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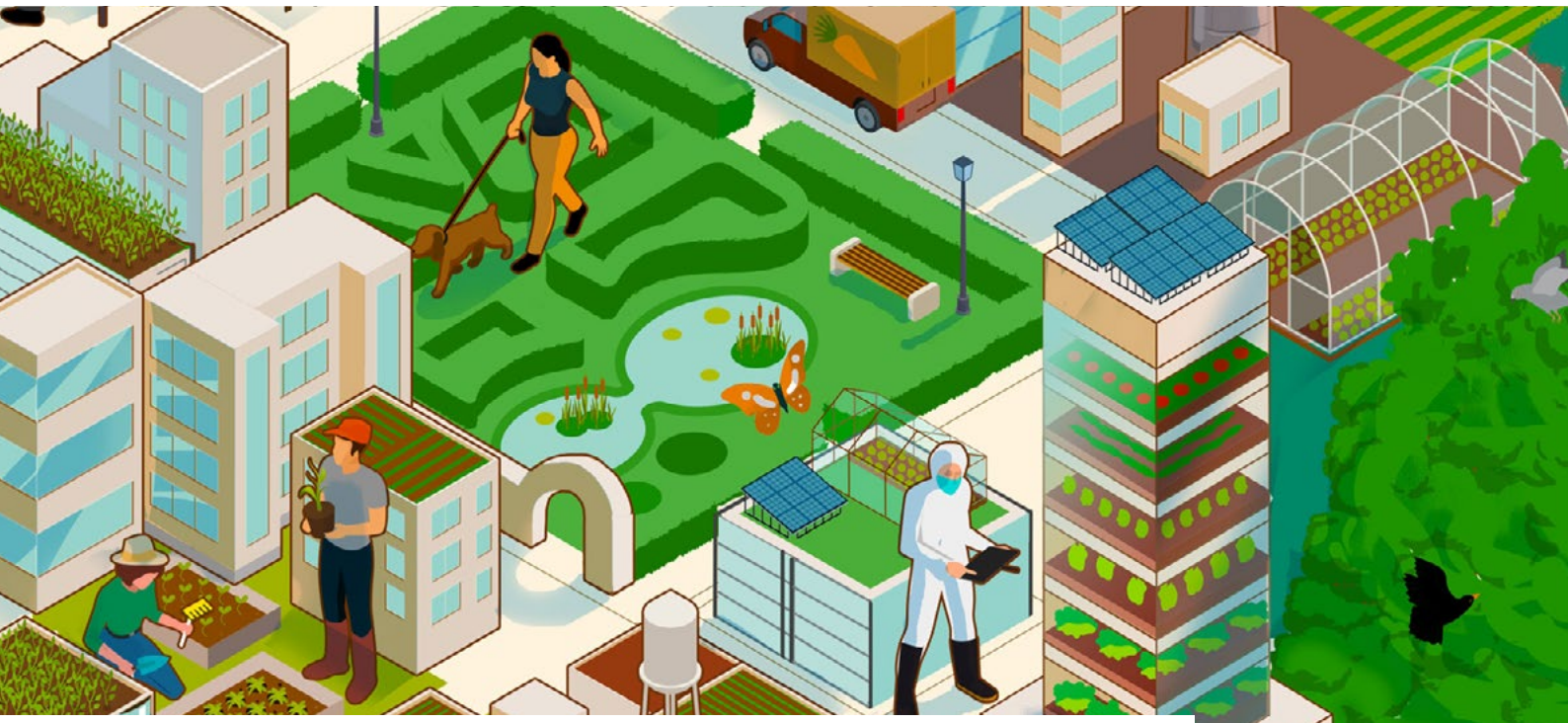

URBAN AND PERI-URBAN AGRICULTURE CASE STUDIES

OVERVIEW, CONCLUSIONS AND RECOMMENDATIONS

An annex to **Urban and peri-urban agriculture sourcebook- From production to food systems**

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An annex to **Urban and peri-urban agriculture sourcebook- From production to food systems**

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Contents

FIGURES

TABLES

PHOTOS

Contributors

This study was carried out at the behest of the Food and Agriculture Organization of the United Nations (FAO) and jointly funded by Rikolto and FAO.

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger.

Rikolto is a non-governmental organization with more than 40 years' experience in partnering with farmer organizations and food chain stakeholders across Africa, Asia, Europe and Latin America, where it works to assure a sustainable income for farmers and nutritious, affordable food for everyone.

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Abbreviations and acronyms

AGRUPAR	Participatory Urban Agriculture Programme (Quito)
ConQuito	Economic Promotion Agency of Quito
CSA	Community supported agriculture
EUR	Euro
FAO	Food and Agriculture Organization of the United Nations
GAP	Good agricultural practices
ha	hectares
ICLEI	Local Governments for Sustainability
m^2	square meter
MUFPP	Milan Urban Food Policy Pact
NGO	Non-governmental organization
PAQ	Quito Agri-food Pact
UPA	Urban and peri-urban agriculture
USD	United States Dollars

Introduction

The population of the world is steadily growing. Most of this population growth is concentrated in cities and urban areas. If predictions hold true, 68 percent of the world's 9.7 billion inhabitants will be urban dwellers by 2050.[1] However, many of those currently living in cities especially, though not exclusively, in the Global South, are malnourished, impoverished and food insecure.

Urban and peri-urban agriculture (UPA) is a vital strategy for building the resilience of cities' food supply, reducing poverty and increasing employment, improving nutritional outcomes, and mitigating environmental degradation of urban spaces. While UPA is no silver bullet, when combined with effective city-region planning,[2] the food system can more effciently meet the needs of diverse actors in urban areas.

To provide additional insights into how UPA is managed as input for the "Sourcebook on Urban and Peri-Urban Agriculture", Rikolto conducted a series of case studies in six cities around the world, which appear in the following order in the text Case Study 1: **Quito** (the Republic of Ecuador); Case Study 2: **Leuven** (the Kingdom of Belgium); Case Study 3: **Dakar** (the Republic of Senegal); Case Study 4: **Arusha** (the United Republic of Tanzania); Case Study 5: **Surakarta** (the Republic of Indonesia) and Case Study 6 **Tegucigalpa** (the Republic of Honduras).

Methodology

These locations were selected (at the behest of the Food and Agriculture Organization of the United Nations [FAO]) based on Rikolto's established presence and continuing work in the cities. The research was conducted through structured interviews with policy-makers and key institutional actors and semi-structured interviews and surveys with UPA practitioners. The surveys focused on the actual practices and experiences of urban and peri-urban farmers and gardeners, while the interviews focused on the existence, creation, and implementation of initiatives and policy concerning UPA.

Independent consultants in the different cities undertook the work of data collection and data analysis for their respective city. (Their work is acknowledged in the list of contributors).

The research carried out was limited in scope, with an average of 25 respondents in each city, and for this reason the authors do not present the study findings as representative. Rather, their findings demonstrate the unique challenges faced by urban agriculturalists in these specific contexts and indicate potential leverage points for further action and investigation. Data was collected between March and April 2020 at the start of the global COVID-19 pandemic and therefore does not account for the impact of COVID-19 on UPA in the 6 cities.

This report first gives detailed accounts of each city and its UPA policies, challenges and practices. These are grouped according to the themes of **land** (availability, tenure); **water** (irrigation, access); **labour** (seasonal versus full-time, worker profile); **finance** (expenses, revenues, access to credit); **agronomy** (UPA practices, technical assistance) and **value chain** (commercialization, availability of inputs, consumer profiles). While policy mechanisms and support interventions are included among these themes, a policy overview presents the final theme of **governance**. These city accounts are followed by a comparative overview of all six cities and culminate in generalizable lessons-learned, interesting findings, and actionable recommendations for planners and policy-makers.

1 For more information see https://population.un.org/wup/
2 For more information see https://www.fao.org/in-action/food-for-cities-programme/overview/crfs/en/

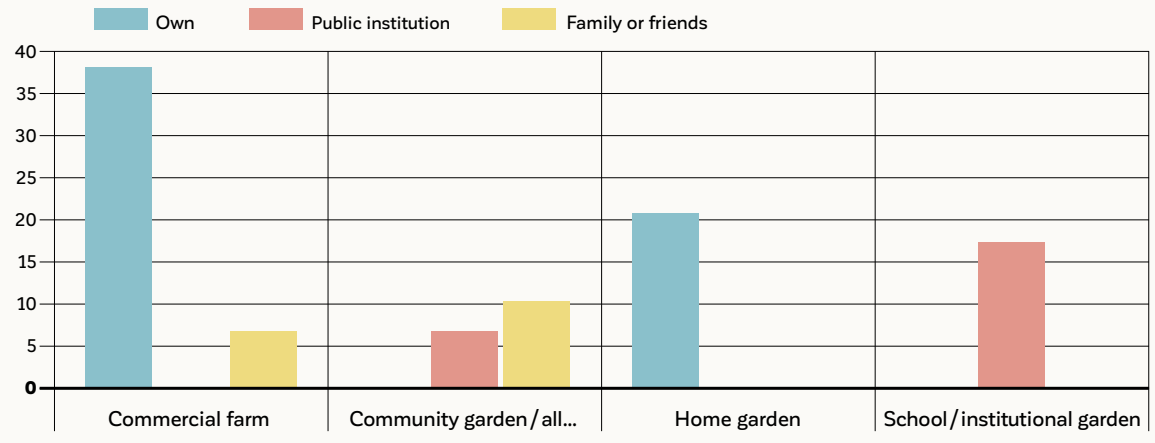
CASE STUDY 1

QUITO, THE REPUBLIC OF ECUADOR

Land

In Quito, a majority of respondents with commercial, community, and institutional gardens cultivate between 500 and 1 000 m^2. Mostly, home gardens are less than 500 m^2 and farmers own 59 percent of the land used. The city implements the Participatory Urban Agriculture Project (AGRUPAR), which provides assistance to producers on their own land but also to communities on municipal land through the rehabilitation of formerly abandoned land, among others. AGRUPAR members account for 63.72 ha of the total urban area distributed among 1 400 gardens. While there is no data on total agricultural land under cultivation outside the AGRUPAR project, those outside of AGRUPAR comprise 60 percent of the study participants and account for two-fifths more land. Many gardeners have inherited land from their parents and grandparents.

FIGURE 1.1 Ownership by type of urban and peri-urban agriculture in Quito



All home gardeners interviewed and most commercial farmers own their land.

The altitude in the Quito metropolitan district ranges from 500 to 4 780 m above sea level. This means large areas are not suitable for gardening. Some farmers overcome the topographical challenges by terracing, as in Photo 1.1.

Water

Of respondents, 83 percent have an irrigation system, most employ drip irrigation technology; 62 percent of producers use the municipal water supply and 14 percent use rainwater harvesters. While harvested rainwater cannot meet the needs of commercial farmers, it can supplement groundwater or the municipal supply. Many commercial farmers use spring water.

Photo 1.2 shows drip irrigation and Photo 1.3 illustrates a surface irrigation system.

Generally, harvested water alone can meet the needs of 70 percent of smaller home gardens. The initial investment in an irrigation system is proportional to the size of the farm. Home gardeners spend just USD 26, on average, for the set up while commercial farmers spend an average of USD 1 161.

Labour

In Quito, only 34 percent of all respondents hire labour during the year, of these, most are seasonal. Only a few commercial farms have full-time employees. Men are hired more frequently than women as labourers, though most of the commercial, home, and community garden respondents are women. Labourers seem to be either underemployed or underpaid, with one commercial farmer spending USD 5 600/year for two full-time employees – little more than half the going minimum wage. While this situation could be related to being engaged in part-time work year-round, it should be apparent how difficult it is to make a living as an agricultural labourer. However, none of the respondents who hired labour had unpaid volunteers.

