URBAN AGRICULTURE IN MUNICIPALITIES ON VANCOUVER ISLAND, BRITSH COLUMBIA

Opportunities and Challenges

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SUMMARY

Section 1. Summary 1

Section 2. Introduction 2

Section 3. Literature Review 4

3.1 Benefits of Urban Agriculture 4

3.2 Limitations of Urban Agriculture 6

3.3. Urban Agriculture Initiatives 7

Section 4. Methods 9

4.1 Case Study Descriptions 9

4.1 Data Collection 10

4.2 Data Analysis 11

Section 5. Results 12

5.1 Langford 12

5.1.1 Challenges and Barriers 13

5.1.2 Opportunities 16

5.2 Tofino 18

5.2.1 Challenges and Barriers 19

5.2.2 Opportunities 21

Section 6. Discussion 24

Section 7. Recommendations 29

Section 8. References 31

SUMMARY

This research identified opportunities and challenges surrounding urban agriculture in two communities on Vancouver Island (BC), Langford and Tofino. The findings of this research elucidate ways of enhancing local policies for better supporting food production in urban areas.

Qualitative research methods were used, with the data sources consisting of interview transcripts and planning documents. Data analysis involved the use of NVivo software to conduct thematic coding and analysis to identify challenges/barriers and opportunities for urban agriculture in both municipalities.

In Langford, the analysis revealed issues related to rapid urbanization and bureaucratic processes. In Tofino, the study found that the community's coastal location presents challenges related to both the local climate and competition for resources from the tourism industry. Both case studies share common challenges related to cross-jurisdictional limitations and bureaucratic hurdles, impacting administrative processes and resource allocation. However, supportive policies, integration into green infrastructure, and community engagement offer promising pathways for urban agriculture development.

Recommendations produced through this work include:

(1) streamlining regulatory frameworks,

(2) promoting collaborative governance,

(3) integrating urban agriculture into green infrastructure, and

(4) prioritizing public awareness and community engagement to enhance urban agriculture and diversify local economies in both regions

INTRODUCTION

Over 55% of the world's population lives in cities, and 80% of all food produced worldwide supplies urban demand (FAO, 2019). Sustainable urban development will require deeper consideration for how to enhance the role of urban and peri-urban agriculture in local food systems (FAO, 2019). In recent decades, cities have become the centre of attention for sustainability concerns and actions such as reducing greenhouse gas emissions, increasing local resilience, and adapting to climate change (Martin, 2023).

Industrialization and urbanization have led to interconnected socioeconomic and environmental issues that negatively affect food production, affordability, and accessibility in cities (Ghezeljeh et al., 2022; Khumalo & Sibanda, 2019). The intensified urban landscape has decreased agricultural land availability and increased dependence on external food sources. As cities grow, transportation networks must accommodate the influx of goods, contributing to pollution and greenhouse gas emissions. Additionally, urban areas often experience socioeconomic disparities, with marginalized communities having limited access to fresh and nutritious food options due to income inequality and the presence of food deserts (Satterthwaite et al., 2010). Consequently, urban food systems are entangled in a complex web of challenges from industrialization and urbanization, necessitating the development of new strategies to better achieve resilient and equitable food production, affordability, and accessibility.

Our food system is responsible for approximately one third (34%) of GHG emissions (Crippa et al., 2021). Additionally, the excessive use of water resources, chemical fertilizers, and pesticides contributes to soil degradation, water pollution, and biodiversity loss. The energy-intensive food production, transportation, and packaging processes further exacerbate environmental burdens. Recognizing these concerns, localizing food production and consumption are possible strategies to support sustainability (Muller, 2018).

Urban agriculture has the potential to mitigate some of the impacts from urbanization and food production through a variety of socioeconomic and environmental benefits (Buchan, 2019; Ghezeljeh et al., 2022). By growing food closer to consumers, urban agriculture can reduce the greenhouse gas emissions associated with long-distance transportation (FAO, 2019). Moreover, it can promote sustainable agricultural practices, such as organic farming and reduced pesticide use, improving soil health and biodiversity conservation (Ghezeljeh et al., 2022). Furthermore, urban agriculture can play an important role with respect to accessing fresh and nutritious food; thus, it can be one means to address food inequalities in urban areas (Satterthwaite et al., 2010). Overall, integrating urban agriculture into urban planning and policy frameworks can contribute to more resilient, equitable, and sustainable urban food systems, aligning with the global goals of mitigating environmental impacts and enhancing food security (Muller, 2018; Buchan, 2019; Ghezeljeh et al., 2022).

INTRODUCTION

Although urban agriculture has the potential to contribute to food system sustainability and resilience, such benefits are not guaranteed, and challenges exist in terms of effectively developing urban agriculture systems and capacity. Accordingly, this research effort explores the opportunities and barriers to urban agriculture, using the communities of Langford and Tofino on Vancouver Island, British Columbia (BC), as case studies.

Through an analysis of semi-structured interview and document data, this research aims to improve understanding on the opportunities and challenges urban agriculture in Vancouver Island municipalities with respect to implementing new urban agriculture projects. Outcomes of this work informed considerations and recommendations for improving local food systems and better integrating urban agriculture into municipalities' planning, policies, and regulations. The work was guided by the research question:

What are the opportunities and challenges around developing urban agriculture in different types and sizes of island municipalities as a component of local, sustainable, and resilient food systems?

Image: TOPSOIL urban farm at Dockside Green, Victoria, Canada
Source: Robert Newell (2020)

URBAN AGRICULTURE

The term and practices around 'urban agriculture' vary in their meaning, mission, and scale depending on how researchers and practitioners use the term and practices (Siegner et al., 2018). Urban agriculture includes vertical agriculture, rooftop farming, community gardens, residential gardens, and commercial urban farms. Depending on their mission, urban agriculture groups can operate their farms as non-profits or as for-profit businesses.

According to FAO, Rikolto and RUAF (2022, p. 7) "Urban and peri-urban agriculture (UPA) can be defined as the growing of plants and the raising of animals within and around cities. UPA provides food products from different types of crops, and animals, as well as non-food products (e.g., aromatic and medicinal herbs, ornamental plants, and tree products)". Siegner et al. (2018, p. 2) define urban agriculture as "reconnecting with the community through food, jobs, and economic development". In terms of city planning, Hodgson et al. (2011), defines urban agriculture as the "production, marketing, and distribution of food in urban areas and at their edges, beyond the idea of food for home consumption or educational purposes. In addition, urban agriculture includes associated physical and organizational infrastructure, policies, and programs within urban, suburban, and rural built environments" (p.14). Along with the wide range of definitions, there has been an extended discussion between scholars about the potential benefits and limitations of urban agriculture.

