (CSA) models. These commercial pathways could provide supplemental income and improve local food resilience.

Methods and Technology

All production systems will be optimized through advanced techniques. Soil-based methods will incorporate the best practices like crop rotation and organic inputs. Hydroponic and aquaponic systems that showed strong performance will be expanded. New technologies like aeroponics may be tested for high-value crop production, especially in vertical farms. Additionally, smart agriculture tools such as environmental sensors, data dashboards, and automated watering systems will be evaluated and deployed to maximize resource efficiency and yields.

Types Of Urban Farmers Involved

Commercial Urban Farmers: All subtypes will be prominent. **High-tech commercial farmers** will be key for large-scale, technologically advanced operations. **Urban market gardeners** will continue to serve niche markets. **Peri-urban commercial farmers** might emerge at the city's expanding fringes.

Social Enterprise Urban Farmers: All subtypes—**Therapeutic and rehabilitation-oriented urban farmers**, **Training and educational urban farmers**, and **Food justice-focused urban farmers**—will be fully integrated, leveraging urban agriculture for broad social impact and financial viability.

Community-Based Urban Farmers: All subtypes—**Community garden coordinators**, **Neighborhood food leaders**, and **Cultural heritage farmers**—will continue to be vital for maintaining community cohesion and decentralized food production.

Individual/Household Urban Farmers: Continue as the foundation of personal food security and leisure, including **Home gardeners**, **Do-it-yourself (DIY) urban homesteaders**, and **Specialized hobbyists**.

Institutional Urban Farmers: All subtypes—**Educational institution farmers**, **Healthcare institution farmers**, and **Correctional facility farmers**—can be fully developed, integrating urban agriculture into their core missions and potentially contributing to institutional food systems.

Experimental/Innovation-Focused Urban Farmers: Research scientists, Technology developers, and System designers will be crucial for ongoing optimization, smart agriculture integration, and developing sustainable, circular systems for the city's future food system.

Focus

The final phase aims for sustainability, efficiency, and economic viability. It envisions urban agriculture as a lasting part of El-Sherouk's food system and urban landscape. By this point, urban farming should be seen not just as a community initiative, but also as a contributor to local food security, employment, and environmental stewardship.

5.5.3 Stakeholder Mapping and Analysis:

Identifying the roles and interactions of local communities, government agencies (NUCA), NGOs, and other key players in urban agriculture projects.

The successful implementation and sustainability of urban agriculture initiatives in El-Sherouk City will depend on the active participation and collaboration of various stakeholders. These include local communities, government agencies, non-governmental organizations (NGOs), academic institutions, and the private sector. Local communities are the primary beneficiaries and active participants in urban agriculture projects. Their involvement is crucial for the labor, local knowledge, and long-term success of these initiatives.

Government bodies are crucial for setting up the right structure and offering support. NUCA, as the entity managing and developing El-Sherouk City, holds the power to weave urban agriculture into the city's master plan and back it with policy. The Ministry of Agriculture and Land Reclamation (MALR) can step in with technical know-how and make sure urban farming aligns with the country's broader agricultural goals. And, of course, the Ministry of Environment plays an essential role in pushing for eco-friendly initiatives and making certain that urban farming methods are good for the environment in the long run.

NGOs often act as key implementers and facilitators of urban agriculture projects, providing technical expertise, community mobilization, and access to funding. Organizations like Schaduf and Urban Greens, while primarily active in Cairo, could potentially extend their initiatives to El-Sherouk City. The Farouk El-Baz Center for Sustainability and Future Studies (FECSFS) at the British University in Egypt (BUE) represents an academic institution that can contribute through research, education, and providing evidence-based solutions for sustainable development, including urban agriculture. The private sector can bring innovation, investment, and business models to the urban agriculture sector, contributing to its scalability and sustainability.

Stakeholder Group	Examples	Role in Urban Agriculture	Level of Involvement	Potential for Increased Engagement
Local Communities	Residents of El-Sherouk City	Participants, beneficiaries, providers of labor and local knowledge	Low to Medium	High
Government Agencies	NUCA, MALR, Ministry of Environment	Policy support, land allocation, infrastructure, technical expertise, regulatory framework, funding opportunities	Low to Medium	High
NGOs	Schaduf (Cairo-based), Urban Greens (Cairo-based), local community groups	Implementation of projects, community mobilization, technical assistance, access to funding	Low	High
Academic Institutions	British University in Egypt (FECFS)	Research, education, providing evidence-based solutions and expertise	Low	Medium
Private Sector	Real estate developers, agricultural technology companies	Investment, development of technologies and infrastructure, establishing market linkages	Low	Medium

Table 10 Stakeholder Mapping and Analysis Elaborated By the Author

This table illustrates the current and potential involvement of key stakeholders in urban agriculture initiatives within El-Sherouk City. While current involvement appears to be relatively

low across most sectors, there is significant potential for increased engagement to leverage the multifunctional benefits of urban agriculture.

5.5.4 Evaluating the Effectiveness and Sustainability of Urban Agriculture in El-Sherouk City.

Direct evaluations or assessments of urban agriculture initiatives specifically within El-Sherouk City are not evident in the research provided. However, by examining evaluations conducted in other parts of the Greater Cairo Region and general assessments of urban and peri-urban agriculture (UPA) in Egypt, we can draw inferences about the potential effectiveness and sustainability of such initiatives in El-Sherouk City.

Rooftop farming in Cairo has truly made a difference, creating positive ripple effects across communities—socially, economically, and environmentally. These projects have noticeably improved local microclimates, boosted food security, and opened up new income opportunities for those involved. However, the lasting success of these initiatives often depends on how deeply the community engages, the availability of solid technical support, and the consistent access to essential resources like water and nutrients. Still, challenges frequently arise—unreliable water supply, unexpected power outages, and intense heat can all threaten the stability of these urban farms.