1.1 Terracing

1.2 Drip irrigation

1.3 Surface irrigation system

No home gardeners hire help, as the family does most of the labour. This is seen by many respondents as an occasion to foster unity and educate:

"The benefit of having the garden at home is, by working together, we can teach the family how things grow, like plants, and the nature of the production process and so understand the great work that farmers do to bring food to the table of their home." Pamela Tamayo

Most farmers listed support with labour as a primary reason for joining a producer network.

The correlation between number of employees and annual yields is 0.642, showing a marked increase in yields with an increase in employees.

Financial

In Quito, 54 percent of those who accessed credit did so through micro-finance institutions. All respondents who did not access credit said it was because there is "no need." Most respondents have other income-earning family members who contribute a minimum of 50 percent to the household. Of home gardeners, who mostly cultivate for home consumption, 60 percent have vocational or university degrees and 66 percent hold other, full-time jobs. This implies a generally higher socio-economic status of home gardeners compared to other UPA producers in this study, their need to access credit is, therefore, negligible.

Mostly commercial farmers access credit, but only 38 percent use these loans to invest in infrastructure. Funds are earmarked for greenhouses, chicken coops, sheds and water reservoirs. In Table 1.1, we can see that half of commercial respondents' operational expenses exceed their investment costs. If the other 62 percent of loan recipients use financial assistance for operational expenses, this could explain why so many report "no need" as a reason for not accessing credit. If most of those who access credit do so to meet operational "needs" rather than to invest in capacity-building infrastructure, it suggests those who don't access credit are reluctant to do so unless faced with the "necessity" of meeting their operational expenses.

TABLE 1.1 Yearly commercial urban and peri-urban agriculture in Quito

Investment costs (USD)	Operational costs (USD)
52 500	25 506
71 050	17 211
572	9 752
8 300	7 014
1 050	6 074
1 850	4 574
10 800	4 224
370	1 962
1 280	1 386
730	1 277
2 030	1134
3 950	1 026
70	450

Agronomy

The AGRUPAR project provides technical training for its members on organic and agroecological production – including synthesizing organic pesticides and compost fertilizer. All respondents practice organic, agroecological, or biodynamic agriculture; 97 percent make their own natural pesticides and 90 percent recycle organic waste for fertilizer. To be able to market products at the AGRUPAR fairs, all production must be organic. In addition, AGRUPAR provides training and assistance with organic and regenerative certification processes, value-added processing and post-harvest management. Though none of the home or institutional gardens possess quality assurance (making the total incidence of quality assurance among respondents 41 percent), 84 percent of commercial respondents have quality assurance in the form of organic certification.

Some who are not members of the AGRUPAR project are members of producer networks and cite sharing good practices as a primary reason for their participation. Common practices and technologies include vermicomposting (Photo 1.4), greenhouses and trellising (Photo 1.5) and raised beds (Photo 1.6).

1.4 Vermicomposting

1.5 Greenhouse and trellising

Only 52 percent of respondents access technical assistance. The three most common types of assistance are: applying GAP (good agricultural practices)/organic/agroecological practices, food safety training (mostly for livestock products) and making inputs. Despite the low overall incidence of accessing technical services, several commercial

1.6 Raised beds

farmers, who cultivate larger areas, choose to invest in reforestation projects on their land. The producers develop these initiatives themselves as green-space conservation to mitigate climate change.

Across all types of UPA, the most common reasons for choosing cultivars are for nutritional diversity, to save money and personal preference. Many commercial farmers say their choice of cultivars is based on habit or custom.

Value chain

The AGRUPAR project set up 15 “bio-fairs” where members can sell their all-organic produce. These fairs are set up in public green spaces and other strategically located municipal property. However, only members of AGRUPAR may sell at these fairs. For such members, these bio-fairs are often their only channel for commercialization. Many non-members report struggling to access the market; 65 percent of all study respondents sell their produce on-site, directly to consumers. The next most frequent way to sell products is directly to consumers through local markets (such as bio-fairs). The third most common path to market is through online sales. Most UPA production is sold directly to the consumer, which ensures fair profits.

However, an oft-cited difficulty in the case study is the lack of knowledge on the part of consumers. Quito farmers report citizens have a total lack of nutritional education, causing many to undervalue vegetables and fruit, preferring caloric quantity over nutritional quality. This means they are reluctant to purchase the more expensive, organically-grown produce from UPA farmers. As all production is organic, it is generally priced higher and 60 percent is destined for middle or high-income consumers.

At the time of the study, UPA products had not penetrated the supermarket sector. However, some farmers have been able to scale-up and create their own storefronts in the city, as seen in Photo 1.7.

As most respondents make their own inputs, there is little data on the availability of conventional agricultural inputs in the city. Moreover, as most sales are direct-to-consumer, intermediaries and other brokers are seldom employed. Yet, this contributes to the lack of UPA products in supermarkets and other economies of scale.

1.7 Farmers' storefront

Governance

The Ecuadorean constitution establishes that all citizens have the right to a nutritious and healthy diet. As such, healthy food is a right in Ecuador.

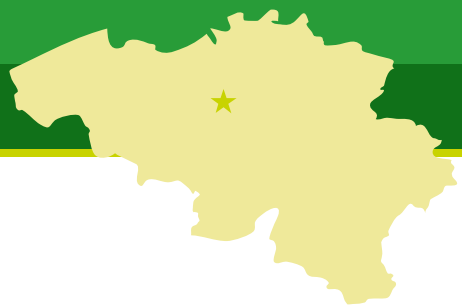
Other national-level laws such as the Organic Food Law and the Law on Organic Agricultural Health aim to promote food sovereignty and effective use of land, water and economic resources.

At the municipal level, Quito joined the Milan Urban Food Policy Pact in 2016 with broad support from civil society and the private sector. This kick-started discussions concerning the Quito Agri-food Pact or PAQ, which was signed in 2018 after intensive multi-stakeholder discussions, research on food system resilience, and environmental assessments that determined the high-vulnerability and low self-suffciency of the urban food supply.

While the PAQ has not been formalized into policy, it is an agreement facilitated by Rikolto, RUAF Global Partnership on Sustainable Urban Agriculture and Food Systems and the municipality and signed by diverse stakeholders: from the Food and Beverage Manufacturers Association (which counts Coca-Cola and Nestlé among its members) to consumer advocacy groups and the mayor's offce to UPA farmers. Though urban agriculture is included in the PAQ, it has not been included in extant policy. Members of the PAQ drew up a Food Charter in 2018. Furthermore, an in-depth proposal was set out by the PAQ to develop new food policy and change processes of food production, distribution, consumption, and waste management. The municipality of Quito accepted the proposal in 2019. At the time of writing, this had not been fully ratified and adopted as an ordinance.

However, AGRUPAR provides municipal support to UPA in the city. It began as a municipal initiative in a low-income neighbourhood in 2002. In the last 19 years it has been upscaled into a self-governing programme with a permanently allocated budget.

After being administered by the Economic Promotion Agency of Quito (ConQuito) in 2005–2010, AGRUPAR now has its own budget for self-management (though just 0.2 percent of the budget for the Metropolitan District of Quito DMQ). AGRUPAR is the most significant representative of agriculture at the municipal level and aims to develop sustainable urban agriculture – to ensure good practices among farmers and provide a safe space to guarantee the commercialization of their products.



CASE STUDY 2

LEUVEN, THE KINGDOM OF BELGIUM

Land

Leuven has seen a 10 percent decrease in agricultural land in the last 7 years. In the last 5 years, the average price of agricultural land has risen by 27 percent.

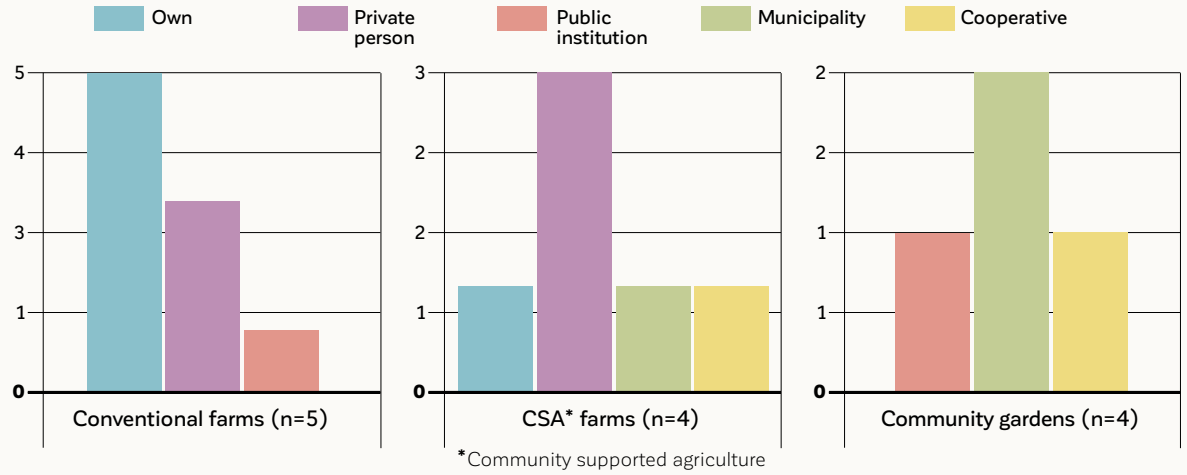
Horticultural production accounts for less than 1 percent of agricultural land in production and the number of horticultural businesses is decreasing. This decrease is the result of land concentration and consolidation by agribusinesses facing pressures to scale-up in the face of declining revenues. Moreover, residential needs continue to encroach on agricultural land, with many peri-urban dwellers having higher purchasing power than farmers. While the land is zoned as agricultural, to prohibit further building, agriculture cannot be mandated, leading to a great deal of land being used to pasture horses or left idle as residential property. Over the past 15 years, 1 000 ha of this land has been sold by the city to fund other social services projects. Realizing much of this land was no longer being devoted to agricultural production, the city implemented a moratorium on the sale of the remaining publicly-owned land.

As part of the Food Connects strategy (detailed further in **Governance**), the city of Leuven implemented a community garden programme in which community members may request land from the city for a garden. These allotments first undergo a soil test, paid for out of the municipal budget, to determine viability and safety. Currently there are 20 such gardens in the urban and peri-urban area of Leuven. All these gardens are between 1 000 to 4 000 m^2, with most occupying vacant land donated by the city. Some land has been donated privately by individuals.

The city also administers 7 ha of lease-free plots, 67 ha more can be rented from the municipality. Land allocated to gardeners lease-free must be used for agriculture.

A Belgian non-governmental organization (NGO), De Landgenoten, leases land close to urban areas exclusively for organic farming. Crowd-funding is employed to purchase the land, linking consumers to the process of productive land acquisition for organic farmers. The land is leased for between EUR 500 and 1 800/ha, depending on its proximity to urban areas.

FIGURE 2.1 Ownership by type of urban and peri-urban agriculture in Leuven



One person practicing community-supported agriculture (CSA) rents part of their land from De Landgenoten, part from the municipality and own the remainder. The other CSAs do not own any land but rent from private persons, a cooperative, or the municipality. All commercial farmers own part of their land; most inherited it from their parents.

Interestingly, two CSA farmers have agreements for land use – one with the municipality, the other with the region. The CSA closer to the city has a rental agreement with the municipal government in which part of their payment is in ecosystem services. The CSA and the city calculate the estimated value of their positive environmental contributions on city land and reduce the cost of rental accordingly.

The other CSA farm has an arrangement with a regional landscape department. The department manages the administration of the management agreement subsidies (Table 2.1) for uncultivated land, while the CSA farmers manage the land itself. They only cultivate 1.5 ha, but with these agreements, their land expands to 7 ha.

Water

Most conventional commercial farms rely on seasonal rains and do not possess an irrigation system, unless it is for surface irrigation. On the other hand, CSA farmers all use irrigation systems, most rely on drip irrigation (one respondent uses sprinklers) and sources from groundwater or harvests rainwater. CSA farmers spend, on average, USD 3 871 for the initial irrigation set up, with land area being directly proportional to the expense. Community gardens may receive support from the municipality if they want to build a rainwater collection basin. Most of these gardeners use rainwater or the municipal water supply.