Benefits of Urban Agriculture

Urban agriculture can provide multiple social, economic, and environmental benefits that can contribute to a community's sustainability and resilience. Potential social benefits include community engagement, food literacy, skills development, human well-being, social inclusion, and importantly, food accessibility, food security, and affordability (Mulligan et al., 2018; Music et al., 2022). For instance, community gardens, such as university-based gardens, public school gardens, and shared backyard gardens have played important roles in promoting food knowledge, skills, and values to students and general public to support long-term security (Music et al., 2022).

In terms of economic benefits, urban agriculture can contribute to local economic development through income and employment generation, non-only for farmers but also for other stakeholders along the value chain. In addition, urban agriculture contributes to urban greening, increasing local aesthetics and (thus) tourism and property values (Azunre et al., 2019; Fusté-Forné & Forné, 2021). The tourism activity around urban agriculture supports the development of the local economy. As noted by Fusté-Forné and Forné (2021), agricultural tourism constitutes a specialized sector within the realm of sustainable tourism in which green infrastructure, such as rooftops and community gardens, become an opportunity for social engagement, entertainment, and promotion of local food production and high-quality gastronomic experiences for visitors and locals.

Urban agriculture also offers valuable environmental benefits. It can be integrated with green infrastructure strategies within urban landscapes. Green infrastructure, incorporates natural and semi-natural elements into urban settings, can contributes significantly to urban sustainability and resilience (Evans et al., 2022; Lin et al., 2017). Green infrastructure plays a crucial role in urban agriculture by allowing the cultivation of food crops in urban green spaces like community gardens, edible landscapes, or vertical farming systems. The complementary relationship between green infrastructure and urban agriculture enhances food security. It bolsters local food production, fostering sustainable urban environments with multifunctional green spaces that simultaneously serve ecological and food production purposes (Evans et al., 2022; Lin et al., 2017).

The benefits associated with of urban agriculture position it as a powerful means of supporting the restoration and regeneration of various ecosystem services, including air quality improvement, biodiversity enhancement, waste and water management, and energy efficiency. Urban agriculture can also contribute to climate adaptation objectives (McDougall et al., 2019; Siegner et al., 2018; Spring et al., 2021). For instance, rooftop gardens have been shown to enhance energy efficiency and can significantly reduce stormwater runoff by up to 60%, depending on the design (Walters and Stoelzel Midden, 2018). A global mapping study revealed that urban agriculture positively impacts food production, nitrogen fixation, energy conservation, pollination, climate regulation, soil formation, and biological pest control, with a collective value of these services totaling to over USD 160 billion (Clinton et al., 2018). Additionally, urban agriculture initiatives provide an educational platform for visitors and locals to explore and better understand human-nature relationships, a crucial aspect of addressing environmental challenges while fostering a stronger connection between consumers and producers. Multifunctionality is a foundational principle of green infrastructure (Evans et al., 2022), and introducing it into urban landscapes through urban agriculture offers versatile pathways to enhance a range of local ecosystem services.

Limitations of Urban Agriculture

Despite the numerous advantages associated with urban agriculture, there are notable limitations when considering its implementation in urban areas. One significant constraint is the lack of available, suitable space in densely populated cities (Ghezeljeh et al., 2022; Siegner et al., 2018). The high cost and limited availability of agricultural land make it difficult for urban agriculture initiatives to expand and adequately meet the growing demand for locally-sourced food (Specht et al., 2014). Moreover, urban agriculture often faces regulatory and zoning hurdles, as some cities lack supportive policies or maintain outdated regulations that hinder the growth of urban farming activities (Smit et al., 2015).

Rapid urbanization and urban sprawl have further exacerbated these issues by driving up property values and, consequently, rental costs. The principle of 'highest and best use' is frequently employed to allocate urban lands to uses that yield higher bid rents, potentially displacing agricultural activities (Azunre et al., 2019). This issue is compounded by the role of tax generation from property values and economic activities in urban planning, which can sometimes conflict with other priorities such as affordable housing, water infrastructure, and the promotion of urban agriculture initiatives (Azunre et al., 2019; Music et al., 2022). Property taxes are a vital revenue source for cities, and special tax incentives, especially those directed at sectors like agriculture, may introduce challenges related to land reclassification and usage. These challenges have the potential to impact tax revenues and influence urban development decisions (The World Bank, 2020).

Other barriers to urban agriculture initiatives exist, beyond just the availability of land. These include cultural acceptability, lack of nutrition education and food literacy, and community acceptance (Siegner et al., 2018). Notably, public acceptance of urban agriculture initiatives within communities can be affected by the use of agrochemicals that pose risks to the quality and health of producers, consumers, and the environment, thus presenting local health and ecological hazards (Lavallée-Picard, 2018). However, the adoption of organic farming methods comes with its own set of challenges for urban agriculture, including concerns related to odours stemming from bio-fertilizers and composting with waste materials (Edelman-Gold & Melendy, 2020). Moreover, conflicts arising from competing land use and property rights may emerge, as the interests of various community members and stakeholders do not always align, potentially affecting the overall public acceptance and involvement in urban agriculture initiatives (Specht et al., 2014).

Urban Agriculture Initiatives

Multiple initiatives and approaches exist, locally and globally, for promoting urban agriculture and overcoming the challenges faced in its implementation across different urban and municipal contexts. On the international scale is the Milan Urban Food Policy Pact (MUFPP). This pact is the world's first international agreement on sustainable urban food systems, where cities are identified as key players in building sustainable food systems and the need for international collaboration to achieve sustainable cities is recognized (Milan Urban Food Policy Pact, 2015; Valley & Wittman, 2019). The MUFPP is a non-binding agreement that serves to coordinate international food policies, shares best practices, and evaluation systems, and it aims to inspire city-led change in governance, sustainable diets and nutrition, social and economic equity, food production, food supply and distribution, and food waste.

URBAN AGRICULTURE

As noted in the MUFPP: “As more cities implement and measure urban food policies, the better will be the collective learning process about how effectively transform urban food system”(Milan Urban Food Policy Pact, 2015). As of today, 199 cities have signed the agreement, including San Francisco, Boston, New York, Toronto, and Vancouver.