General assessments of UPA in Egypt suggest its potential for a wide range of socio-economic and environmental roles, including aesthetic urban design, waste management, microclimate control, and biodiversity conservation. However, the growth of UPA in Egypt can be hindered by socio-political, cultural, and technical hurdles, such as soil contamination and the need for specialized knowledge. Despite these challenges, UPA is recognized for its potential to address urban food insecurity, poverty, and various environmental and social issues.

Lessons learned from successful urban agriculture initiatives in Cairo and the broader region emphasize the importance of several key factors for effectiveness and sustainability. Capacity development through theoretical, technical, and practical training is crucial for equipping participants with the necessary skills and knowledge. Active community involvement and a sense of ownership are essential for the long-term success of projects. Thorough market research and planning are necessary to ensure that the crops grown are relevant to local needs and can provide economic benefits. Additionally, financial contributions from beneficiaries can induce a greater sense of ownership and commitment. Remote monitoring throughout the implementation process can also help identify and address challenges promptly.

Given the similarities in climate and urbanization challenges between Cairo and El-Sherouk City, these findings suggest that urban agriculture initiatives in El-Sherouk City could be effective and

sustainable if they incorporate these best practices. Prioritizing community engagement, providing comprehensive training and technical support, ensuring access to resources, and developing viable economic models will be key determinants of their success.

Evaluation Aspect	Findings from Other Regions (e.g., Cairo & Greater Cairo)	Implications for El-Sherouk City	Key Indicators
Social, Economic, and Environmental Impacts	Rooftop farming projects improve microclimates, food security, and generate income.	Similar benefits could be expected if projects are well-supported.	<ul style="list-style-type: none"> - Number of households engaged- Monthly income generated- Change in local food availability - Reduction in rooftop temperatures
Success Factors	Community engagement, technical support, and resource availability (water, nutrients) are essential.	El-Sherouk must prioritize these to ensure project sustainability.	<ul style="list-style-type: none"> - Attendance in training sessions- Number of technical support visits- Regular water and input availability - Participant satisfaction scores
Common Challenges	Irregular water supply, power cuts, and extreme heat can hinder productivity.	Mitigation strategies (e.g., water-saving techniques, shading) should be built into plans.	<ul style="list-style-type: none"> - Frequency of irrigation interruptions- Days of extreme temperature events - Percentage of farms with heat/water mitigation systems
Potential Roles of UPA	Supports aesthetic design, waste management,	Could contribute to ecological and visual enhancement of El-	<ul style="list-style-type: none"> - Number of UPA-integrated green spaces- Volume of organic waste reused- Biodiversity indicators (e.g.,

	biodiversity, microclimate control.	Sherouk's urban fabric.	pollinator counts)- Resident satisfaction with urban environment
Barriers to Growth	Includes soil contamination, cultural resistance, and lack of technical knowledge.	Addressing these through education and appropriate cultivation methods is critical.	<ul style="list-style-type: none"> - Number of contaminated sites identified - Enrollment in awareness programs- Pre/post knowledge assessment scores
Lessons Learned	Training, market research, active participation, financial buy-in, and remote monitoring support long-term success.	Applying these strategies can enhance effectiveness in El-Sherouk's urban agriculture programs.	<ul style="list-style-type: none"> - Number of training modules delivered- Market access points created - Percentage of participants contributing financially- Monitoring reports generated per month
Overall Recommendation	Incorporating best practices from Cairo improves feasibility and sustainability of urban agriculture.	El-Sherouk should adapt these strategies to local needs and conditions for optimal outcomes.	<ul style="list-style-type: none"> - Adoption rate of best practices - Number of UPA projects successfully scaled- Policy alignment with UPA goals

Table 11 Evaluating the Effectiveness and Sustainability of Urban Agriculture in El-Sherouk City.

5.5.5 Challenges and Limitations Encountered in Implementing and Maintaining Urban Agriculture in El-Sherouk City.

Although urban agriculture holds significant promise for El-Sherouk City, its implementation and long-term upkeep are likely to face a number of obstacles. Due to the limited availability of city-specific data, many of these anticipated challenges are based on broader regional trends and common patterns observed in urban agriculture initiatives elsewhere.

A significant challenge is the potential inexperience and lack of agricultural skills among the majority of El-Sherouk City's urban residents. Many may not possess the knowledge required to identify suitable crops, manage growing conditions, or address common agricultural issues. This necessitates the development of comprehensive training programs tailored to the urban context.

Soil contamination may present a serious challenge for urban agriculture in El-Sherouk City, especially in districts previously occupied by industrial activity or dense construction. Such contamination is a frequent concern in urban areas and could jeopardize the safety of food produced locally. To mitigate potential health risks, comprehensive soil assessments should be conducted prior to cultivation. In cases where soil quality is deemed inadequate, alternative approaches—such as hydroponic farming or the use of raised beds with clean, fertile soil—can provide viable and safe methods for food production.

Water availability and quality represent another crucial consideration. Egypt faces water scarcity, and urban agriculture initiatives in El-Sherouk City would need to prioritize water-efficient techniques. Additionally, the potential for increased water bills for participants in rooftop or other forms of urban farming needs to be addressed.

Maintaining the commitment and participation of beneficiaries over the long term can also be challenging. Drop-out rates can be high if participants do not perceive sufficient benefits or face difficulties in managing their urban farms. Ensuring the financial sustainability of urban agriculture projects, potentially through micro-credit schemes or market-based approaches, is also essential for their long-term viability.