Climate change is causing rains to fall less frequently or in unusual patterns. For example, one CSA farmer noted a 10-week dry spell experienced during the typically wet Belgian spring.

2.1 Drip irrigation system

Labour

In Leuven 80 percent of respondents employ outside labour.

In terms of social inclusion, the CSA workforce is the most representative, including women, the elderly, international migrants and persons with disabilities. The Flemish Government grants subsidies to farmers who employ people with disabilities.

None of the respondents have full-time employees, preferring seasonal labour. This lack of full-time labour diverges from the other cities in the study, probably because of the climate; the growing and harvesting season is shorter in Belgium.

Commercial farmers employ the fewest people, with an average of 5.5 seasonal hires, less than half the average workforce employed by community gardens. CSAs employ an average of eight people seasonally. However, except for commercial farms, most employees are unpaid volunteers.

Commercial farms and CSAs show a strongly negative relationship between number of employees and annual production yields (kg), with a correlation of -0.502. Most likely this is because of greater mechanization and larger land area. The larger the area of land cultivated, the fewer employees are hired, with a correlation of -0.887.

Finance

While only 33 percent of UPA farmers access credit, all those who do not take out credit report "no need" for loans. Conventional commercial farmers who access credit all go to banks, while all CSA farmers obtain loans from community financing (such as crowd-funding) and micro-finance institutions instead. None of the community gardens report accessing credit, even though the city of Leuven has a EUR 2 000 total yearly budget to assist community gardens with start-up costs.

The reason the remaining farmers do not access credit, may be partially related to the subsidies in place at the national and European level. In fact, the conventional commercial farmers all report they would not have a living wage without subsidies. While these national level subsidies are not focused on UPA, anyone practicing agriculture can access these subsidies if they have sufficient land, and the ability to navigate the bureaucratic administration.

Table 2.1 lists some of the support available to any farmer from the European Union, Flemish Government and a regional NGO, De Landgenoten.

Further support for UPA specifically comes from the province of Flemish Brabant. Table 2.2 shows an overview of this budget.

TABLE 2.1 Support available in Leuven

WHICH?	BY WHOM?	CONDITIONS	AMOUNT IN EUR
Management agreements	Flemish Government	Financial support in exchange for certain measures that benefit the environment (e.g. field borders)	Average = 1 645/ha
European Agricultural Guarantee Fund (EAGF)	European Union	Financial support linked to the number of ha in possession and the crops grown.	
Support based on ha for biological production method (Departement Landbouw en Visserij, 2019)	European Union	Financial support when switching to biological production	(300–1 320/ha (depends on the crop) for 2–3 years)
Availability of land for biological production	Non-profit: De Landgen oten	Purchase of agricultural land to rent to farmers using biological production methods	17.08 ha divided between eight farmers in Flanders

TABLE 2.2 Overview of financial support for UPA from the province of Flemish Brabant

Expense	Budget in EUR (2020-2025)
Project "Farmers with Class": Subsidy for farmers	500 000
Operation costs of NGO Regional Products Flemish Brabant	1 300 000
Promotion of short chain initiatives and regional products	125 000
Specific activities concerning multifunctional agriculture (endive box, week of the short chain, organization of "Farmers with class")	587 000

"The subsidies we receive seem a lot to most people. The European Union would like to decrease them. However, I would much rather receive a fair price for my products and no subsidies, but then the food has to be two to three times as expensive." Lea Claes

Table 2.3 compares total investment costs with total operational costs for commercial and CSA farmers. The two farms with higher operational costs than their investments are both CSA farms. One of the benefits for CSA farmers are the low start-up costs. As members must sign up and pay at the beginning of the year, the farmers have capital to budget right away. The difficulty is then to find an adequate number of members.

Agronomy

TABLE 2.3 Yearly commercial and community supported agriculture in Leuven

Investment costs (USD)	Operational costs (USD)
1 609 520	218 642
70 800	74 576
1 652 000	59 708
31 978	51 826
182 900	21 240
48 380	18 408
14 626	11 151
10 620	5 275
6 502	3 157

All community garden and CSA respondents in Leuven practice organic or agroecological farming. Of the CSA respondents, 3 in 4 have organic certification; 3 in 4 also have university degrees and came to farming from other industries. An ethic of care pervades CSA farms. According to one CSA farmer:

"For me agriculture is care, not production. We don't actually produce anything, it's the ecosystem that produces." Brecht Goussey

Only 1.1 percent of agricultural land in Flanders is under organic production. This percentage is only moderately improved in the Leuven area with 2.6 percent of agricultural land (or 0.62 percent of the total municipal area) cultivated organically. This is still much less than the European average of 6.7 percent. The European Union provides subsidies (seen in Table 2.1) for farmers to switch to organic production, though the uptake is slow in Flanders because (according to several CSA respondents) the Farmers Union is generally conservative and agricultural education at university emphasises technological innovation and bio-engineering.

Common agricultural technologies used by respondents are greenhouses (Photo 2.1, with drip irrigation), rain harvesters, and heavy machinery (excluding community gardens, all respondents but one CSA and a beekeeper use tractors).

Diversity of products is a primary motivator for CSAs in Leuven when selecting produce for cultivation. As these CSAs rely on community support, they must cater to the expectations and diversity of their client-members. CSA farmers must provide variety and consistency to keep their members.

In Leuven, 47 percent of respondents have quality assurance, most through third-party certification.

As community gardens are prohibited from commercializing their produce, there is no need for quality assurance. CSAs with assurance are all certified organic, as noted above.

Commercial farms with assurance are evenly split between cooperative certifications, regional guarantee label, organic certification and self-control certified. Of the respondents, 87 percent receive technical assistance. As mentioned above, city funds are allocated for training and capacity-building of community gardens in the urban and peri-urban area.

Most training is focused on good agricultural practices (GAP) and is free or the cost is nominal. The Flemish Government requires all farmers who use chemical pesticides to attend food safety training once a year to ensure proper application. Seventy-five percent of farmers are members of producer networks, and most cite sharing good practices as a primary reason for participating.

Value chain

In Leuven, community gardens are prohibited from commercializing their produce. As the general motivation to begin one of these gardens is social rather than economic or financial, this is not a problem for most community gardeners.

CSA farms in Belgium operate on "you-pick" or box delivery systems. In the "you-pick" system, members can come as they like and pick what they want directly from the ground. They are expected to follow an honour system and to take only what they need and what they can eat. Different coloured flags indicate "don't take," "take sparingly," "take as much as you want" with more explicit instructions distributed through e-newsletters or on-site bulletins (Photo 2.2).

While the "you-pick" system is effective for promoting social cohesion between producers and consumers, it requires the farm to be close to the city.

Many CSAs in suburban areas have trouble finding enough members. For them, a combination of boxes and "you-pick" is best. Especially during the COVID-19 pandemic, the number of members requesting boxes grew, along with CSA membership in general.

2.2 On-site bulletin board

©Rikolto/Amber Steyaert

2.3 Kort'om vending machine

©Rikolto/Jelle Goossens

Commercial conventional farmers in Belgium usually pursue many options for commercialization. Most respondents connect local producers with local consumers. In the short chain, while the prices farmers obtain for their products are higher, much more work is involved. Many farmers must still provide their own logistics, administration and transport to sale points. For some online-oriented platforms, farmers also must maintain up-to-date product information. Respondents reported enjoying the social aspects of interacting with consumers.

While many of these models are still direct-to-consumer, the city of Leuven partnered with Rikolto to develop Kort'om Leuven, a business-to-business short-chain platform. This allows smaller-scale farmers to enter economies of scale, connecting them with supermarkets and local businesses. Photo 2.3 shows the introductory Kort'om mobile vending machine, raising awareness of the brand. Kort'om currently supplies 13 supermarkets and 19 buyers from the hospitality sector.

In Leuven, mainstream consumers are often ignorant of the importance of nutritious, sustainably produced food. This places the burden of education on many farmers when interacting with consumers in short-chain initiatives. Farmers find they need to inform buyers of farming practices, which may seem strange, or the benefits of their more expensive local products.

Governance

In Leuven, a multi-stakeholder approach has been integral to the creation of an integrated city food policy that benefits UPA.

This began with a petition that collected signatures from civil society organizations and citizens in 2016. After the petition was delivered to the city, the municipality budgeted EUR 10 000 to facilitate multi-stakeholder dialogues. The first open meeting was held at the end of 2017. A steering committee was created after that first meeting to draft the Food Connects strategy. The members were: Riso Vlaams-Brabant (NGO working on community building), Levuur (participation consultants), the departments of Sustainability, Health, and Economy and Trade, the Farmers Union, University of Leuven, Rikolto, a CSA farmer and a conventional farmer. After the document was drafted and approved, actual implementation was left to a cross-sectoral group of municipal and provincial departments, NGOs and Leuven Climate Neutral 2030.

In 2018, with the election of some members of the Green Party to the municipality, agriculture was moved out of the Department of Economy, and a Green Party officer took charge of Agriculture and Consumption. This explicit connection between agriculture and consumption moves agricultural policy (at least at the local level) away from being a purely economic activity towards a more integrated approach connecting consumption and production.

Furthermore, a 16-member advisory council was formed in January 2020, which would help steer the implementation of Food Strategy projects. The 16 members represent a similarly wide-range of interests, from conventional to alternative producers and public servants to consumers. Table 2.4 shows the five-year municipal budget for the implementation of the strategy and associated UPA initiatives.

Despite the laudable, and highly important inclusion of farmers in these discussions, the actual workings of government take place during working hours in the city centre, making it difficult for farmers to participate as desired. Several CSA farmers reported they have seen very little benefit of the Food Strategy. They are happy it exists, but do not feel they are a part of it.

TABLE 2.4 **Leuven municipal budget (agriculture and food strategy)**

Expense	Budget in EUR (2020-2025)
Support for community gardens	12 000 (2 000/year)
Subsidy for projects assisting the implementation of the Food Strategy	50 000 (10 000/year, starting from 2021)
Website Food Strategy	90 000 (15 000/year)
Subsidy Rikolto for start-up of Short Chain Platform Kort'om	40 000 (2020: 36 000, 2021: 4 000)
Subsidy for studies and action plans concerning the implementation of the food strategy (food waste, agricultural advisor, community gardens, city farms, ...)	200 000

CASE STUDY 3

DAKAR, THE REPUBLIC OF SENEGAL

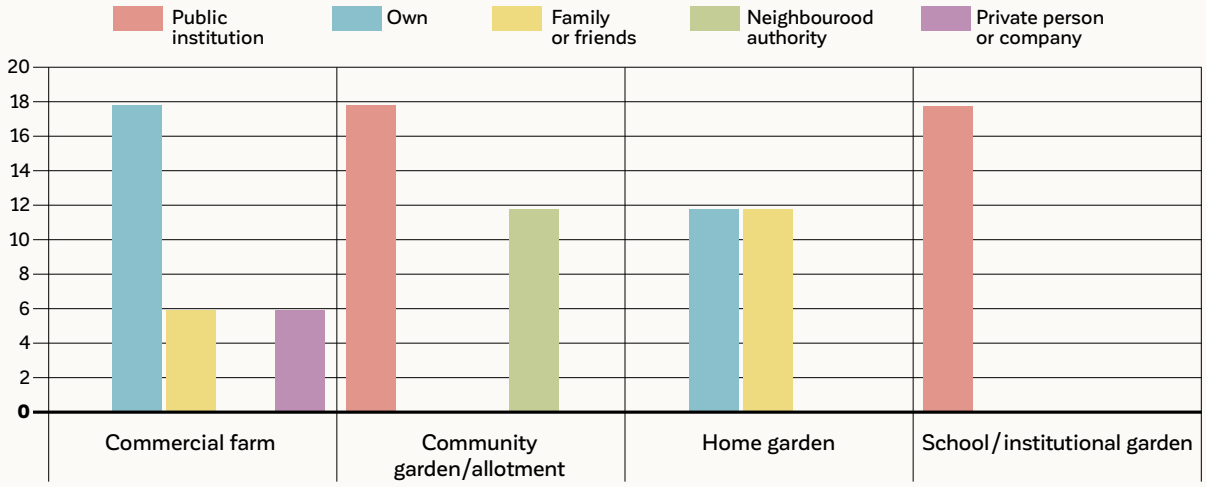
Land

Dakar has unique land challenges as it is a city that occupies a peninsula. According to data from 2008, 35 percent of land in the Dakar region was cultivated, 30 percent was vacant or bush. However, in the last ten years, the population has increased by over one million people resulting in average loss of agricultural land at 60 ha per year. With the Dakar Urban Development Plan, the municipality plans to limit urban growth and preserve forests and green spaces. While this plan does not explicitly prioritize urban agriculture, the mayor of Rufisque (a department within the Dakar region) has moved to reserve 2 330 ha for urban and peri-urban agriculture. Additionally, the Niayes, a major agricultural area along the Atlantic coast, is zoned to prohibit building, though this can be difficult to enforce. Moreover, despite decreased agricultural land, the number of farmers has continuously increased since the 1960s.