On local and regional scales, some states in the United States have implemented strategies and significant changes in their policies to strengthen and encourage urban agriculture development. For example, in 2013, California approved the New Urban Agriculture Incentive Zones Act (Assembly Bill 551), which aims to increase the use of privately owned, vacant land for urban agriculture and to improve land security for urban agriculture projects (Assembly Bill No. 551, 2013; Zigas, 2013). This is possible due to the designation of areas within their boundaries as “urban agriculture incentive zones.” In these areas, landowners can commit their land to agricultural use for at least five years to receive a reduction in their property taxes. Their parcel’s property tax assessment is then based on the agricultural value of the land rather than the market-rate value of the land (Zigas, 2013).

As another example, Illinois approved a bill in 2018 that enables local governments support of urban agriculture through different incentives. Such incentives include reductions in utility fee services and property taxes (Dunklau, 2018; House Bill 3418, 2013)

Image: Sign for urban farm market at Dockside Green, Victoria, Canada
Source: Robert Newell (2020)

METHODS

Case Study Descriptions

This study utilizes a case study approach to examine opportunities and barriers for developing urban agriculture practices on Vancouver Island, British Columbia. Case studies allow for in-depth exploration of a particular phenomena (in this case urban agriculture). In the case of this research project, these cases (Tofino and Langford) afford the opportunity to understand urban agriculture practice and governance across Vancouver Island.

Tofino is located at the tip of the Esowista Peninsula in the Alberni-Clayoquot Regional District on Vancouver Island's west coast, and it has a stunning natural landscape characterized by rugged shorelines, lush rainforests, and proximity to the Pacific Ocean. Its population, though relatively small, has been steadily growing due to its popularity as a tourist destination and a desirable place to live. This population growth brings challenges such as increased housing demand, rising costs of living, and greater pressure on local resources (Tofino Municipality, 2021).

Tofino's biophysical characteristics, such as its temperate climate and proximity to the ocean, create an ideal environment for exploring sustainable and climate-resilient urban agriculture practices, including the use of salt-tolerant crops. Furthermore, the town's strong connection to tourism and the importance of local food production for the hospitality industry make it an excellent case for investigating how urban agriculture can contribute to food security, community resilience, and economic diversification (Tofino Municipality, 2021).

Langford is situated on the southern tip of Vancouver Island. It is one of the 13 municipalities in the Capital Regional District, where Victoria is the core city, and it is one of the fastest-growing communities in BC (Depner, 2022). Its population growth is driven by factors like more affordable housing options than offered by other cities in the region, a growing local economy, and its proximity to Victoria, the provincial capital. Langford's local economy has seen significant development in recent years, with various commercial and industrial activities contributing to its economic vitality.

The rapid urbanization and increasing housing demand in Langford raise concerns about land use, food security, and the sustainability of local food systems (City of Langford, 2022). Investigating urban agriculture in Langford provides insight into how this growing city can balance its economic development with the need for sustainable and resilient food production systems. Moreover, Langford's diverse community and economic base make it a valuable case study for examining the social and economic aspects of urban agriculture in a rapidly expanding urban context (City of Langford, 2022).

METHODS

Data Collection

The research involved semi-structured interviews with six stakeholders from the case studies. Participants included individuals from local governments in Tofino and Langford, non-profit organizations, and for-profit organizations that work in the area of urban agriculture. Table 1 provides a summary of the interview participants' respective case study communities and sectoral affiliations.

Table 1. *Affiliation and locations of interview participants*

Sector	Langford	Tofino
Local government	2	2
Non-profit organization	0	1
Urban agriculture business	1	0

The interviews took place in March 2023 via Zoom video conferencing, and they ran between 40 minutes and 1 hour. The interview questions (see Appendix) were designed to cover various topics, including organization/entity details, the interviewees' roles in urban agriculture projects, opportunities and successes, barriers to achieving success, partnerships related to urban agriculture, and the impact of urban agriculture at different scales, as well as expectations, using a similar methodological approach as done in Newell et al. (2021). Approval from the Research Ethics Board of Royal Roads University was granted prior to the data collection.

This research also included public documents as part of its dataset, and these were examined to identify areas of alignment, tension, and gaps related to local urban agriculture development based on current local plans. The document data serve to complement the data from the semi-structured interviews, and it was analyzed alongside the interview transcripts. Table 2 provides a summary of all the documents analyzed in this research. Each document was coded to highlight and focus on all information related to urban agriculture in both locations.

METHODS

Table 2. *Public documents included in the dataset*

Case Study	Documents
Langford	• Official Community Plan Bylaw No. 1200 • Setting Our Table: Capital Regional District Food & Agriculture Strategy (RFAS) 2016
Tofino	• Official Community Plan Bylaw No. 1290, 2021 • Alberni Valley Agricultural Plan 2011-2031

Data Analysis

Data analysis involved thematic coding and analysis. The analysis commenced with the interview data. The interview data underwent transcription, organization (interview content was arranged in a logical sequence to make it more manageable and accessible for further analysis), and categorization (transcripts were grouped according to location, Langford or Tofino files) and were subsequently imported into NVivo software.

The coding process began with inductive coding, which developed codes based on a comprehensive data review. During this process, initial codes emerged by directly identifying recurring concepts, ideas, and themes from the interviews. These codes were specific to the content and context of the interviews and served as the foundation for the thematic analysis. Codes were composed of single words or terms that captured the general concepts or themes.

Following the interview data analysis, the document data were imported into NVivo and were coded using the codes produced through the interview transcript analysis. This approach provided a structured and consistent basis for coding the planning documents, ensuring that the same themes and concepts identified in the interviews could be explored within the documents. In addition, following an inductive coding approach, new codes and themes were identified and added to the coding framework as they emerged in the review of each document.

METHODS

Following the initial coding phase, axial coding was performed to refine and categorize the initial codes, from the transcripts and public documents, into more general and descriptive themes and to create a more concise list that identifies cohesive themes among the two data sources. As explained by Strauss (1998), "axial coding identifies relationships between open codes to develop major codes. Major codes are the aggregation of open codes with close interrelation or overlapping" (p. 109). Aggregation was done in cases where there were relatively few references (i.e., n = 10 or less) in the data for a specific code and when there was a close relationship between codes and could be incorporated into a broader theme inclusive of another code.