Urban farms can be susceptible to pests and disease attacks. The close proximity of plants in urban environments can facilitate the rapid spread of diseases, requiring the implementation of integrated pest management strategies that minimize the use of chemical pesticides.

Extreme weather conditions, such as heat waves and sandstorms, prevalent in the region, can also pose challenges for urban agriculture. Selecting heat-tolerant crop varieties and implementing protective measures like shading may be necessary to mitigate these impacts.

Finally, the absence of specific regulatory and policy frameworks supporting urban agriculture in El-Sherouk City could be a significant limitation. Clear guidelines and support from NUCA and other relevant government agencies would be crucial for fostering the growth and integration of urban farming within the city's development plans. Addressing these challenges proactively through careful planning, community engagement, and appropriate support mechanisms will be essential for realizing the full potential of urban agriculture in El-Sherouk City.

Challenge	Description	Potential Solutions
Lack of Agricultural Knowledge	Most residents may lack experience and skills in farming.	Develop urban-focused training programs and workshops.
Soil Contamination	Areas with industrial or heavy construction history may have polluted soil.	Conduct soil testing; use hydroponics or raised beds with clean soil.
Water Scarcity and Cost	Egypt's water scarcity and higher water bills may hinder implementation.	Promote water-efficient techniques; consider subsidies or water reuse systems.
Sustained Participation	Participants may lose interest or drop out if benefits aren't visible.	Provide continuous support; use micro-credit and market-based incentives.
Pests and Diseases	Dense planting can lead to rapid disease spread and pest infestations.	Implement integrated pest management with minimal chemical use.
Extreme Weather	Heatwaves and sandstorms can damage crops.	Use heat-tolerant crops and protective structures like shading nets.
Lack of Policy Support	No clear urban agriculture regulations or policies exist in El-Sherouk.	Develop supportive policies in collaboration with NUCA and other authorities.

Table 12 Challenges and Limitations Encountered in Implementing and Maintaining Urban Agriculture in El-Sherouk City, elaborated by the author.

5.8 Conclusion

Urban agriculture presents a significant opportunity for El-Sherouk City to enhance its sustainability, resilience, and the overall quality of life for its residents. By embracing initiatives like rooftops and community gardens, El-Sherouk can reap substantial environmental benefits, foster stronger social connections, and stimulate local economic activity. The successful integration of urban agriculture, however, requires a collaborative and community-driven approach. Strong partnerships between NUCA, local organizations, and the residents themselves will be essential for navigating the challenges of the local climate and ensuring the long-term viability of these initiatives. Ultimately, by strategically leveraging its existing infrastructure and

embracing the potential of urban agriculture, El-Sherouk City can cultivate a greener, more resilient, and more vibrant future for its community.

Conclusion: Synthesizing Findings on the Role of Urban Agriculture in El-Sherouk City's Sustainable Development.

Urban agriculture presents a promising opportunity for El-Sherouk City, offering a practical and adaptable way to address the city's escalating urban challenges. Beyond improving food security, this approach delivers wider benefits—socially, economically, and environmentally. While comprehensive, large-scale projects tailored to El-Sherouk are still limited, valuable insights can be gathered from ongoing initiatives throughout the Greater Cairo Region. Currently, the city is facing several critical issues: rapid population growth, stretched infrastructure, environmental stress, and weakening social bonds. The increasing number of gated communities has only deepened the divide, making it more difficult to build inclusive, well-connected urban neighborhoods.

Crucially, urban farming demonstrably contributes to mitigating these pressures. It actively cultivates stronger community engagement, significantly enhances food security, elevates the overall quality of life for residents, and directly stimulates new economic opportunities. Furthermore, it expands vital green spaces, modulates local microclimates, enables the productive repurposing of urban waste, enriches biodiversity, and champions effective water conservation.

The successful integration of urban agriculture within El-Sherouk City's fabric hinges critically on a concerted, collaborative endeavor. Local communities, in concert with governmental entities such as NUCA, non-governmental organizations, academic institutions, and the private sector, must collectively spearhead its implementation. Acknowledged obstacles persist: deficiencies in skills, the potential for soil contamination, water scarcity, the challenge of securing sustained beneficiary commitment, the management of pest and disease outbreaks, adaptation to extreme weather events, and the present void of explicit policy frameworks all necessitate careful consideration. Despite these hurdles, the profound advantages of embedding urban agriculture within El-Sherouk City's developmental trajectory are indisputably substantial for its enduring, sustainable future.

Recommendations: Providing actionable, recommendations for policymakers, urban planners, community organizations, and other stakeholders to further leverage urban agriculture for addressing urbanization challenges and promoting sustainability in El-Sherouk City.

To effectively leverage the potential of urban agriculture in addressing the urbanization challenges and promoting sustainability in El-Sherouk City, the following recommendations are proposed for various stakeholders:

- **Policy and Regulatory Framework:** The New Urban Communities Authority (NUCA) must craft and enforce a distinct policy and regulatory scheme to overtly champion urban

agriculture initiatives within El-Sherouk City. This framework should delineate land-use parameters, incorporate zoning ordinances that sanction urban farming in diverse settings—be they residential, commercial, or institutional—and streamline the permitting processes for these ventures. Integrating urban agriculture into the city's foundational master plan, designating it as a crucial component of green infrastructure and sustainable development, will further underscore its importance and foster its expansion.