In order to efficiently use their limited land, many urban home gardeners turn to micro-gardening, following an FAO initiative. This is usually done on terraces, most home garden respondents cultivate 100 m^2 or less. The respondents are split: half cultivating plots they own, half cultivating on friends' or family land.

3.1 Community garden in Dakar

FIGURE 3.1 **Ownership by type of urban and peri-urban agriculture in Dakar**



Commercial gardening is mostly relegated to the peri-urban area and most respondents cultivate between 1 and 3 ha. Most commercial farmers own the land they cultivate, or rent it from friends or family or privately. Often the land used has been inherited from their parents.

Community gardens are granted land by the relevant municipal authorities and often occupy roundabouts, public parks and vacant lots, such as shown in photo 3.1. Land is requested from the relevant authorities, whether the municipality or the neighbourhood. All community garden respondents cultivate publicly owned land. School or institutional gardens cultivate land that has been granted by the school or institution.

Many urban producers use public or private land without any formal agreements, making for precarious usufruct rights. Many work on unregistered land, making it easy for the land to be expropriated. National level projects (such as highways) can also supersede municipal land-use agreements. The Mbao Forest, however, is administered by the Federal Department of the Environment, which allocates land to several farmer cooperatives, granting them more secure land tenure.

Water

In the dry climate of Dakar where, as a result of climate change, average yearly rainfall is decreasing, access to water is the greatest constraint to UPA. For most commercial farmers, more than half of their operational expenses go towards water tariffs. The median amount commercial respondents spend on water per year is USD 2 973. This is the case, despite government measures to reduce water tariffs and standardize billing for market gardeners.

These government measures have helped reduce the competition between citizens and farmers over water provision through better management of the water supply. The policy developed around water, while it has proven beneficial, is not coordinated with UPA-specific policies. This causes water availability to fluctuate heavily for farmers, with changing dry season quotas and service interruptions. An additional constraint is the prohibition (via consumer protection laws) of the use of wastewater on land used for horticulture.

All commercial farmers have either sprinkler or surface irrigation systems for which they use the municipal water supply. The initial investment for these irrigation systems averages USD 1 484. Most community, institutional, or home gardens do not have irrigation systems but water their micro-gardens by hand. Community gardens often share a water source and use hand pumps to draw water for themselves.

Labour

All commercial UPA respondents hire labour. Commercial farmers employ more than double the number of elderly women than men. Commercial farmers also hire about the same number of seasonal and full-time labourers.

The home and community gardeners who hire labour mostly do so for hand irrigation. Sixty percent of community gardeners do not hire labour. Most community gardens are composed of 20 to 30 people. In some cases, gardeners simply take care of their own small, designated area, especially for micro-gardening. In other community gardens, such as the one in Mbao Forest, labour is a collective resource. A president and secretary maintain a logbook of labour hours and use this to distribute proceeds from the sale of produce.

School gardens almost exclusively rely on volunteer labour from teachers, parents and students. The study also shows there is a positive correlation between annual production yields and number of employees at 0.64.

Finance

Complaints about unaffordable interest rates in Dakar is one of the primary reasons respondents do not access credit, along with not liking to take out credit. Almost 70 percent of respondents do not access credit. Most who access credit are commercial farmers and, of those who do access credit, 50 percent go to banks. Most non-commercial farmers receive funds in the form of grants from NGOs and some private companies.

TABLE 3.1 **Yearly commercial urban and peri-urban agriculture in Dakar**

Investment costs (USD)	Operational costs (USD)
21 960	24 372
1 170	9 100
279	4 703
90	2 115
50	1 762

Table 3.1 shows the total investment and operational costs for commercial respondents. As is readily apparent, all farmers have much higher operational costs than investment costs. With this in mind, there seems to be a correlation between respondents' complaints about high interest rates and their general reluctance to take on debt.

High interest payments would essentially be folded into their already high operational costs, creating a disincentive for taking out credit. This keeps their investments in infrastructure and capacity-building projects to a minimum. Farmers' insecure usufruct rights, discussed earlier, are a further disincentive to infrastructure investment and increase farmers' risk of loan default in the event of their land being expropriated. For UPA farmers in such a context, accessing credit may appear more risky than it is worth.

Tables 3.2 and 3.3 provide examples of home garden and commercial farm expenses and profits for comparison.

TABLE 3.2 **Annual expenses/profits – home garden in Rufisque (Dakar region)**

Crops	Production (kg)	Revenue (USD)	Expenditures (USD)					
			Seeds	Fertilizers	Pesticides	Labour	Other expenses	Income (USD)
Onion	3 000	1 081	54	90			54	883
Animal	**Production (chickens)**	**Revenue (USD)**	**Livestock to start**	**Starter feed**	**Growth feed**	**Electricity**	**Vaccines**	**Income (USD)**
Chickens	420	1 892	405	80	266	216	108	817
		2 973						**1 700**

TABLE 3.3 **Annual expenses/profits – commercial farm in Rufisque (Dakar region)**

Crops	Production (kg)	Revenue (USD)	Expenditures (USD)					Income (USD)
			Seeds	Fertilizers	Pesticides	Labour	Other expenses	
Onion	35 000	12 613	541	1 622	324	7 784	17 579	
Tomato	40 000	28 829	378					
Cabbage	600	27 027	450					
Totals	**75 600**	**68 469**	**16 369**	**1 622**	**324**	**7 784**	**17 579**	**39 791**

While overall investment in UPA from the local private sector is low, some international companies provide support. For example, the community gardens in Mbao Forest received financial support in the initial phases from an international tobacco company. The extent to which such an international investment is a smokescreen for a history of tobacco-related deforestation and public health issues in Senegal and other African countries remains to be seen.

At the national level, Project Smallholder Horticulture Empowerment and Promotion aims to increase farmer's incomes in the fertile Niayes region bordering Dakar through financing and professionalization. The Directorate of Horticulture implements this Project with bilateral support from Japan.

Agronomy

All home gardeners surveyed in Dakar use micro-gardening techniques, though some also cultivate on open ground. Micro-gardening in Dakar usually involves using recycled plastic bottles and other small containers for cultivation. These containers are filled with nutritious substrate (often rice balls, manure or peanut shells – peanuts being a major export commodity in Senegal) and placed on recycled wood tables. Most of what is grown are herbs, particularly mint, and other small vegetables. Most community gardens, especially those located in roundabouts and other places with potentially compromised soil quality, incorporate micro-gardening techniques. Such community micro-gardening area are shown in Photo 3.2 and 3.3.

Some gardeners also incorporate chickens into their micro-gardening operations. Chickens roost underneath the tables where the herbs are grown, as in the home garden listed in Table 3.2.

Most commercial respondents also only cultivate horticultural crops. Those that do raise livestock choose smaller animals, such as the sheep.

The most common reasons for choosing what to cultivate, across all types of UPA, are high market demand and high market price. Though undoubtedly, land area also provides practical constraints to raising cattle or other large animals.

3.2 Participants receive training on how to cultivate vegetables using micro-gardening techniques.

3.3 Seedlings cultivated in old tires at a horticultural micro-gardening training center and nursery

Most home gardens and institutional gardens practice organic production. Most community gardens self-identify their farming practices as sustainable. Most commercial farmers produce conventionally – only one practices agroecology.

Only one respondent in the Dakar study has quality assurance. This is a commercial producer who has been certified through an internal cooperative system.

56 percent of respondents receive technical assistance. This mostly takes the form of making their own inputs and employing agricultural best practices. Community gardens have a much higher incidence of accessing technical services. Less than half of commercial and home garden respondents access technical assistance. Those who do, mostly receive training on food safety procedures for the correct application of chemical pesticides.

Two commercial farmers use greenhouses for production. One of these greenhouses was built as part of a broader programme implemented by the Ministry of Agriculture. Over the course of five years, the farmers gradually purchased the greenhouses built by the ministry.

Value chain

All micro-gardeners commercialize their products on-site through direct sales, whether community or home gardens. Commercial respondents sell products through traditional markets, on-site, and through collectors or intermediaries. Many commercial producers also own some logistic resources to aid in the sale of their products. Three commercial respondents own their own trucks to transport goods or storefronts for direct commercialization.

While most commercial respondents are men, their wives or mothers usually manage the direct-to-consumer sales on-site and through traditional markets. On the other hand, men manage the larger sales directly to collectors or intermediaries.

Every three months, the community of Toubab Dialaw hosts an organic market. However, this is a generally high- to middle-income area popular with tourists and foreigners. As Toubab Dialaw is 30 km away from Dakar it is difficult for urban producers and consumers to reap the benefits from this particular market.

While many home and community gardeners make their own inputs, most commercial farmers purchase from vendors. All commercial farmers purchase pesticides from vendors. Dakar grants some subsidies for inputs. Livestock vaccines can be subsidized up to 50 percent.

Regarding intermediary points in the value chain, much of the infrastructure is oversized. For example, the Federation of Market Gardeners of the Niayes rent their cold storage warehouse facility to mango exporters. However, the production volume of the farmers falls far below the available space in the warehouse, leaving a substantial area unused.

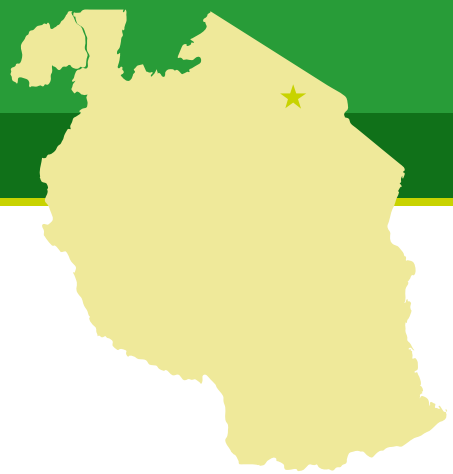
Governance

Dakar has several different policies that are implemented at various levels and across various sectors, though there is little coordination between them. This is largely related to the recent processes of decentralization in the country. The devolution of governance provides greater autonomy to municipal authorities. However, because this process is recent, many municipalities have neither the revenue streams nor the knowledge to effectively govern in light of their new (relative) autonomy.

Programme d'Accélération de la Cadence de l'Agriculture Sénégalaise (PRACAS), a federal agriculture acceleration initiative, does not mention UPA, though Dakar has been able to capture some subsidies for UPA inputs. The national food policy in Dakar emphasises poverty reduction. The Dakar region has implemented an urban development plan to reduce the growth of the urban built environment and preserve forests and green belts. Moreover, there is coordination between the municipality, farmer groups and the federal Department of Environment, which administers the agricultural land in Mbao Forest.