The final step of the analysis involved a deductive coding approach, which was used to integrate themes into categories in cohesive, succinct, and meaningful expressions (Flick, 2009) via pre-identified categories to identify patterns and relationships. In this step, all the generated codes and themes were organized into challenge and opportunity categories, as this allowed for an analysis that specifically addressed the study's research question and objectives. Figure 1 illustrates an overview of the coding process.

Image: Market sign and urban farm at Dockside Green, Victoria, Canada
Source: Robert Newell (2020)

RESULTS

Langford

The analysis identified 14 themes associated with the Langford data. Out of these, eight themes related to challenges/barriers. In total, challenges/barriers had a total of 141 coded references, and four themes had noticeably higher coded references than the others in that they exceeded 20 references (n=28, n=24, n=24, and n=21). Six themes are related to opportunities. Opportunities had a total of 73 coded references, and only one theme exceeded 20 references (n=29).

Table 3. *Themes related to challenges and opportunities for urban agriculture in Langford*

Themes	Challenges	Opportunities
Biophysical limitations in cities	12	1
Cities' infrastructure and services	1	12
Climate change resilience	0	2
Cross-jurisdictional limitations and bureaucratic processes	24	2
Green infrastructure development and design	1	29
Intensified local food interest	0	5
Land availability and value	21	1
Limitations in infrastructure capacity	28	0
Limited government supports and supportive regulation	10	0
Low economic viability	9	0
Municipal priorities	24	0
Socio-cultural limitations	7	0
Socio-economic benefits	3	11
Supportive policy and regulatory framework	1	10

RESULTS

Challenges and Barriers

The Langford data analysis revealed eight themes related to challenges and barriers. Table 4 presents a summary of the challenges/ barriers, and details and explanations of the identified themes are discussed below.

Table 4. *Challenges and barriers related to urban agriculture in Langford*

Emerged Themes	Codes
Biophysical limitations in cities	Wildlife management, construction limitations, urban infrastructure and its shade, soil quality
Cross-jurisdictional limitations and bureaucratic processes	Long and costly bureaucratic procedures, split and non-articulated system, provincial and regional strategies.
Land availability and value	Deficient ALR management and productivity, land value, land classification, zoning bylaw, space available for urban agriculture, and appropriate land
Limitations in infrastructure and capacity	Core funding, intergenerational transition, limited staff resources, limited water and wastewater infrastructure, need for research and reliable data, & need for infrastructure capacity expansion.
Limited government supports and supportive regulation	Limited support
Low economic viability	Economic value, economical investment, financial disincentive, low rates in agricultural jobs, limited resources available: budget and time.
Multiple municipal priorities	Housing, urban agriculture: lowest priority, and resources competition
Socio-cultural limitations	Low community engagement, low people awareness, cheap food preference

RESULTS

Four out of the eight emerged themes demonstrated a higher number of coded references in relation to urban agriculture in Langford. One of these themes relates to cross-jurisdictional limitations and bureaucratic processes, which were identified as significant hurdles for urban agriculture.

The challenges include lengthy and costly bureaucratic procedures, a lack of coordination between different governmental departments and governmental levels, and potential conflicts between provincial, regional, and municipal urban agriculture strategies, as well as misalignment with local needs. For example, some interviewees from both locations recognized that there is a district-level food and agriculture strategy/plan. However, while aligning and implementing these strategies at the municipal level, there has been limited consideration of local needs and conditions that could support urban agriculture initiatives. For instance, various challenges are associated with securing access to water resources and affordable housing for urban agriculture farmers and workers.

Another challenge to urban agriculture development in Langford is the existence of multiple municipal priorities and resource competition, wherein housing and other community needs take precedence over urban agriculture initiatives. Additionally, the issue of land availability (or lack thereof) and property values significantly impacts urban agriculture.

Issues related to the management of the Agricultural Land Reserve (ALR) leads to limitations in productivity and availability, creating constraints for bylaw or zoning amendments. For example, inadequate enforcement of ALR regulations can lead to landowners engaging in non-agricultural activities on protected agricultural land. This weak enforcement can result from insufficient resources, staffing, or political will to ensure compliance.

Inadequate monitoring and reporting mechanisms can make it difficult to track changes in land use and assess the effectiveness of ALR policies. Consequently, zoning bylaws and land classification further restrict the available space for urban agriculture, and the high value of land makes it challenging for urban agriculture projects to secure affordable and suitable locations.

RESULTS

Other challenges include infrastructure and capacity limitations. These limitations encompass various dimensions, including physical infrastructure, economic factors, and social constraints. For example, the inadequate core funding allocated to urban agriculture projects, a significant hurdle to their development and sustainability. Such funding challenges can further strain already limited staff resources, thereby impeding or slowing down the progress of these essential initiatives. Additionally, the absence of effective intergenerational knowledge transfer disrupts the effective sharing of critical skills and expertise, impacting individuals' active engagement in urban agriculture projects and exacerbating social constraints.

Moreover, the insufficiency of water and wastewater infrastructure compounds the challenges faced by urban agriculture, placing constraints on its operations. Lastly, the need for more reliable research and data exacerbates these difficulties, as access to such essential information assumes a pivotal role in informed planning and decision-making in the dynamic and ever-evolving field of urban agriculture. By addressing these multifaceted challenges cohesively, urban agriculture can pave the way for sustainable growth and resilience within urban environments.

Other challenges include the biophysical limitations in cities that prevent urban agriculture expansion. Urban agriculture faces various biophysical constraints, including wildlife management (i.e., coexisting with deer, birds and other species such bears and cougars that may also be attracted due to the presence of other species and food), dealing with potential conflicts between agriculture and urban wildlife, construction constraints due to limited available space, neighborhood bylaws, and structural requirements, and soil quality concerns arising from contamination due to industrial activities. Limited government supports and supportive regulation were also recognized as a challenge for urban agriculture in Langford, given the unclear regulatory framework.

Another urban agriculture challenge concerns low economic viability. Economic factors significantly impact the success of urban agriculture, with high economic investment requirements for infrastructure and innovation, along with financial disincentives and low profitability in agricultural jobs, potentially hampering its economic viability. Finally, socio-cultural limitations play a crucial role, with low community engagement, limited awareness among people about urban agriculture benefits, and a preference for cheap, easily accessible food hindering the development and adoption of sustainable urban agriculture practices in urban environments.