- **Capacity Building and Training:** Comprehensive training programs on urban farming techniques, tailored to the specific context of El-Sherouk City, should be established for residents. These programs should cover topics such as basic horticulture, soilless cultivation methods (hydroponics, aquaponics), pest and disease management, water-efficient irrigation techniques, and food safety practices. Collaborations with academic institutions like the British University in Egypt (BUE) and experienced NGOs can provide the necessary expertise and resources for these training initiatives. Creating platforms for knowledge sharing and networking among urban farmers will also foster a community of practice and facilitate the exchange of best practices.
- **Resource Management:** When we talk about managing resources, consider this: pushing for smart, water-saving urban farming techniques like hydroponics, vertical setups, and drip irrigation is just plain crucial to save water in our dry climate. And hey, let's also really explore and back ideas for collecting rainwater and safely reusing treated wastewater for irrigation—obviously, all while hitting those health and environmental marks. We should definitely encourage and make it easier for neighborhoods to start composting, turning city organic waste into useful soil boosters for our urban gardens, cutting down on landfill junk.
- **Community Engagement and Social Inclusion:** As for getting people involved and being inclusive, it's a no-brainer: we need to actively bring local communities into the thick of planning, designing, and rolling out these urban agriculture projects. That's how we ensure they truly fit local needs and give folks a real sense of ownership. Setting up community gardens in easy-to-reach spots—think residential common areas, public parks, schools, even rooftops—will open up chances for people to connect, relax, and grow their own food. And we've got to make sure our urban agriculture efforts specifically target vulnerable residents in El-Sherouk City. It's a great way to boost their food security, create opportunities to earn a buck, and just generally make their lives better.
- **Economic Viability and Market Linkages:** When it comes to the financial side and reaching buyers, we need to facilitate the creation of local venues and methods for urban farmers to sell their produce. This might involve launching farmers' markets, backing direct

transactions with restaurants and local businesses, or connecting urban farmers with established agricultural cooperatives. Furthermore, exploring opportunities to provide small loans, grants, or other monetary support is crucial to help residents establish and expand their urban farming endeavors. Emphasizing the financial advantages of urban agriculture will be instrumental in securing its enduring presence.

- **Research and Innovation:** Encourage and support research initiatives by academic institutions like BUE/FECSEFS to identify the most effective urban agriculture techniques, suitable crop varieties, and innovative solutions for the specific environmental and socio-economic conditions of El-Sherouk City. Promote the adoption of smart agriculture technologies, such as sensors and data analytics, to optimize resource use and improve yields in urban farming systems.
- **Multi-Stakeholder Collaboration:** Foster stronger partnerships and collaboration among all relevant stakeholders, including local communities, NUCA, the Ministries of Agriculture and Environment, NGOs, academic institutions, and the private sector. Regular dialogues, workshops, and joint projects can help align efforts, share resources, and leverage the diverse expertise of each stakeholder group to advance urban agriculture in El-Sherouk City.
- **Monitoring and Evaluation:** It's essential to put in place a sturdy framework for tracking and assessing how well urban agriculture projects in El-Sherouk City are performing. and after establishing this system, it is needed to incorporate clear metrics that can track the social, economic, and environmental effects of these initiatives, thereby enabling choices to be made based on solid data and fostering ongoing enhancement. Using these Consistent evaluations will prove instrumental in pinpointing triumphs, obstacles, and areas ripe for further progress.

Evaluation Aspect	Findings from Other Regions (e.g., Cairo & Greater Cairo)	Implications for El-Sherouk City	The Key Indicators
Social Economics Environmental Impacts	Rooftop farming projects improve microclimates, food security, and generate income.	Similar benefits could be expected if projects are well-supported.	- Number of households engaged- Monthly income generated- Change in local food availability- Reduction in rooftop temperatures

Success Factors	Community engagement, technical support, and resource availability (water, nutrients) are essential.	El-Sherouk must prioritize these to ensure project sustainability.	<ul style="list-style-type: none"> - Attendance in training sessions - Number of technical support visits- Regular water and input availability- Participant satisfaction scores
Common Challenges	Irregular water supply, power cuts, and extreme heat can hinder productivity.	Mitigation strategies (e.g., water-saving techniques, shading) should be built into plans.	<ul style="list-style-type: none"> - Frequency of irrigation interruptions- Days of extreme temperature events- Percentage of farms with heat/water mitigation systems
Potential Roles of UPA	Supports aesthetic design, waste management, biodiversity, and microclimate control.	It could contribute to the ecological and visual enhancement of El-Sherouk's urban fabric.	<ul style="list-style-type: none"> - Number of UPA-integrated green spaces- Volume of organic waste reused- Biodiversity indicators (e.g., pollinator counts)- Resident satisfaction with urban environment
Barriers to Growth	Includes soil contamination, cultural resistance, and lack of technical knowledge.	Addressing these through education and appropriate cultivation methods is critical.	<ul style="list-style-type: none"> - Number of contaminated sites identified- Enrollment in awareness programs- Pre/post knowledge assessment scores
Lessons Learned	Training, market research, active participation, financial buy-in, and remote monitoring support long-term success.	Applying these strategies can enhance effectiveness in El-Sherouk's urban agriculture programs.	<ul style="list-style-type: none"> - Number of training modules delivered- Market access points created- Percentage of participants contributing financially- Monitoring reports generated per month
Overall Recommendation	Incorporating best practices from Cairo improves feasibility	El-Sherouk should adapt these strategies to local	<ul style="list-style-type: none"> - Adoption rate of best practices- Number of UPA projects successfully

	and sustainability of urban agriculture.	needs and conditions for optimal outcomes.	scaled- Policy alignment with UPA goals
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Table 13 Recommendations For different Challenges Elaborated By the Author

CHAPTER SIX: Conclusion

The concluding chapter summarizes the research findings and emphasizes the value of urban agriculture as a tool for addressing the challenges of rapid urbanization in Cairo and El-Sherouk City. It offers practical recommendations for integrating urban farming into city planning, including policy suggestions and strategies for community involvement. The chapter also suggests areas for future research, with a focus on scaling urban agriculture projects and further exploring their long-term sustainability. The conclusion reaffirms the potential of urban farming to create more resilient and sustainable cities in Egypt.