The Rufisque municipality in the Dakar Metropolitan Region developed a Food Policy Plan that enjoys broad community support.

Importantly, there is a growing community voice from farmer cooperatives and civil society organizations to give priority to UPA in the Dakar urban development plan. The incorporation of these grassroots movements into the devolved governance of the municipality will be vital for sustainable growth.



CASE STUDY 4

ARUSHA, THE UNITED REPUBLIC OF TANZANIA

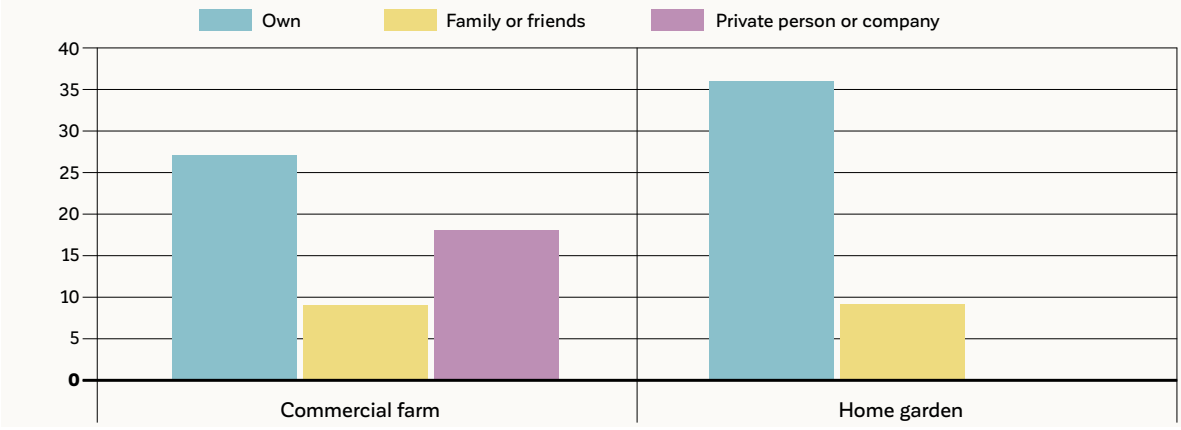
Land

Arusha suffers from loss of agricultural land, as population growth and rural-to-urban migration require increasing expansion of residential areas. Still, 64 percent of undeveloped land in the city (13.5 ha) is devoted to UPA. The 70 percent of respondents, who own land often rent more. This is especially true of those who keep livestock, who often own less than 50 m^2.

The 30 percent who rent the land they use, rent it for a limited period of time for cultivation or to pasture livestock. While land used for livestock is strictly controlled, sanctions for off-plot production of horticultural crops fluctuate based on administrative procedures. Similarly, while optimizing land use is inscribed in the Arusha City Plan 2020/21, a lack of procedural specificity and budget leaves implementation to political impulses.

Moreover, land is not registered or zoned by the municipality as agricultural or residential. This allows landowners to change the use of land at will. This can make the continued use of land for agriculture perilous and contributed to the failure of an irrigation scheme, detailed in the section on water.

FIGURE 4.1 Ownership by type of urban and peri-urban agriculture in Arusha



Water

The Themi river system cuts through Arusha, it is the primary water source for most UPA producers. All respondents have surface irrigation systems and 81 percent source water from the river, the rest from the community water supply. Irrigation set up and maintenance costs total between USD 6 and 15, depending on the size of the cultivated area. Generally, total annual water costs average around USD 9, though some producers who source from the river reported no associated costs.

The city council, in an effort to promote UPA, began two irrigation projects to connect agricultural areas with the river. However, both projects failed. One irrigation channel was successfully constructed, but much of the targeted land had been taken out of production and converted to residential area, drastically reducing the efficacy of the project. The owners and occupants of the land transitioned from agricultural production without governmental communication, in spite of the irrigation project being underway. Governmental coordination with targeted beneficiaries could have mitigated this failure. The other irrigation channel suffered from the lack of coordination with the Department of Construction and was bisected by the construction of a road, rendering it useless.

Labour

In Arusha, 20 percent of the population (113 000) are agricultural workers. Of study respondents 95 percent hire seasonal or full-time labour on their UPA plots. Home gardeners do not hire any full-time labour, preferring to hire on a seasonal basis.

Seventy-six percent of respondents employ significantly more women than men, seasonal and full-time. Commercial farmers hire fewer people in total because they maintain full-time staff while home gardeners have a huge influx of labour during harvest season. Since many crops are planted twice throughout the year, there is a greater incentive for commercial farmers to maintain a year-round workforce.

Unfortunately, based on the data, it seems some commercial farmers underpay (or under-employ) their labourers, with some spending far less than the government mandated minimum wage on full-time employees. Even if this is not a case of wage theft, but simply underemployment, it is difficult for agricultural labourers to maintain a livelihood. However, these labourers are indispensable to the productivity of UPA in Arusha: the study data show a positive correlation between annual yields and number of employees at 0.822.

Finance

In Arusha, twice as many home gardeners access credit as their commercial counterparts. The most common source of financial assistance for home gardeners is a farmer organization (55 percent) followed by banks (45 percent).

All respondents who are home gardeners report being part of a producer network. Though they cite “sense of community” to be the primary motivation, there are clearly financial incentives to belonging to such a network in the form of easier access to credit.

Most respondents do not have records of expenses and revenues from their farms, though commercial farms have slightly better data than home gardens. Based on their educated estimations, however, operational expenses are more than double their investment expenses, as shown in Table 4.1.

TABLE 4.1 Yearly commercial urban and peri-urban agriculture in Arusha

Investment costs (USD)	Operational costs (USD)
2 610	8 475
882	4 000
892	3 380
663	3 339
989	3 135
93	1 554
9	1 505
7	1 034
6	786
0	739
9	727
9	602

Many urban farmers who receive a loan will often spend it on operational expenses such as seeds in the planting stage or pesticides and fungicides for pest and disease control. These immediate operational "needs" take precedence over the capacity-building investments that are initially proposed in the loan application.

In the absence of investment in productivity or efficiency enhancements on UPA farms, profits may stagnate. This will make it more difficult to pay back loans and potentially initiates a vicious cycle. As the primary reasons respondents gave for not accessing credit were unaffordable interest rates and denial of the loan request, this cycle could be especially detrimental to the accessibility of future credit.

In terms of financial benefits from UPA in Arusha, all producers interviewed in the study reported that 75 percent or more of household income is provided by UPA revenues and 75 percent or more of their household food consumption comes from their farm. However, the farmer cooperative Mtandao wa Vikundi vya Wakulima Tanzania reports that their farmers generally bring in between USD 6 to 10 per month. This means many farmers are living on less than a quarter of Arusha's minimum wage.

Agronomy

Micro-gardening practices have a strong presence in the home gardens in Arusha, and in other cities, such as Mbeya in the Southern Highlands of Tanzania. Many respondents use "sock gardens" (Photo 4.1), empty bottles, and flowerpots to grow small vegetables and herbs. Other space-saving techniques such as hydroponics are also used (Photo 4.2), though very few respondents cultivate hydroponically.

Several respondents use greenhouses, similar to those in Photo 4.3 with drip irrigation in the foreground. Other respondents use small, raised beds to grow herbs and vegetables as in the "kitchen garden" shown in Photo 4.4.

4.1 A "sock garden" in Mbeya

4.3 Greenhouses and drip irrigation in Mbeya

4.2 Hydroponics in Mbeya

4.4 "Kitchen garden" in Mbeya

4.5 Drip irrigated raised beds with trellising in Arusha

4.6 Demonstration plots in Arusha

Integrated techniques are also common. In Photo 4.5 raised beds and trellising are integrated with a drip irrigation system.

All respondents reported following GAP protocols. Arusha has a high incidence of quality assurance among respondents at 72 percent. Most of those with quality assurance in Arusha acquired it through their cooperative or company internal control system. There are no third-party certifications among respondents.

Most respondents select the crops they cultivate based on best market price and high demand.

Arusha City Council partners with several farmer cooperatives, private sector organizations and training institutes (Mtandao wa Vikundi vya Wakulima Tanzania, Tanzania Horticultural Association, and Tengeru Horticultural Research and Training Institute) to administer training and demonstrations at the Nanenane Training Ground.

Photos 4.6 and 4.7 show the Horticulture Specialist and some of the demonstration plots. Some of the cooperating organizations also have their own demonstration plots elsewhere in the city.

The city itself has 18 demonstration plots throughout the city. Most training is free for farmers. Arusha respondents have a high incidence of accessing technical services, with 95 percent of respondents taking advantage of these services, usually for agricultural best practices.

Furthermore, agricultural input companies provide extension services to farmers, through municipal extension workers. These extension services are most often related to food safety and concern chemical application and/or good agricultural practices. However, it should

4.7 Horticulture specialist advises UPA farmers in Arusha

be noted that this technical advice comes hand-in-hand with the marketing of company products. While increased access to technical advice is beneficial for agricultural productivity, the privatization of extension services should be observed with some apprehension.

Value chain

As part of the Arusha City Council five-year plan, the Council gave business licenses to 45 agricultural input companies to operate in the city to increase the accessibility of inputs to urban farmers. These same input companies, as mentioned, also provide technical assistance. The agro-inputs most frequently procured are seeds, pesticides, vaccines for livestock and animal feed. Respondents have welcomed the increased availability of inputs.

NGOs, civil society organizations and private sector organizations are more involved and innovative in the professionalization and commercialization of UPA than the municipality. One private sector organization the Tanzania Horticultural Association, developed a mobile application that gathers relevant information for marketing products: up-to-date prices, contact points and available markets for commercialization. Another NGO, Organization for International KOoperation and Solidarity organizes farmers' markets so that producers can sell their products. Arusha City Council provides access to kiosks for sales at public markets and maintains the infrastructure and cleanliness of market facilities.

The city also imposes a crop tax on agricultural traders/collectors to generate revenue and manage food trading. These traders play a significant role in the UPA value chain. The most common method of commercializing products among the respondents is at local markets through collectors. The other most common method is through contract farming with private companies.

Traders therefore play an important role in bringing UPA products to market.

The other most popular methods of commercialization among respondents are local markets, through a cooperative, and direct sales at local markets. Most respondents take advantage of at least two of these methods.

The city also has several processing facilities for value addition of animal products, some of which are owned and administered by the city (i.e. Arusha Meat Company).

Governance

There is no extant policy in Arusha related to UPA. All policies exist at the national level and are addressed to agriculture, livestock, and the environment in general, with little consideration for UPA. The Arusha City Council five-year development plan was designed to implement these national level policies at the municipal level. The plan was notably lacking in cross-sectoral, cross-level, or multi-stakeholder participation. A single consultant drew up the plan, with some expert input, before it was ratified by the city council.

Furthermore, while UPA is included in the plan, it is neither emphasized nor financed, leading to inconsistent projects, lack of coordination, and initiatives that come and go with political inclination. The departments in charge of managing UPA in the city are the Livestock and Fisheries Department and the Department of Agriculture, Irrigation and Cooperatives. These departments are required to follow the five-year development plan as set out by the planning department and city council, though there does not seem to be any implementation strategy, budget and evaluation framework.

City officials report completing 85 percent of the actions outlined in the plan. Though, in the absence of any of the mentioned frameworks for implementation and evaluation, along with a general lack of specifics as to what concrete actions have been accomplished, this assessment cannot be verified.

Moreover, the lack of cross-sectoral cooperation, as illustrated by the failure of the irrigation project detailed above, makes it clear that more departments need to be involved in all processes from planning to implementation and evaluation.