RESULTS

Opportunities

Thematic analysis of the document analysis and interviews revealed several opportunities for urban agriculture that can positively impact Langford. Six themes emerged from the analysis of opportunities of urban agriculture in Langford. Table 5 presents an overview of the findings, and detailed explanations of the themes are provided below.

Table 5. *Opportunities related to urban agriculture in Langford*

Themes	Codes
Cities' infrastructure and services	Availability for farmer's markets, cities and larger markets, city's infrastructure: water and energy, lower transportation cost, more labor resources, and urban compost availability
Climate change resilience	Climate change and community resilience
Green infrastructure development and design	Amend infrastructure policies and standard, developer's role and engagement, function of green infrastructure, government promotion: green infrastructure, green renovations, incentives, interest in green infrastructure, new buildings design, temperature control, biodiversity, and esthetic value
Intensified local food interest	Interest in food accessibility, foodie movement, public interest and concern about food security, support for local
Socio-economic benefits	Indigenous people engagement, nature-human relationship, governance, urban agriculture as a strategy to diversify economy
Supportive policy and regulatory framework	Land leasing program, sustainability goals, wording in OCP

RESULTS

One opportunity lies in leveraging cities' existing infrastructure and services to support urban agriculture. This includes utilizing available spaces for farmer's markets and establishing connections with larger markets within the city. Moreover, the city's infrastructure, such as water and energy systems, can be harnessed to benefit urban agriculture practices. Lower transportation costs, abundant labor resources, and access to urban compost further increase the viability of urban agriculture in urban settings.

Another opportunity arises from green infrastructure development and design, which includes amending infrastructure policies and standards to support urban agriculture, engaging developers to incorporate green elements like green roofs and community gardens, promoting green infrastructure through governmental initiatives, offering incentives for green renovations, integrating green design principles in new buildings, and harnessing the benefits of temperature control, biodiversity, and aesthetics through green infrastructure.

Socio-economic benefits can also be gained through urban agriculture. The opportunities identified through this research include engaging Indigenous communities in urban agriculture, fostering nature-human relationship, contributing to better governance, and using urban agriculture as a strategy to diversify the local economy.

Increased interest in local food was identified as an opportunity, which relates to the growing interest in food accessibility, the foodie movement, public concern about food security, and the support for local food systems. Finally, climate change resilience emerged through the data as theme that captures the role of urban agriculture in enhancing community resilience to the effects and impacts of climate change.

A supportive policy and regulatory framework play a powerful role in advancing urban agriculture opportunities. Implementing land leasing programs for urban agriculture, setting sustainability goals, and incorporating specific wording in the Official Community Plan (OCP) can signal and strengthen the city's commitment to promoting and sustaining urban agriculture practices.

RESULTS

Tofino

The data analysis found 17 themes to be associated with Tofino. Out of these, eleven themes fall under the category of challenges/barriers, and a total of 236 challenges/barriers references were coded. The themes with the highest number of references, in rank order from highest to lowest, are as follows: limitations in infrastructure and capacity (n=75), socio-economic limitations (n=27), limited government supports and supportive regulation (n=22), municipal priorities (n=22), land availability and value (n=19), and geography and meteorology limitations (n=16). The other six themes related to opportunities, and had a total of 102 coded references. Two of the themes were noticeably higher than the others in their coded references, and they were the only two that exceeded 20 references (n=24, n=21). Table 6 shows a summary of these results.

Table 6. *Themes related to challenges and opportunities for urban agriculture in Tofino*

Themes	Challenges	Opportunities
Biophysical Limitations in cities	7	0
Cities' infrastructure and services	2	9
Climate Change Resilience	0	2
Coastal Community	7	3
Cross-jurisdictional limitations & bureaucratic processes	3	0
Geography & Meteorology limitations	16	0
Green Infrastructure development and design	2	9
Intensified local food interest	1	9
Land availability and value	19	3
Limitations in Infrastructure and Capacity	75	5
Limited government supports & supportive regulation	22	4
Low Economic viability	4	1
Municipal priorities	22	3
Socio-cultural limitations	27	9
Socio-economic Benefits	12	24
Supportive Policy and Regulatory Framework	11	21
Tourism as primary economy driver	6	0

Challenges and Barriers

Eight themes were categorized as challenges and barriers in the Tofino data analysis. Table 7 presents a summary of the challenges/barriers, and the details and explanations of the identified themes are provided below.

Table 7. *Challenges and barriers related to urban agriculture in Tofino*

Themes	**Codes**
Biophysical limitations	Constraints to growth, wildlife management
Coastal Community	Coastal communities' inclusion, different coastal needs
Cross-jurisdictional limitations, bureaucracy	Cross-jurisdictional limitations and bureaucratic processes
Geographical and meteorological limitations	High average rainfall, low temperatures, non-agricultural area, unaffordable weather conditions
Land availability and value	Appropriate land, deficient ALR management and productivity, land classification, land value, limited strategic land uses, space available for urban agriculture projects, & zoning bylaw.
Limitations in infrastructure and capacity	Core funding, intergenerational transition, lack of project continuity, limited staff resources, limited water and wastewater infrastructure, need for infrastructure and capacity expansion, need for research and reliable data & deficient urban agriculture location - accessibility
Limited govn't supports & supportive regulation	Lack of inclusive policies, lack of supportive regulation, limited support, missing regional focus.
Low economic viability	Low rates in agriculture jobs, operational and economic challenges, limited resources available: budget and time & transportation cost.
Municipal priorities	Housing, lowest priority, resources competition
Socio-cultural limitations	Food demand, local diets, low community engagement, low community interest, low people awareness, preference for cheap food & social perspectives on urban agriculture
Tourism as primary economy driver	Changes in demographics and land, tourism and water demand

RESULTS

According to all the interviewees, geography and climate limitations constitute a significant challenge for urban agriculture in Tofino. Participants noted challenges around managing adverse weather conditions, such as high average rainfall and low temperatures even in summer, which can affect agricultural productivity and viability in Tofino. Land availability and property values present additional challenges, with the need to find appropriate land for urban agriculture projects, address issues with deficient ALR management and productivity, navigate land classification complexities, and manage limited strategic land use and space availability while complying with zoning bylaws.

Limitations in infrastructure and capacity is a major challenge, and this includes core funding shortages, difficulties in intergenerational knowledge transfer, limited staff resources that affect project continuity, needs for infrastructure and capacity expansion to support economic and social systems and values, the need for research and reliable data to support urban agriculture initiatives, and importantly, issues around water supply and wastewater infrastructure. The latter issue was identified as the top challenge in Tofino for urban agriculture, and it appeared frequently in the data. In addition, limited government supports and (a lack of) supportive regulations pose challenges in the form of insufficiently inclusive policies (in terms of land use) limited support for urban agriculture initiatives, and the absence of a regional focus on urban agriculture development.