6.1 Discussion of Key Findings.

The conclusions drawn from this investigation powerfully affirm the concept that urban agriculture (UA) offers a versatile remedy for the intricate difficulties arising from Egypt's accelerated urban expansion. By synthesizing theoretical underpinnings, comprehensive case examinations, and practical fieldwork in El-Sherouk City, a clear theme becomes evident: UA possesses the capacity to alleviate concerns such as ecological strain, food scarcity, and the fraying of social bonds within rapidly evolving urban landscapes.

Specifically, within El-Sherouk, the research uncovers a wealth of previously unnoticed opportunities that, if leveraged, could significantly bolster the city's resilience and ecological equilibrium through urban farming initiatives. Spatial analyses reveal a substantial quantity of underutilized areas—including rooftops, empty lots, and even landscaped central dividers within residential districts and public spaces—all of which could be creatively repurposed for productive ends.

Furthermore, these assessments confirm their suitability for diverse forms of UA, encompassing rooftop cultivation and community-operated greenhouses. Low-density urban morphology and generous spatial configuration create favorable conditions for integrating local food production systems. This physical layout, when it is combined with a demographically youthful population, with the help of existing academic institutions, and a growing entrepreneurial spirit, cultivates a conducive environment for sustainable urban agriculture initiatives. These socio-spatial dynamics not only reflect the city's capacity to support such interventions but also highlight potential entry points for community-driven development and resilience-building strategies. These qualities make El-Sherouk not only a suitable pilot site but also a paradigm that might be replicated in other developing Egyptian cities.

The feasibility study in Chapter Five demonstrates that UA the implementation in El-Sherouk is both economically and environmentally feasible, and how Urban farming may be have the ability to reduce food transportation costs, and increase food self-reliance, besides creating new job opportunities,

particularly for young people and marginalized populations. The carried out SWOT analysis supports these ideas based on a variety of factors, including enough sunlight, available space, and the growing demand for fresh, local produce. By emphasizing advantages like easily accessible land and growing public interest in sustainability, two important factors for starting successful pilot projects. In terms of what urban agriculture crops could produce in El-Sherouk, the possibilities are both diverse and practical. based on the city's climatic conditions—characterized by abundant sunlight and relatively low humidity—UA can support the cultivation of a wide range of high-value crops. first Leafy greens such as lettuce, spinach, and arugula are very suitable for rooftop and hydroponic systems due to their fast growth cycles and high nutritional value. Herbs like mint, basil, and thyme thrive in small containers and vertical gardens, making them ideal for balcony or terrace farming. second, the vine crops such as tomatoes, cucumbers, and peppers perform well in greenhouse settings, offering residents access to staple produce, which is called "salad vegetables" and is often costly or inconsistently available in local markets. With proper planning and low-cost protective structures, some root vegetables and legumes—like carrots, beets, and beans—could also be grown in raised beds or rehabilitated soil plots. Altogether, these crops not only enhance dietary diversity and nutritional intake for local households but also represent marketable goods that can contribute to micro-enterprises and small-scale food economies within the city.

Furthermore, El-Sherouk brings a valuable Global South lens to the conversation, reflecting patterns seen in international examples like Accra and Dhaka. Similar to these cities, El-Sherouk shows that UA can flourish even in areas facing infrastructural and economic challenges, provided there is strong community involvement and a creative approach to using idle spaces. Its rooftop gardens and reclaimed land echo Accra's land-use innovations, while the city's grassroots momentum is reminiscent of Dhaka's urban farming networks.

At the same time, El-Sherouk shares notable traits with cities in the Global North, such as Chicago and Turin. In Chicago, urban farming is woven into broader efforts around community uplift and food equity, with disused lots repurposed through joint public-private initiatives. Turin, meanwhile, includes agriculture within its green urban design strategies to bolster ecosystem health and local food resilience. The examples reveal that, regardless of whether a city is resource-rich or constrained, UA offers adaptable, scalable benefits. El-Sherouk—though relatively new in urban terms—demonstrates that with spatial opportunity and civic readiness, even recently developed cities can achieve meaningful outcomes through UA.

To conclude, El-Sherouk shows credit advantages—spatial, social, and policy-related—that support the implementation of UA into urban systems. This research confirms that urban agriculture isn't just a theoretical ideal but a practical possibility within El-Sherouk's context. By aligning its available assets and land potentials, institutional openness, and human energy, with forward-thinking urban policies, the city could emerge as a leading example of sustainable urban transformation.

6.1.1 Limitation of the Study

Carrying out this study faced significant limitations due to the scarcity and fragmentation of data on urban agriculture in Egypt. Specifically, there was a notable absence of recent quantitative data on

urban farming in El-Sherouk and similar newly developed cities. This issue reflects a broader trend identified in previous studies of Cairo's green spaces, which have pointed out a persistent "lack of data" problem—current, comprehensive datasets are not readily available to researchers or planners, and existing information is dispersed across various institutions. In this research, essential official documents such as land-use plans and maps had to be manually reconstructed, while efforts to interview key municipal officials and agricultural extension agents were hindered by logistical challenges. These difficulties, along with limited access to authoritative spatial data, restricted engagement with stakeholders. So the limitation of data compromise the generalizability of the findings. Similar urban agriculture studies have also noted that small or non-representative samples—such as only including formally registered practitioners—and incomplete data reduce the reliability of overarching conclusions. Consequently, the findings of this thesis should be interpreted with caution, as the data constraints likely influenced both the depth and accuracy of the analysis.