CASE STUDY 5

SURAKARTA, THE REPUBLIC OF INDONESIA

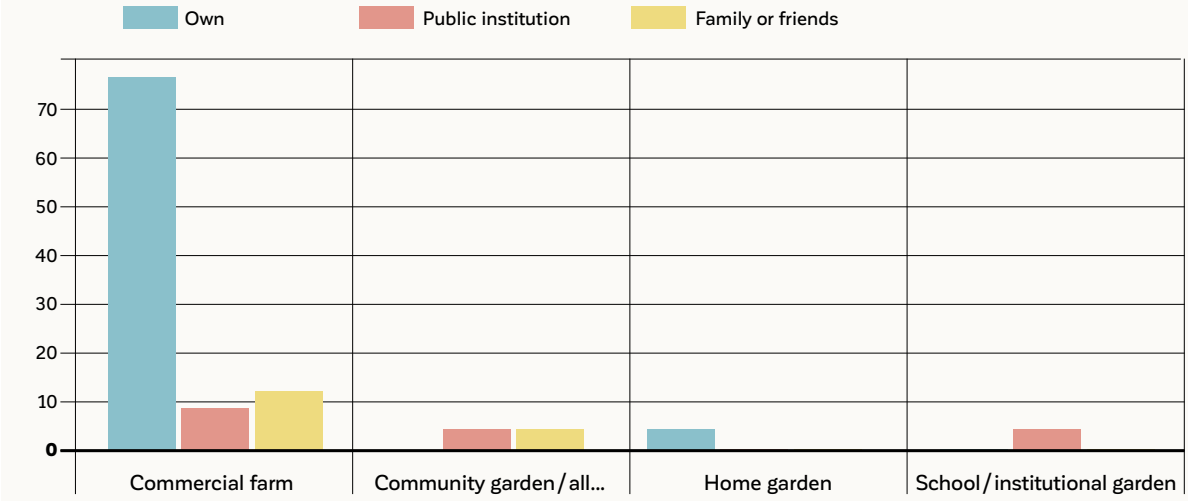
Land

In Surakarta land for agriculture is disappearing as a result of the pressures of housing a growing population and through the expansion of *batik* (dyed cloth) industry factories and infrastructure. Sixty-six percent of land is used for residential areas. Additionally, land is increasingly fractured into smaller parcels as parents pass it down to their children.

Land tenure arrangements benefit male children and lead to gender inequalities, as traditional inheritance grants male children two parts and female children one part.

With the regional-level planning policy, land zoned for agriculture that is currently unused or unproductive is being earmarked for residential development.

FIGURE 5.1 Ownership by type of urban and peri-urban agriculture in Surakarta



Average cultivated land area from the study was 3 162 m^2, with 68 percent of respondents owning their own land. Those who rent their land pay an average rate of USD 126 per year.

Most of these commercial farmers reside in suburban areas where more land is available, though all respondents cultivate 1 ha or less (average land area cultivated in the study is ~3 000 m^2).

Water

In Surakarta groundwater and rivers provide ample water supply, with 60 percent of respondents saying they have irrigation systems. Commercial farms invest, on average, USD 102 for their irrigation system and generally pay approximately USD 34 per year for their water needs. Surface irrigation channels are the most common system (shown in Photo 5.1). During the dry season, water is obtained from reservoirs.

These reservoirs are used across districts and are administered not by the municipality, but by the Central Java Provincial Authorities. In tandem with local governments, they determine the management, flow rates, and scheduling of water for use in agriculture and electricity production and for flood control. Seventy percent of respondents do not monitor the quality of their water supply.

Labour

In Surakarta, many women feel their labour is marginalized by increased mechanization in agriculture. While not necessarily the result of increased use of machinery among respondents, women are employed less frequently than men across UPA types in the study.

Commercial farms often employ the elderly. Community and institutional garden respondents exclusively employ people year-round; commercial farmers hire the bulk of their labour on a seasonal basis while still maintaining a full-time labour force. Eighty percent of respondents hire labour.

Women report they are paid less than their male counterparts for the same work. This is a pernicious inequality that, though less prevalent in urban areas, still pervades the agricultural sector in Indonesia.

5.1 Surface irrigation channels

Some respondents also use cows to plough the fields. It would be interesting to consider the labour of animals (fertilizer production, ploughing, integrated pest management and other similar services) in terms of managing and valuing labour resources at the level of urban planning. However, this is beyond the scope of this study.

Finance

Of respondents in Surakarta, 44% accessed loans. Commercial farmers primarily obtain them from banks. Non-commercial farmers obtain them from microfinance, the community, a farmer organization, or a contract company." Sixty percent of the farmers do not apply for credit at all because there is "no need" or because they do not like to take on debt.

Women and young people report that the requirements for collateral are often insurmountable obstacles to their being able to obtain credit.

One chicken producer, on the other hand, has total investment and yearly operational costs of over USD 1 million. He produces 600 000 broiler chickens per year contracting for a private company. His business model, undoubtedly, makes him a more attractive candidate for the bank from which he borrows investment capital. In contrast with many of the other respondents, he has achieved an economy of scale.

The median total cost (investments and operations) for UPA farmers is only USD 3 579. Table 5.1 shows the total reported investment and operational costs of commercial respondents.

TABLE 5.1 Yearly commercial urban and peri-urban agriculture in Surakarta

Investment costs (USD)	Operational costs (USD)
272 953	750 373
536	108 165
1 340	66 353
21 105	57 509
0	22 666
523	5 640
3	4 717
50 518	3 722
268	3 661
201	3 318
808	2 762
4 105	1 715
1 409	941
195	806
110	746
78	695
409	627
148	238
67	173
10	146
127	48

Only four farmers report investment costs that are higher than their operational expenses.

Despite the lack of circumspect record keeping on the part of farmers, this trend in expenses speaks to their reticence to take on debt unless it is "needed." What precisely counts as a need for such farmers is beyond the scope of this study, but undoubtedly meeting operational expenses is a concern for many. Moreover, it should be noted that certain types of productive intensification require more inputs and therefore higher operating expenses (the chicken farmer, for example, at the top of Figure 5.1).

Agronomy

Three of the respondents in Surakarta produce hydroponically. They all use their hydroponic system to grow green, leafy vegetables (Photo 5.2). All use natural pesticides they produce themselves or none. The area they cultivate ranges from 17 m^2 to 2 068 m^2.

Hydroponic cultivation is popular among urban youth as it is energy efficient, relatively easy to use, and possible on limited land. There are many hydroponic groups in urban areas and, on average, they provide hydroponic training packages at affordable rates at Indonesian rupiah 100 000 to 150 000/person (USD 6 to 10) and assist with implementation. The remaining respondents plant plots in open ground (Photos 5.3 and 5.4).

Agroecological farming is practiced by 36 percent of respondents and 32 percent maintain good agricultural practices. The rest declined to classify or self-identify as practicing land optimization.

5.2 Hydroponic system used to grow vegetables

5.3 Open ground plot

Only one respondent possesses quality assurance, in the form of third-party B certification for food safety.

The producers interviewed cite personal preference as the main reason for their choice of cultivars. This is followed by high market demand and nutritional diversity.

Fish, specifically catfish (Photo 5.5), is more popular than other kinds of livestock among respondents in Surakarta.

Sixty percent of respondents access technical assistance, with the most common being the application of good agricultural practices or livestock rearing. Generally, these services are accessed free of charge and, on average, respondents participate three times per year. Support is provided by the Department of Fisheries and a university for seeds, machinery and certification. Private agricultural input companies also give demonstrations. NGOs advise on cultivation and marketing.

5.4 Growing papaya in an open ground plot

5.5 Catfish reared in tanks

Value chain

One factor to consider in the UPA value chain, and the food system in general in Surakarta, is the immense quantity of non-cash food aid that comes into the city. As of February 2020, 2.8 million kg per month arrive in Surakarta as non-cash food aid, which accounts for just over 50 percent of the city's total monthly food needs.

This food aid is supplemented by what is produced in the city region itself, 444 521 kg/month, or 8 percent of monthly food needs. As for the rest, it is more than accounted for by the 24.3 million kg of food (452 percent of monthly food needs) that arrives from other regions to be consumed, traded and exported.

These trading patterns surely have distorting effects on markets for locally produced food, especially when UPA farmers and others in the region are competing for an 8 percent share of a market that is 500 percent saturated.

In recent years, Solo has become a trading hub for food commodities. This has given rise to increasing numbers of multinational supermarkets and hypermarkets. Traditional markets are still spread throughout every district, as well as local or national supermarkets.

The Surakarta study reported 48 percent of respondents commercialize their products through collectors. Another 48 percent engage in direct sales, though only 20 percent reported selling on-site. Direct sales often target middle- to high-income consumers. These customers are mostly interested in vegetables, fruits and honey. As we will see in the following section, much of the policy invoked in support of UPA is generally focused on consumption. Priority is given to food security, accessibility, safety, and nutrition, rather than to the perennial concerns of producers – land tenure, water access, or commercialization channels.

During the COVID-19 pandemic and lockdowns, producers reported a rise in online sales. As there was little formalized online infrastructure in place, products were mainly promoted on social media. Consumers express their interest via comments and messages. Farmers contract a service or deliver products themselves, and consumers pay in cash or bank transfer upon receipt.

Governance

Surakarta is beholden to 2012 federal laws mandating food security (the Food Law). To this effect, the city devised their Regional Action Plan for Food and Nutrition 2016–21, the budget being USD 65 million for five years. This plan does not explicitly privilege UPA. Focusing instead on food security and nutrition, it prioritizes increased quality of access and increased productivity of agriculture.

The Plan is implemented by the Food Security Council, which reports directly to the Mayor. This council is composed of the secretaries of various departments such as Agriculture, Food Security and the regional office. There is cross-sectoral cooperation with 11 secretaries engaged in implementing the plan and managing the budget.

Cross-level cooperation between national, regional and city policies and practices is well articulated. However, this generally takes a top-down approach. Surakarta implements national level policies at the local level, articulated in tandem with regional authorities, as seen in the above Regional Action Plan for the Food Law. There seems to be little in the way of grassroots or multi-stakeholder approaches.

Another programme the federal Ministry of Agriculture implements in the city is the Sustainable Food Home Area. This programme is administered by the city Department of Agriculture, Food Security and Fisheries and focuses on women's involvement in urban agriculture. Women are under-represented and underpaid in agriculture around Surakarta and are, therefore, targeted as beneficiaries. The city department plans to initiate five Women's Farmer Groups each year, budgeting USD 3 420 for each group for the start-up, training and land acquisition procedures. So far, 26 Women's Farmer Groups have been established.

Little to no budget has been set aside for evaluation and monitoring of all these initiatives.

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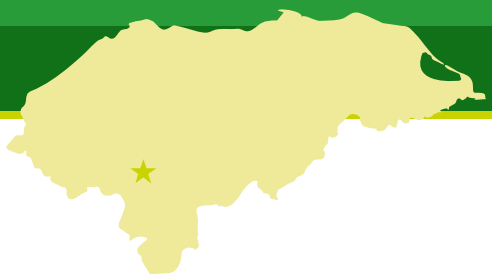


CASE STUDY 6

TEGUCIGALPA, THE REPUBLIC OF HONDURAS

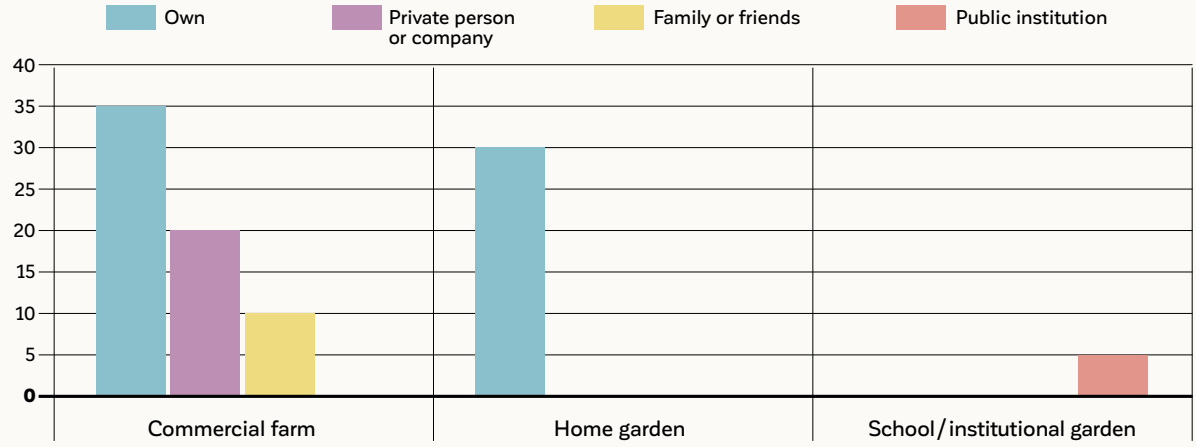
Land

In Tegucigalpa, 24 percent of the land area is used for agriculture and 67 percent is forest or mountainous areas with slopes greater than 15 percent incline. The irregularity of the terrain makes agriculture difficult.