Other challenges relate to multiple, and sometimes conflicting, municipal priorities and community needs. For example, the prioritization of housing over urban agriculture is indicative of the competition for resources and land. Such prioritization and planning needs also create challenges around garnering support for urban agriculture projects in urban environments. These challenges can lead to tensions within the community, as stakeholders grapple with limited resources and divergent goals. Finding balance between housing and urban agriculture remains a complex task for urban planners and policymakers.

Other challenges identified through the analysis include biophysical limitations that, in Tofino's case, are related to the constraints to growth due to water supply capacity and local geographic and wildlife management. Tofino faces a unique challenge as a coastal community, requiring consideration of coastal needs, such as cultural preservation, community resilience, tourism management, costal erosion and flooding, and sustainable fishing, and local diets to ensure the viability and long-term urban agriculture projects. These challenges create problems around low economic viability in the agriculture sector in general in Tofino, which is reflected in low-wage job salaries and higher investment demands for urban agriculture projects in Tofino.

RESULTS

The limitations in local infrastructure and capacity, connected with Tofino's naturally attractive geography, have given rise to a complex interplay of challenges, particularly in urban agriculture. Tourism, as the region's primary economic driver, has amplified these challenges, particularly with respect to water supply and demand. The demand created by the tourism industry places additional stress on already strained water resources.

The challenges are compounded by cross-jurisdictional limitations and bureaucratic processes, which present formidable obstacles to effectively implementing urban agriculture initiatives. Addressing these multifaceted challenges requires a concerted effort toward achieving effective coordination and simplifying processes across different governmental levels.

Opportunities

Thematic analysis of the document and interview data resulted in the identification of several opportunities for urban agriculture that can have a positive impact on Tofino. The analysis resulted in six key themes, each representing a distinct aspect of the potential benefits of implementing urban agriculture in the area. Table 8 presents an overview of the findings, and detailed explanations of the themes are provided below.

Thematic analysis of the public documents and interviews revealed several opportunities for urban agriculture. Such opportunities relate to socio-economic benefits, which involve building relationships, collaboration, and partnerships, engaging and supporting the community, and establishing connections with Indigenous Peoples. The thematic analysis also highlights the potential for urban agriculture to foster governance, social cohesion, and the preservation of traditional knowledge. Additionally, urban agriculture is seen as an effective strategy to diversify and boost the local economy.

It is important to recognize that while current policy and regulatory conditions present challenges for urban agriculture in Tofino (as reported above), opportunities were also found in this thematic area. A foundational framework exists upon which more supportive policies can be built in this region (and other regions throughout BC). The current framework seeks to implement a land leasing program, formulate policies to bolster local food systems, support urban agriculture in residential areas, develop sustainability plans, and integrate urban agriculture-related considerations into official city plans.

RESULTS

Table 8. *Challenges and barriers related to urban agriculture in Tofino*

Themes	Codes
Cities' infrastructure and services	Availability for farmer's markets, city's infrastructure: water and energy, development public amenities, direct market type farming operation, lower transportation cost, more labor resources, short-term land use opportunities, urban agriculture in commercial and industrial zone
Climate change resilience	Climate change: adaptation and mitigation, community resilience.
Green infrastructure development and design	Developers, interest in green infrastructure, new buildings design & urban agriculture and its esthetic value.
Intensified local food interest	Food accessibility, food culture, foodie movement, & support for local.
Socio-economic benefits	Building relationships, collaboration and partnership, community involvement and support, indigenous people engagement, nature - human relationship, opportunity for governance, social cohesion, traditional knowledge, urban agriculture as a strategy to diversify local economy.
Supportive policy and regulatory framework	Land leasing program, policies for local food systems, support urban agriculture in residential areas, sustainability plan, wording in official OCP.

Opportunities identified through the analysis include those related to the city infrastructure and services. There is potential for accommodating a greater number of farmer's markets and improving the city's infrastructure in terms of water and energy to support urban agriculture. It also includes developing public amenities, implementing direct market-type farming operations, reducing transportation costs, and providing more labor resources.

RESULTS

Short-term land use opportunities and exploring urban agriculture in commercial and industrial zones were also identified; for instance, rooftops of commercial buildings can be repurposed to thriving urban gardens. This optimizes underutilized space and promotes green initiatives within the urban landscape. Furthermore, old industrial zones that are underused can be transformed into intensive hydroponic or vertical farming operations. These urban agriculture projects can use indoor spaces within industrial areas to grow crops such as leafy greens, herbs, or even microgreens. These operations can use existing infrastructure, such as warehouses or factories, and leverage proximity to markets and distribution centers for fresh produce. Similarly, repurposing abandoned train infrastructure, such as rail yards that are no longer in operation, for agricultural purposes offers a unique opportunity to bring agriculture closer to urban center. This approach not only maximizes underutilized spaces but also offers the potential for short-term economic and environmental benefits by reimagining urban areas for agricultural purposes (Carlet et al., 2017).

Other opportunities include how urban agriculture offers a multifaceted approach to enhancing climate change resilience while concurrently contributing to community wellbeing objectives. In terms of adaptation strategies, it helps communities become more resilient by diversifying their food sources and reducing their vulnerability to supply chain disruptions caused by extreme weather events (Dubbeling & De Zeeuw, 2011). Community gardens and local urban farms are prime examples that empower residents to produce food locally, reducing dependence on distant food sources and transportation. This localized approach contributes to food security during climate-related disruptions. Urban agriculture can contribute to the building of social capital and community resilience by connecting people, providing access to fresh and healthy food, and creating opportunities for education and community engagement (Gittleman et al., 2018). Additionally, urban agriculture helps mitigate climate change by sequestering carbon, reducing food transportation emissions, and promoting green infrastructure through green roofs, enhancing overall urban climate resilience (Specht et al., 2014).

The integration of green infrastructure into urban agriculture opportunities aligns with the development and design of modern cityscapes. Developers may express interest or receive incentives from the city to incorporate green infrastructure into new projects, seamlessly weaving urban agriculture into building designs to enhance aesthetics and functional benefits. Lastly, there is growing interest in intensified local food initiatives, driven by increasing food accessibility, the food culture, and the ‘foodie movement’, which has bolstered support for locally produced food products.