6.2 Conclusion and Policy Recommendations For Local Authorities:

"To unlock the full potential of urban agriculture, cities must not only acknowledge it as a legitimate land use but also embed it within formal planning, regulatory, and financial frameworks, supported by strong governance and community participation" (Cassatella & Gottero, 2020, p. 6)

Building on the above findings, a recommendation a comprehensive suite of policy actions tailored to the Egyptian context. First of all, governance should be strengthened by assigning clear responsibility for urban agriculture within government, such as through a dedicated municipal office or an inter-departmental committee. Also, including the local community organizations and NGOs in the planning process is also critical. For instance, Baltimore's sustainability plan established a food policy task force and an "urban agriculture chapter" to coordinate city support for farming¹³⁵.

Second, the local authorities should conduct a city-wide survey of underutilized land to identify spaces suitable for agriculture. This information can guide the creation of urban farming zones and permit gardens in residential, commercial, and vacant plots. The master plan and zoning regulations should explicitly allow urban farming as a legitimate land use. Rosario's experience demonstrates the value of integrating UA into the land-use planning system¹³⁶, and El-Sherouk authorities should follow suit by protecting land or offering long-term leases for community gardens and rooftop farms.

Third, regulatory frameworks must be established to support UA operations. To have clear guidelines on the suitable types of plants and animals allowed to ensure the safety of the residents, food safety standards, and the permitted use of compost and recycled water. Streamlining the permitting process will make it easier for citizens to start and maintain UA initiatives.

¹³⁵ Baltimore Office of Sustainability, *Homegrown Baltimore: Grow Local – Urban Agriculture Plan* (Baltimore: Baltimore Office of Sustainability, 2013), 6–8, https://planning.baltimorecity.gov/sites/default/files/HomegrownBaltimore_UrbanAgPlan_05152013.pdf.

¹³⁶ Claudia Cassatella and Enrico Gottero, *Integrating Urban and Peri-Urban Agriculture into Urban Planning: Barriers, Tools and Strategies* (Brussels: COST Action Urban Agriculture Europe, 2015), 123–125.

Fourth, different financial and infrastructural support is very essential. Municipalities with the help of different NGO's or international Programs should provide grants, low-interest loans, or tax incentives. Financial support will help expand the range of people could participate and in launching and sustaining UA projects. Also, Infrastructural support might include subsidized drip irrigation systems, composting facilities, and access to local markets. Given Egypt's climate, technologies like hydroponics, vertical farming, and rainwater harvesting should be prioritized.

Fifth, capacity building is vital. Training programs and extension services should be developed to address the specific needs of urban farmers, with a focus on soil-less cultivation, pest management, efficient irrigation, and business planning. Partnerships with universities and NGOs can help deliver this education and establish networks among urban farmers.

Sixth, beyond that, local authorities should actively bolster the broader urban farming economy. This means championing shorter food supply chains and fostering the development of collaborative structures, such as community-supported agriculture. Furthermore, offering practical guidance is essential to help cultivators expand their ventures and strengthen their financial stability. Lastly, it's crucial to put in place a robust system for tracking the actual results of all urban agriculture projects. This involves meticulously observing aspects like how land is utilized, the quantity of produce harvested, the level of community involvement, and the ecological effects. The information gathered through these monitoring efforts should then directly influence policy adjustments and lead to more effective program enhancements

These recommendations reflect both the El-Sherouk case study and international best practices, particularly those outlined by the EFUA project's typology of tools: inventories, plans, regulations, incentives, and assessment mechanisms.

Besides, to effectively implement the above recommendations and overcome existing limitations in data and institutional coordination, it is essential that authorities invest in systematic data collection and improved information sharing. Establishing a centralized, open-access urban agriculture database—covering land availability, active farming initiatives, production metrics, and socio-economic indicators—can enhance transparency and support evidence-based policymaking. This effort would ideally be bolstered by establishing official collaborations among city governments, academic institutions, and local groups. Such partnerships would then foster the continuous generation of pertinent, localized data through methods like collaborative mapping, remote sensing technologies, and community-driven reporting. Furthermore, simplifying how information flows to key players—including municipal leaders, urban planning departments, and agricultural advisory agents—will effectively minimize institutional disorganization. Designating a specific liaison or a coordinating body within the municipality could then streamline access to precise spatial and policy data, thereby enabling more comprehensive planning processes and mitigating potential sampling biases in future evaluations. By embedding data governance into urban agriculture policy, El-Sherouk and similar cities can ensure more equitable, informed, and adaptive approaches to sustainable food systems.

6.3 The transferability of the Findings:

The strategies proposed for El-Sherouk have relevance far beyond this one city. Many Egyptian urban centers share similar conditions: rapid population growth, increasing food insecurity, and the presence of underutilized land. For example, satellite cities around Greater Cairo, such as New Cairo and 6th of October City could readily adopt urban agriculture policies inspired by El-Sherouk. Community gardens and rooftop farms are especially well-suited to residential compounds and university campuses, while container gardens and micro-farms could be deployed even in denser urban areas to enhance food security and resilience.

Internationally, the El-Sherouk model aligns with successful cases from both the Global South and North. In Rosario, Argentina—a city similar in size to Cairo’s suburban districts—the Urban Agriculture Program has been integrated into municipal land-use policy, supporting hundreds of gardens through land allocation, training, and input provision. In Turin, Italy, the Green Infrastructure Strategic Plan reserves vacant areas for multi-functional agriculture and includes zoning protections for ecological agricultural areas. Similarly, Baltimore, USA, has incorporated urban agriculture into its official sustainability plan, with a dedicated chapter outlining land-use strategies that encourage local food production. Other EFUA-affiliated cities such as Lisbon, Almere, and Copenhagen have also institutionalized urban farming through tailored legal and financial mechanisms.