Similar to other case studies, commercial farmers generally occupy sub- and peri-urban areas of the city where they cultivate anywhere from 2 500 m^2 to 2 ha (20 000 m^2). As shown in Figure 6.1, all home garden respondents own their land, as do a majority of commercial farmers.

Most commercial respondents manage the land themselves. Most have inherited both their land and the farming business from their parents.

FIGURE 6.1 Ownership by type of urban and peri-urban agriculture in Tegucigalpa



Water

In Tegucigalpa, water shortages are common with frequent interruptions in municipal water service. Ninety percent of respondents have drip or sprinkler irrigation systems connected to community reservoirs or water springs. Most commercial farmers also use rainwater harvesters. The average commercial farm irrigation system, according to respondents, costs USD 811. Of these irrigation systems, the city government supports 70 percent technically or financially.

According to the study, in a neighbourhood of 500 families, the municipal government provided machinery and funding to construct 10 community reservoirs. These reservoirs can generally service ten producers.

While only 5 percent of respondents use wastewater recycling, treated wastewater is the most viable water source for UPA considering the persistent water shortages in the summer. Yet, only the Zamorano University, which is a fair distance from Tegucigalpa, has a commercial scale wastewater treatment system.

In urban areas 5 percent use the artisanal technology of filtering through gravel filled tires. With the use of drip irrigation, the construction of reservoirs, along with training, Tegucigalpa has seen a more rationed use of water in UPA.

A widespread concern is the contamination of water with chemical pesticides.

Labour

All commercial UPA respondents hire labour, while home and institutional gardens do not. Home garden respondents rely on volunteer labour exclusively. Commercial farmers also hire more full-time than seasonal labourers, at least twice as many. Women are employed at a much lower rate than men on commercial farms.

The average total annual cost of labour for commercial farmers is USD 5 283.

One community garden UPA project is facilitated through El Verbo Church; 600 women participate in the cultivation of the garden on the church's land. In order to ensure smooth participation in the project, the women are divided into groups of 30 and each group is obliged to work in the garden once every 20 days. Surplus produce is distributed according to those who have worked extra hours.

In Tegucigalpa there is a positive correlation between number of employees and annual yields of 0.638.

Finance

Many respondents in Tegucigalpa reported they do not access credit because there is no need. However, the second most common response is a lack of financial institutions in the area.

In Table 6.1, investment costs and operational costs for commercial respondents are compared side by side. As is readily apparent, commercial farmers' operational costs far exceed their investment costs. As all commercial respondents use synthetic pesticides and fertilizers, they generally practice input intensive agriculture. This means operational costs are higher than if they synthesized their own inputs.

TABLE 6.1 Yearly commercial urban and peri-urban agriculture in Tegucigalpa

Investment costs (USD)	Operational costs (USD)
3 645	49 463
2 147	15 196
2 086	12 936
3 078	11 036
628	10 801
2 025	10 652
3 848	9 100
1 094	6 547
2 106	5 891
1 377	5 706
1 458	4 645
486	4 358
648	3 467

A 2011 FAO project trained 11 savings and credit banks to manage UPA funding. The farmer-members of these credit unions were obliged to deposit 50 percent of the support they received from the FAO project. The self-sufficiency of the community increased, the credit unions manage USD 5 000 annually for their members and provide loans from these funds. Unfortunately, the expertise gained from the project has not been distributed and replicated among other financial institutions and communities.

Only respondents who are commercial farmers reported receiving credit. Of these, 50 percent use banks and 42 percent use micro-finance institutions.

Commercial respondents report, on average, that 80 percent of their household income comes from UPA. This income ranges widely, from USD 4 000 to USD 20 000 annually. In 2019 the minimum wage in Honduras was USD 7 900/year.

FUNDER Agri-Business Foundation provides financial support to the commercial agricultural sector, though none of the study respondents reported interacting with this foundation.

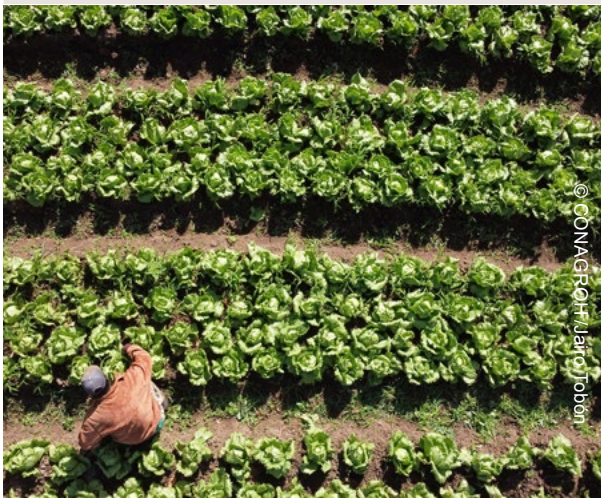
Agronomy

Respondents in Tegucigalpa who practice commercial UPA all report they follow good agricultural practices. Home gardeners are evenly split between agroecology, organic and GAP. However, none of the respondents have quality assurance. Moreover, only 5 percent of all agricultural products sold in the city have quality assurance.

Most commercial respondents cultivate on open ground (Photo 6.1). Many also use raised beds and greenhouses (Photo 6.2). Home garden respondents most often adopt micro-gardening techniques, using small containers or boxes to grow tomatoes, onions, herbs and leafy vegetables (Photo 6.3).

Common UPA techniques and technologies in Tegucigalpa include greenhouses, vermicomposting, drip irrigation, production in recycled tyres, water harvesters, wastewater recuperation. One respondent also uses hydroponic technology.

6.1 Cultivation on open ground



6.2 Hydroponics in greenhouse

6.3 Using small containers to grow herbs and small vegetables

Commercial respondents said that market price and high demand were their main reasons for choosing what to cultivate. Home garden respondents tend to cultivate based on personal preference and nutritional diversity. As home gardeners exclusively produce for their own consumption, this also leads to less chemically intensive farming and better overall environmental sustainability. On the other hand, commercial respondents prioritize economic solvency over environmental concerns, leading to more intensive use of chemical pesticides and fertilizers.

A major concern for many farmers is the contamination of water because of the indiscriminate use of chemical pesticides.

The study in Tegucigalpa found low rates of access to technical services among respondents: only 40 percent reported receiving technical assistance.

Of the support received, most is in the form of applying GAP and post-harvest processing techniques. The Directorate of Agricultural Research and the National Institute of Vocational Training are public sector organizations that provide technical support to farmers. FUNDER, mentioned above, provides business development services and NGOs, such as Madre Tierra, provide support to family orchards in cultivation of native varieties.

Despite these various initiatives, Tegucigalpa has seen a high rate of attrition of urban farmers. For example, of 1 200 gardens begun during a 2009–2011 FAO project, only 15 percent are still producing. This is largely because of a lack of technical assistance. During the project, FAO and the Mayor's office funded and staffed three training and demonstration gardens. In the years that followed, the city disinvested in two of the gardens, leaving only one demonstration garden.

It is therefore notable that the most common reason commercial respondents participate in producer networks is to share good practices.

Value chain

Regarding inputs, all but one commercial respondent purchase inputs from vendors. The only notable exception is animal feed – most commercial respondents feed livestock from their own production. The second most cited reason for commercial farmers to participate in a producer network is to share inputs.

In Tegucigalpa, many producers do not have access to the Internet, making it impossible for them to access some of the online tools, such as INFOAGRO, which was developed to provide up-to-date information on prices. Furthermore, options are limited for commercializing products.

Sixty-two percent of commercial respondents sell their products on-site or at local markets direct-to- consumer (home garden production is exclusively used for consumption). Economies of scale exclude small farmers. Those that approach the scale to sell to supermarkets often lack the professional skills to obtain fair prices and supply reliably.

Women are usually responsible for small-scale direct sales in traditional markets and on the street in residential areas. Men generally handle larger commercial exchanges with supermarkets and intermediaries.

Several commercial farmers reported contracting with a private company. These contracts are often arranged in tandem with the initial development of the farm to ensure a steady channel of commercialization and to secure an income stream. Several other respondents reported selling in local markets through intermediaries.

FUNDER, a bank and the supermarket chain La Colonia, initiated a national level programme, De Mi Tierra, to connect farmers with other actors in the value chain. The bank provides funding, FUNDER supports farmers with technical assistance, and La Colonia's 46 supermarkets nationwide provide opportunities for commercialization. The programme's efficacy has not been evaluated.

Governance

No food policy has been created at the municipal level in Tegucigalpa. The city signed the Milan Urban Food Policy Pact in 2015 and is a member of Local Governments for Sustainability (ICLEI). Most initiatives implemented by the city government are articulations of national level policy. For example, the National Sustainable Rural Development Program was extended to include urban areas in 2012. However, the government failed to allocate funds to municipalities.

A national level food security initiative also has been implemented at the city level.

On the whole, various national level organizations implement projects in urban areas, but there is no centralized plan for Tegucigalpa. This results in very little cross-sectoral cooperation.

Despite multiple FAO pilot projects, and a variety of national organizations and local non-profits initiating projects, there is generally a lack of follow through and coordination. The earlier example of the attrition of urban demonstration gardens funded by the city seems exemplary. However, there are still grassroots modes of expansion and upscaling.

School garden initiatives, supported by FAO and the Mayor's office, targeted primary-school children in Cerro Grande in 2009–2010. Teachers were trained to work with students and a tank connected to an irrigation system was installed to store water and a greenhouse to produce seedlings. Today, in addition to growing fruits, vegetables and herbs in their garden, schoolchildren also process and sell their own products such as pickles, jellies, candies and fortified tortillas in the community. This has produced a positive "multiplier effect": 40 of these schoolchildren's families have created their own home gardens in their backyards.

7

OVERVIEW, CONCLUSIONS AND RECOMMENDATIONS

The benefits of urban and peri-urban agriculture are varied and substantial. UPA can bring improvements in income, access to diverse and nutritious food, social cohesion and environmental health. In Tegucigalpa, UPA farmers consumed, on average, 35 percent more fruits and vegetables than before they began farming. In Quito and Arusha, UPA provides approximately 26 percent and 23 percent (respectively) of the total food needs of the city. In Dakar, UPA farmers reported diversifying their diet with nine more types of fruits and vegetables. In Quito, the average urban gardener grows 43 different horticultural species, diversifying their nutritional intake and preserving biodiversity and heirloom varieties. Surakarta has seen greater inclusion of women in agriculture in the form of women's cooperatives funded by the city. In Leuven, persons with disabilities are employed on many farms through government incentives.

This is, by no means, an exhaustive list of the benefits reported in the case studies, but the benefits follow the pattern observed in other locations – UPA farmers report positive effects on income, community and family cohesion, diet, and the immediate environment (or, at least, a heightened awareness of the importance of sustainability in agriculture).