DISCUSSION

This research examines the challenges and opportunities of developing urban agriculture in Langford and Tofino. The study's exploration of urban agriculture challenges and opportunities in Langford and Tofino highlights the complex interplay between geographical, socio-economic, regulatory, and biophysical factors. The findings of this study indicate that urban agriculture experiences both challenges that are particular to each location's characteristics and challenges that are experienced broadly. While each location faces unique challenges, common threads underscore the potential for urban agriculture to thrive in these communities.

The specific conditions of geography, local culture, and economic drivers can shape and define the viability of educational, recreational, or commercial urban agriculture projects. For example, Tofino's coastal location exposes it to cool temperatures, high rainfall, and strong winds (Environment and Climate Change Canada, 2021; Vancouver Island University, n.d.), limiting the growing season and variety of crops that can be grown locally. According to all the interviewees, geography and climate limitations in Tofino for urban agriculture present requirements for specialized and sophisticated infrastructure and or technology (e.g., greenhouse and high-precision irrigation systems), resulting in challenges around economic viability.

Other place- and context-specific challenges include tourism, which is both a primary economic driver and significant challenge for Tofino in ways that differed from Langford. Tofino is a popular tourist destination, and the demand for land for tourism-related activities can lead to competition for suitable areas for urban agriculture initiatives and other resources, particularly water. Simultaneously, tourism related to Tofino's most significant challenge: limited infrastructure capacity. Restrictions in the water supply were identified in all sources of data; the official OCP and interviews. Climatic and geographical conditions in concert with a high demand for water create conditions limiting water supply, urban growth, and (consequently) urban agriculture.

Both Langford and Tofino experience challenges for urban agriculture related to cross-jurisdictional limitations and bureaucratic processes. Cross-jurisdictional limitations arise in regions like Tofino and Langford when multiple municipalities or governmental entities have authority over land use and zoning regulations. This issue can lead to inconsistent or conflicting policies related to agriculture and urban agriculture practices (Andersson et al., 2015). As a result, challenges exist for urban agriculture initiatives that may need to navigate complex administrative processes and obtain approvals from different authorities, which leads to delays and increased administrative burdens.

DISCUSSION

Bureaucratic processes involve obtaining permits, licenses, and approvals for various activities, including urban agriculture projects. Bureaucratic hurdles can be time-consuming and costly and may involve dealing with multiple levels of government and regulatory agencies (Freeman et al., 2021). Cumbersome administrative procedures can deter individuals and organizations from engaging in urban agriculture initiatives due to the perceived challenges and uncertainties associated with navigating the bureaucratic landscape.

Bureaucratic limitations in urban agriculture initiatives are closely related to several other challenges faced in Langford and Tofino, such as limitations in infrastructure and capacity, land value and availability, limited government supports and supportive regulation, and conflict among municipal priorities show up in Langford and Tofino for urban agriculture initiatives. Bureaucratic processes can exacerbate limitations in infrastructure and capacity. The time-consuming nature of navigating administrative procedures can impede the development of necessary infrastructure, such as water and wastewater systems, which is vital for urban agriculture (Specht et al., 2014).

Bureaucratic hurdles are also connected to land value and availability challenges. Complex administrative requirements may discourage potential landowners from making their properties available for urban agriculture, affecting land accessibility and affordability (Gittleman et al., 2018). In addition, limited government supports and supportive regulation are intertwined with bureaucratic obstacles. The absence of clear and supportive regulatory frameworks can lead to confusion and uncertainty for urban agriculture practitioners, making initiating and sustaining projects challenging (Mougeot, 2005). Finally, conflicts among municipal priorities can be exacerbated by bureaucratic processes that require coordination among different departments and levels of government. These conflicts may hinder the alignment of municipal goals with the needs of urban agriculture (Dubbeling & De Zeeuw, 2011). Thus, the bureaucratic hurdles present challenges that interact with and magnify other obstacles, making them a critical consideration for the potential future urban agriculture landscape in Langford and Tofino.

In regions like Langford and Tofino, where urbanization and tourism have contributed to increased land prices and property values, securing appropriate land for urban agriculture at affordable prices becomes challenging (Koscica, 2014). Bureaucratic processes, including complex permitting procedures and administrative delays, can delay the allocation of public lands for urban agriculture, exacerbating the challenge of obtaining affordable land for such purposes.

DISCUSSION

Due to lengthy decision-making timelines and administrative burdens, these processes discourage government entities from designating public lands for urban agriculture. Consequently, the scarcity of available public lands increases demand for private lands suitable for urban agriculture, driving up land prices and limiting accessibility (Mougeot, 2005).

According to interviewees, issues around ALR management and its low productivity also significantly slow down amendment bylaws that may support urban agriculture initiatives. In addition, complex governance structures and cross-jurisdictional limitations can result in limited opportunities for urban agriculture initiatives to access government support and resources, directly affecting the infrastructure capacity required for urban agriculture, such as funding and human resources. Different municipalities may have varying priorities, and funding for urban agriculture may need to be prioritized, making it difficult for urban agriculture projects to receive adequate support (Smit et al., 2015). For example, interviewees said community needs such as housing and water supply minimized urban agriculture 's importance.

The presence of multiple municipal priorities, such as economic development, urbanization growth, environmental conservation, and tourism, can lead to conflicts in resource allocation and policy decisions (McClintock, 2014), despite urban agriculture being identified as an objective in Langford and Tofino's OCP and Alberni-Clayoquot Regional District and Capital Regional District food and agriculture strategies urban agriculture may only sometimes align with the top planning priorities, resulting in less attention and funding for urban agriculture initiatives.

Biophysical and social-cultural constraints also play an important role in the potential (or lack thereof) to develop and expand urban agriculture in Langford and Tofino. Biophysical constraints, such as wildlife management, varying soil quality, urban design and its construction, and water availability, influence the choice of crops that can be grown and the overall productivity of urban agriculture initiatives (Świąder et al., 2023). Additionally, these constraints may require specific adaptation measures and sustainable practices to ensure successful agricultural outcomes that are in compliance with local bylaws, zoning regulations, and community acceptance. Considering the local communities, social-cultural constraints encompass community perceptions, cultural heritage, community awareness and engagement, and land tenure systems that can influence the acceptance and adoption of urban agriculture in these regions (Orsini et al., 2014; Kingsley et al., 2020).