Transferring El-Sherouk’s model to other cities in the Global South requires careful attention to local governance, spatial planning systems, and community dynamics. Several guidelines can support this transfer. Cities should begin with a comprehensive land inventory to identify available public and private plots. For urban agriculture to gain proper recognition, it absolutely must be formally incorporated into municipal development blueprints and local zoning regulations, solidifying its standing as a legitimate land use. Furthermore, establishing inclusive governance frameworks is paramount; these should actively involve city departments, non-governmental organizations, academic institutions, and local community representatives to collaboratively oversee both the strategic planning and practical execution. Finally, initiatives aimed at building capacity ought to prioritize cultivating the necessary competencies for cultivating food in urban settings, with a particular emphasis on empowering at-risk populations.

Legal frameworks must be revised to remove unnecessary restrictions and provide clarity on food safety, environmental management, and land tenure. Financial mechanisms such as micro-loans, input subsidies, and tax incentives will help UA ventures become viable. Public engagement should be fostered through educational campaigns, school garden initiatives, and participatory planning processes. Lastly, cities should plan for continuous learning by establishing monitoring and evaluation systems that capture performance data and inform iterative improvements.

These guidelines reflect global lessons and EFUA’s policy toolkit and are adaptable to urban contexts across Latin America, Africa, and Southeast Asia. With thoughtful adaptation, urban agriculture can become a key innovation in sustainable urban development throughout the Global South.

6.4 Answers to the research questions

1. What Are the Specific Benefits of Urban Farming for Food Security, Sustainability, and Urban Livability?

(Refer to Chapter Two: Literature Review, and Chapter Five: Findings and Analysis)

Urban agriculture is more than just growing food in cities—it's about creating healthier, more resilient communities. First and foremost, when it comes to food security, UA gives people—especially those in outlying areas like El-Sherouk—easier access to fresh and affordable food. Instead of relying on long, fragile supply chains, families can grow their own or buy locally, which improves nutrition and can even lower grocery bills.

from an environmental perspective, UA brings nature back into the city. Rooftop gardens, green walls, and even tiny backyard plots help cool down overheated neighborhoods, clean the air, and support biodiversity. Techniques like composting and drip irrigation mean less waste and smarter water use—a major plus in a place like Egypt.

also it gives power to the space. Empty rooftops? Vacant lots? Balconies? Urban farming turns all of that into opportunity. It helps cities grow inward rather than outward, saving land and reducing sprawl.

On a more human level, UA changes how we feel about the places we live. it can transform a unuedsed space into a vibrant, shared green space. People meet, work together, and learn from one another. In El-Sherouk's often-isolated gated communities, these spaces could be the missing link in building a stronger sense of belonging.

2. What Are the Main Barriers and Opportunities for Implementing Urban Agriculture in El-Sherouk City?

(Refer to Chapter Five: Findings and Analysis, Section 5.2 – Barriers and Opportunities)

Urban farming in El-Sherouk faces a fair share of roadblocks and obstcals . To start, most residents and even city staff aren't familiar with the ins and outs of urban agriculture. They might not know what crops are best for our climate, or how to deal with pests sustainably. Water, too, is a big issue. Traditional irrigation methods won't cut it in Egypt's dry environment.

Soil quality is another concern. While El-Sherouk doesn't have the industrial pollution of older cities, soil testing and perhaps some remediation are still necessary. More broadly, there's no official policy backing UA right now. but this should be strengthened by the support of zoning in the design process

On the other side, El-Sherouk's youth as a city works in its favor. There's room to grow—literally. Unused rooftops, school grounds, and parks offer real potential. And besides the expansion of the city is still in process, there's a chance to integrate UA directly into planning. Universities like BUE could lead research and offer training, making El-Sherouk a model for innovation.

Even the gated community model, often blamed for social isolation, could be turned into an advantage: making this community tending a shared garden, connecting over food and greenery.

3. What Are the Potential Long-Term Impacts of Urban Agriculture on Urban Sustainability in Cairo and El-Sherouk?

(Chapter Six: Discussion and Long-Term Vision)

Looking ahead, urban agriculture has the potential to reshape how cities like Cairo and El-Sherouk grow—both physically and socially. It's not just about food production anymore. It's about creating healthier, more resilient urban environments where people can thrive.

Environmentally speaking, the long-term benefits are significant. When cities add more green spaces—whether it's a rooftop garden or a vertical wall of herbs—the impact is felt almost immediately. Temperatures drop, air quality improves, and rainwater is better absorbed into the ground instead of flooding the streets. These little patches of green also give bees, butterflies, and other pollinators a chance to return, helping restore small but vital ecosystems that cities often lose.

But there's more to it than greenery. Urban agriculture encourages a shift toward smarter resource use. Picture a neighborhood that composts its organic waste and uses it to nourish local gardens, or one that reuses lightly treated greywater to irrigate crops. These systems help close the loop—turning waste into value—and push cities toward a circular economy that's both cleaner and more efficient.

On the food side, growing locally builds much-needed resilience. Global crises—from supply chain disruptions to pandemics—can expose just how vulnerable cities are when they rely entirely on imported goods. Urban agriculture can't replace large-scale farming, but it can offer a safety net. It shortens the distance from field to fork and gives communities a sense of food sovereignty.