DISCUSSION

Despite challenges and barriers, urban agriculture has numerous opportunities in Langford and Tofino. The study findings reveal common factors in both locations that contribute to the success of urban agriculture projects, such as supportive policies and regulatory frameworks and the recognition of the socio-economic benefits. The supporting policies and the acknowledgment of urban agriculture 's potential advantages offer a promising pathway for sustainable development and community well-being in both regions. For example, including urban agriculture in the OCP demonstrates a commitment to and recognition of the benefits of sustainable and localized food production within urban areas by local governments (Rosol et al., 2018), such as its role in climate change mitigation and adaptation. The wording in the OCPs signals that urban agriculture is considered an integral component of urban planning and development, which can promote the allocation of resources and support for its implementation.

As commented by some interviewees, urban agriculture can serve as strategic green infrastructure and contribute to green infrastructure plans and strategies, which is a significant opportunity. The integration of urban agriculture within green infrastructure aligns with the sustainable development goals of Langford and Tofino. In Langford, where rapid urbanization has occurred (Depner, 2022), implementing urban agriculture within green infrastructure can counterbalance development impacts and promote a more balanced urban-rural relationship. In Tofino, renowned for its natural beauty, combining urban agriculture with green design can enhance the town's commitment to ecological conservation while providing opportunities for residents to connect with their local environment and diversify their local economy.

In addition, it is crucial to recognize that urban agriculture holds the potential to create spaces that can promote community engagement, encouraging social interaction and shared activities, as noted by Kingsley et al. (2020). These spaces serve as platforms for knowledge sharing and can play a pivotal role in diversifying the local economy by initiating new urban agriculture projects. Simultaneously, urban agriculture aligns with the growing interest in intensified local food initiatives. As a result, it emerges as a viable strategy to address challenges associated with tourism as the primary economic driver and the often-low economic viability encountered by urban agriculture projects. This integrated approach underscores the multifaceted benefits that urban agriculture can bring to the social fabric and the local economy, making it a valuable tool for sustainable community development.

DISCUSSION

The study underscores the significance of supportive policies and regulatory frameworks as catalysts for successful urban agriculture implementation. The integration of urban agriculture within green infrastructure emerges as a promising strategy for promoting local food production and addressing broader urban challenges, such as climate adaptation and ecological conservation. This complementary approach to urban planning can help Tofino balance tourism-driven economic growth and sustainable land use practices while aiding Langford in managing rapid urbanization's impacts. However, the journey toward successful urban agriculture in these regions is challenging. Cross-jurisdictional complexities, bureaucratic hurdles, and conflicts in municipal priorities challenge timely project implementation and resource allocation. Limited land availability and zoning regulations further compound these issues, particularly in Tofino's context, where space for agricultural activities is scarce. Balancing the preservation of natural landscapes and diversifying the local economy through urban agriculture requires thoughtful negotiation and community engagement.

Despite constraints posed by climate, geography, and limited resources, the inclusion of urban agriculture in Langford and Tofino's Official Community Plans (OCPs) indicates a commitment to sustainable and localized food production, aligning with broader goals of environmental stewardship and community wellbeing. Urban agriculture 's potential extends beyond food production. It offers a means to foster community engagement, social cohesion, and knowledge sharing. By creating spaces for interaction and shared activities, urban agriculture can contribute to economic diversification and help mitigate challenges linked to tourism dependency.

Image: Urban farm at Dockside Green, Victoria, Canada
Source: Robert Newell (2020)

RECOMMENDATIONS

The findings of this study emphasize that recognizing urban agriculture as a vital component of sustainable urban development presents opportunities for Langford and Tofino to navigate their unique challenges. By leveraging supportive policies, embracing innovative approaches like integrating urban agriculture within green infrastructure, and fostering community participation, these communities can cultivate resilient, livable, and harmonious urban environments that thrive in the face of evolving global and local dynamics. Based on the finds of this research, four recommendations for promoting and increasing adoption of urban agriculture have been developed:

1. Streamline regulatory frameworks and policies.

Local governments should prioritize the development of regulatory frameworks and policies to address the challenges urban agriculture initiatives face in Langford and Tofino. This recommendation is directed toward municipal authorities and relevant governmental agencies. Urban agriculture projects can navigate bureaucratic hurdles more efficiently by simplifying permitting procedures, zoning regulations, and administrative processes. Developing supportive policies and clear regulatory frameworks can also foster an environment conducive to urban agriculture, promoting its growth and viability. Such initiatives should consider each region's unique geographical and climatic conditions and the need for specialized infrastructure in specific cases.

2. Increase collaborative governance and interagency coordination.

Langford and Tofino should promote collaborative governance and interagency coordination to overcome challenges related to cross-jurisdictional limitations and bureaucratic processes. This recommendation targets municipal authorities, regional governments, and other relevant stakeholders. By fostering cooperation among different levels of government and regulatory bodies, conflicts and delays in decision-making can be minimized. Establishing clear lines of communication and coordination can streamline administrative procedures and facilitate the approval of urban agriculture projects. Collaborative governance can also align municipal priorities with the needs of urban agriculture, ensuring that resources are allocated effectively.

RECOMMENDATIONS

3. Engage in strategic green infrastructure integration with urban agriculture.

Both Langford and Tofino should embrace the strategic integration of urban agriculture within green infrastructure. This recommendation is targeted at urban planners, architects, and local governments. Integrating urban agriculture into green infrastructure aligns with the sustainable development goals of both regions. In Langford, where rapid urbanization has occurred, it can help counterbalance development impacts and promote a more balanced urban-rural relationship. In Tofino, known for its natural beauty, combining urban agriculture with green design can enhance the town's commitment to ecological conservation while providing opportunities for residents to connect with their local environment and diversify their local economy. This approach should be incorporated into urban planning and development initiatives.

4. Conduct public awareness and community engagement efforts.

To leverage the potential of urban agriculture and garner community support, Langford and Tofino should prioritize public awareness and community engagement efforts. This recommendation concerns local governments, community organizations, and educational institutions. Promoting the benefits of urban agriculture and its role in local food production, climate change mitigation, and community resilience can raise awareness among residents. Engaging the community through workshops, educational programs, and participatory initiatives can foster a sense of ownership and involvement in urban agriculture projects that can help diversify the local economy. This increased support and engagement can contribute to the sustainability and success of urban agriculture initiatives in both regions.

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