It's crucial not to forget the profoundly human element inherent in urban farming, which naturally fosters community cohesion. This endeavor is hands-on, inherently social, and frequently driven by local residents. Individuals who participate—whether by planting seeds, gathering harvests, or simply contributing to garden design—develop a more profound attachment to their local area. There's an undeniable satisfaction in witnessing the fruits of one's own labor and a heightened sense of stewardship for the collective environment.

Furthermore, urban farms often function as dynamic educational spaces. They offer venues for schools, academics, and even intrigued neighbors to observe sustainable methods in action. Over time, these locations could transform into centers of innovation, serving as crucibles for experimenting with new concepts, disseminating knowledge, and facilitating collective learning within communities.

In essence, urban agriculture is more than a trend. It's a long-term investment in the kind of future El-Sherouk and Cairo deserve: green, resilient, and rooted in community.

4. What Are the Economic Effects of Urban Agriculture on Growth, Employment, and Property Values in El-Sherouk and Cairo?

(Refer to Chapter Five: Socioeconomic Implications of UA in El-Sherouk and Cairo)

UA can be a real economic driver if developed thoughtfully. On a grassroots level, it allows residents to sell what they grow—either directly or through community-supported agriculture programs. That keeps money circulating locally and gives people a chance to try small business ideas—anything from handmade herbal teas to urban beekeeping.

Jobs come in all shapes and sizes, too. Some are directly involved in growing and harvesting; others emerge from support services—irrigation equipment, compost sales, training, and delivery logistics. It's particularly promising for youth and retirees who may otherwise face limited employment options.

And let's not forget property values. Living near a green, active garden makes neighborhoods more attractive. Homes next to vibrant UA spaces often sell for more, thanks to the aesthetic, health, and social benefits.

At the end we can say that urban farming isn't just a side project, it's an engine for inclusive, sustainable economic development.

5. How Do New Urban Residents Integrate Into Communities, and What Role Can Urban Agriculture Play in Fostering Social Cohesion?

(Refer to Chapter Five: Social Dimensions of Urban Agriculture)

In places like El-Sherouk, where the buildings go up long before the social ties do, community integration is a real challenge. Urban agriculture offers a simple, grounded solution—invite people to dig in the dirt together.

Shared gardens act like third places: they aren't home or work, but somewhere in between where people can connect. When neighbors water plants side-by-side or share tools, conversations start. Friendships form. Differences fade.

There's also learning. Younger might come in with tech-savvy ideas, while older residents contribute years of experience. That kind of exchange strengthens intergenerational bonds and creates shared purpose.

Even more, when residents help plan and manage UA spaces, they feel part of something bigger than themselves. Events like harvest festivals or garden tours give communities a chance to celebrate together, and in a city as diverse as El-Sherouk, that kind of unity matters.

Ultimately, UA doesn't just grow food. It grows more, it grows relationships, accountability, and a genuine sense of belonging to the place.

6.5 Future Research Recommendations

Locally (Egyptian Context):

In order to complete the findings, the studies should conduct longitudinal analyses of urban farming's socio-economic impacts in El-Sherouk and other new urban communities. Multi-year surveys or panel studies could measure how UA affects household income, employment, nutrition, and land use over time.

To complement our cross-sectional findings by capturing long-term trends and seasonal effects. Ideally, these investigations would also incorporate multiple stakeholder perspectives (farmers, consumers, local officials) to inform urban food policies, as has been recommended in similar UA research.

Globally (Comparative Models):

Carrying up Comparative research is needed across different urban contexts to identify scalable UA models. For example, applying the same methodological framework to cities in the Global North (e.g. Europe or North America) and the Global South (e.g. Africa, Latin America) to contrast policies, economic structures, and cultural factors. This will give us a cross-cultural comparison would illuminate how institutional settings and socio-economic conditions influence UA success, guiding policymakers toward best practices that can be adapted to Egypt's or other cities conditions.

Sustainability Evaluation

Further research should strictly assess the long-term ecological and economic sustainability of urban farming projects. This includes developing integrated evaluation frameworks that consider environmental, social and economic outcomes together. Future studies could thus combine lifecycle analysis, ecosystem-service valuation, and cost-benefit analysis to evaluate whether rooftop gardens, vertical farms or community plots remain viable and eco-friendly over decades. Such work would help ensure that UA initiatives deliver true resilience and resource efficiency, rather than being short-lived experiments.

Integration of Artificial Intelligence

Emerging AI techniques open powerful new tools for urban agriculture research and implementation. Like spatial analysis and site selection can be enhanced by machine learning applied to satellite and drone imagery. AI-based object-detection models can automatically identify rooftops, vacant lots, and green spaces in high-resolution aerial photos, helping in mapping potential suitable sites that are often missing from official databases or creating a database. Correspondingly, AI-driven image analysis can monitor crop health and soil conditions in near real-time. All of these spatial insights would be very beneficial to planners to target locations best suited to agriculture and to track the progress of urban gardens or farms without prohibitive field costs.

The Predictive models of AI trained on local weather, soil, and management data have achieved very high accuracy in estimating crop yields. By keep feeding these models up-to-date sensor or satellite

data, urban farmers could receive automated alerts about expected productivity or required interventions. These tools yield interpretable guidelines to help farmers optimize planting schedules and inputs.

Lastly, AI can aid community engagement and policy decision-making. Smart platforms can gather resident preferences and farming knowledge from community members, helping to tailor UA projects to local needs. For the municipal or city level, AI models can simulate policy scenarios to evaluate the impact of zoning changes, subsidies, or education programs on UA outcomes. So more efficient allocation of resources and help craft responsive UA policies, thereby making urban farming both more inclusive and evidence based.

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