The following sections will draw out conclusions based on an overview of all the case studies. The case studies are compared to one another following the same thematic progression seen in each case study: Land, Water, Labour, Finance, Agronomy, Value Chain and Governance. For gaps in existing policy and practice, suggestions based on the case studies, are made concerning potential institutional and policy actions to ensure the benefits of UPA are as widely accessible as possible. General conclusions are limited by the scope of this study, but form the basis of recommendations for further research.

Land

Agricultural land in all case studies is disappearing. The decrease in agricultural land in urban and peri-urban areas seemingly follows a few broad patterns, always in combinations:

Expansion: Urban expansion results in decreasing amounts of land for agriculture. This may take the form of residential expansion, as reported in Arusha, Dakar, Leuven and Surakarta, or through the expansion of industry, seen in Surakarta with the growth of batik factories.

Fragmentation: Land fragmentation causes agricultural parcels to become smaller and smaller, hampering effective management and productivity. In Dakar, the number of farmers has increased steadily since the 1960s. In Surakarta, inheritance divides land among children in ratios that privilege males. When combined with urban expansion, this fragmentation can increase the uncertainty of land tenure for UPA farmers.

Concentration: The concentration of land into the hands of fewer and fewer agricultural companies makes procuring land more difficult for aspiring farmers. As seen in Leuven, this phenomenon is often accompanied by marked increases in the price of agricultural land (increases of 27 percent in the Leuven area).

Limitation: Geographic or topographical limitations constrain both urban expansion and agricultural production. In Quito and Tegucigalpa, steep inclines and inhospitable terrain at higher altitudes make both farming and urban expansion more capital intensive, excluding many small producers either through the unsuitability of the terrain or the capital investments required to cultivate the land.

With decreasing availability of agricultural land, how can UPA producers access land and maintain their use rights?

Land tenure, allotment, and zoning

- As enacted in Leuven, lease-free city-owned plots can be distributed to aspiring gardeners while mandating continued agricultural use. This prevents the conversion of agricultural land into residential areas.
- Mandating formalized use agreements would increase the security of land tenure in places like Dakar, where informal agreements keep farmers in a state of uncertainty. Whether these agreements are between individuals, between companies and individuals, or between individuals and the government, they should be registered with municipal authorities to protect the usufruct rights of farmers.
- Making such formalized agreements must correspond with zoning the land in question for agricultural use to prevent its transfer to non-food purposes. Such zoning practices could be used to prevent the easy conversion of agricultural land to residential (seen in Arusha with the failure of the irrigation scheme).
- Disincentivize the use of arable land for non-food purposes. Zoning land for agriculture can still lead to occupants not using it as such (pasturing of horses in Leuven), taxing unproductive agricultural land at higher rates could reduce these kinds of practices.
- Instead of earmarking unproductive agricultural land for residential use (as in Surakarta), consider the ecosystem services provided, potentially ceding non-productive areas to existing farmers in the form of management agreements (as seen with CSA farmers in Leuven).
- Invest in production technologies such as terracing in places like Tegucigalpa and Quito to open up greater areas of land for cultivation in the face of topographical challenges.
- Urban planning strategies can earmark spaces within the built environment for agriculture (rooftops, green spaces, etc.). Urban plans should also include limitations on urban sprawl and prioritize/incentivize renovation of existing urban infrastructure over expansion into peri-urban areas.
- Develop plans for using vacant land in the urban area. Vacant areas owned by the city could be registered to urban farmers with term-specific contracts. Vacant areas owned by private companies or individuals could be granted property tax waivers if they enter into term-specific contracts with UPA farmers.
- Designate areas of the city where off-plot production is allowed and set parameters to regulate such activity.

7.1 Vacant ground developed for production

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Water

Water needs vary widely across the case studies. In Arusha, Leuven and Surakarta water access is neither a primary concern nor a high cost. UPA farmers in Arusha reported paying only USD 6 to 10 annually for their water, while UPA farmers in Dakar paid, on average, almost USD 3 000 annually. With climate change causing dry places to get drier and even temperate places to experience unusual rain patterns, freshwater availability will only become more pressing in the coming years. Besides, most respondents in all the case studies reported the quality of the water they used was untested. This is especially concerning considering the widespread worry among respondents about pesticide contamination in the water supply.

Water is always a shared resource. Whether as rain, groundwater, rivers, reservoirs, or the piped municipal supply, water is held in common. In Dakar, farmers share the municipal water supply with citizen-consumers. The river Themi is the common source for almost all producers in Arusha. Community and regional reservoirs are common in Tegucigalpa and Surakarta, respectively. All farmers look to a cloudy sky with expectation. Contamination and reduction of the water supply has far reaching effects for all farmers in a given area.

In the face of reduced availability, increasing irregularity, and potential contamination of the water supply, how can UPA producers efficiently and safely access the water they need?

Water availability and efficient use

- As seen in Dakar, regulating water use while giving preference to agriculture is important for drier climates. Water tariffs and quotas should be integrated into urban planning for UPA.
- Irrigation techniques such as drip irrigation use water more efficiently than other forms. Sprinkler irrigation results in more rapid evaporation, especially in hotter climates. Incentivize the uptake of irrigation technologies that take into account the climatic conditions of the area.

- Many producers diversify their water supply, except in Dakar, where almost all producers rely exclusively on the municipal water system. In Quito, most commercial farmers cannot rely exclusively on harvested rainwater for their production, but it can be a helpful supplement. Moreover, incentivizing the uptake of rainwater harvesting techniques among small-scale home gardeners can alleviate the burden on municipal water supplies. In many places, there is less of a risk that rainwater is contaminated.
- The city can undertake large-scale irrigation projects to supply water to those at a distance from the water source, as attempted in Arusha.
- Establish regulatory protocols for the treatment of wastewater for use in agriculture. Rather than prohibit recycled wastewater in horticultural production, as in Dakar, establish treatment protocols for consumer protection. As in Tegucigalpa, conduct training on cheap, artisanal wastewater filtration.
- Invest in technologies and research cooperation to use saline water for production in dry coastal cities like Dakar or other low-elevation urban areas facing rising sea levels.[3]

7.2 Irrigation system applied in urban farmland

Labour

Labour is a vital, though often under-considered, aspect of agriculture. For many UPA practitioners in the case studies, a significant part of their operating expenses goes to employing full-time or seasonal labourers. Though employment varies widely across the different cities, the majority of commercial respondents in all the cities hire labour for some part of the year. However, it is difficult to earn a living wage as an agricultural worker, often because farmers cannot pay well and because of the seasonal nature of the work.

Hiring labour can lead to greater social inclusion and greater agricultural productivity.

Increased rates of employment in urban agriculture would help distribute the financial benefits of UPA among the landless and unemployed. It can also serve as a training opportunity for the next generation of urban agriculturalists.

The study results indicate a notable positive correlation between number of employees and annual yields in Arusha, Dakar, Quito and Tegucigalpa. As the sample size for this study was small, these results should not be taken as representative; they are indicative of a trend that should be explored further. In these cities, the positive correlation (0-1) between yields and employees was as follows:

Arusha: 0.822.

Dakar: 0.64.

Quito: 0.642.

Tegucigalpa: 0.638.

The correlation in Surakarta was almost non-existent at 0.067.

This trend of positive correlation does not hold in the data gathered from Leuven, in fact, the opposite trend is seen. Leuven data showed a negative correlation between yields and number of employees at -0.502. As only commercial and CSA farmers in Leuven had data on yields, the following correlations are controlled for only commercial and CSA respondents in an attempt to explain this divergence from the other cases.

3 For more information see https://www.voanews.com/silicon-valley- technology/dutch-experiment-shows-farming-salty-water-possible

We found a strong negative correlation between land area and number of employees at -0.887. No other case study had a negative correlation between land area and number of employees.

Moreover, we found a positive correlation between land area and annual yields at 0.844.

Based on these trends, the area of land cultivated has a greater effect on yields in Belgium because of mechanization. While all farmers in the four cities with positive yields/employee relationships cultivate less than 5 ha (usually significantly less), the average area under cultivation in the Leuven study was over 23 ha. When controlling for institutional and community gardens, the average area under cultivation for CSA and commercial farms is over 36 ha. In this case it becomes clear that the positive correlation between number of employees and yields is dependent on a smaller area of cultivation.

With this information in mind, how can policy-makers and UPA farmers efficiently and respectfully manage agricultural labourers?

7.3 Female urban farmer checks plants

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Labour for inclusion, training, and sustainable intensification

- Further investigate these positive correlations between yields and labour, as the case studies are not derived from large enough sample sizes to be representative.

Sustainable intensification

- Resilience of the city's food supply is a primary goal, yet available land is rapidly dwindling. Planners need to consider methods of sustainably intensifying production. The relatively small size of most UPA plots (i.e. in Quito, 500 to 1 000 m2) precludes the use of heavy machinery, which is often used in rural agriculture to stimulate higher yields. Moreover, limited access to credit places the infrastructural investments for vertical farming out of reach of many urban farmers. Labour should be leveraged as a method of sustainable intensification.
- Incentives based on the size of the cultivated area could be distributed in the form of employment credits/subsidies to increase the number of labourers a UPA farmer can hire.
- Payroll taxes or associated costs for agricultural producers could be eliminated.
- Farmer cooperatives could extend membership to landless labourers, creating a ready labour pool for farmers.

Social inclusion

- Leuven subsidizes hiring people with disabilities. This allows for an increased labour base for farmers, while also promoting more healthy and active lifestyles for the differently-abled and providing them a nominal wage.
- Apprenticeship programmes could be created, in partnership with schools and universities, where young people can learn from and work for UPA farmers for credit.
- Ensure the eradication of wage gaps between male and female employees.

Migration and unemployment

- The majority of agricultural labour is contracted on a seasonal basis, though very few study respondents employ migrant labourers. Migrant labour is an important phenomenon to be considered by policy-makers concerned with urban agriculture. Making seasonal work visas, temporary housing, and employee protections more accessible to migrant labourers would increase their employment security and expand the seasonal agricultural labour pool.
- With rapid urbanization increasing un- or underemployment, seasonal agricultural labour could be promoted as part of the antidote to pervasive job insecurity in cities. This must be accompanied by incentives meted out to farmers to increase their labour pool instead of mechanizing.

Finance

Based on the city case studies, the percentage of respondents who did not access credit was always greater than 50 percent, ranging to almost 70 percent in Dakar, confirming that UPA farmers generally do not access credit. Most of those who access credit are commercial farmers, except in Arusha where twice as many home gardeners access credit than their commercial counterparts. Except for Leuven, the overwhelming majority of commercial farmers have operational costs that far exceed their investment costs (more than double in many cases). This trend, when paired with the low incidence of accessing credit among respondents, suggests a different interpretation of the most cited reason for not accessing credit.

©Rikolto/Camille Rannou

Many respondents from all the cities who did not take out credit reported there was "no need" to do so. This suggests respondents' understanding of "needing" credit is related to the difficulty of access. The second most common reason was that they "don't like to take out credit." In Arusha, Dakar and Tegucigalpa, unaffordable interest rates and a lack of financial institutions in the area were also frequently cited.

While we imagine loans should be used to increase capacity-building infrastructure and to increase incomes, farmers "need" credit for their operational expenses. In the Arusha case, respondents reported being granted a loan for infrastructure investments only to use the funds on seeds, vaccines, or other inputs. So, for the UPA farmers in this study, there may not necessarily be a "need" to access credit for investing in productive capacity. However, this lack of need is undoubtedly related to a lack of easy access to credit and a reticence to take on debt unless it is "necessary" for operational expenses, at which point farmers take out credit at potentially unaffordable rates and inaugurate a potentially vicious cycle of debt.[4]

Considering the general inaccessibility of credit and high interest rates, how can UPA farmers gain access to capital investments to build productive capacity and increase their income?

Finance livelihoods and capacity-development:

- Facilitate farmer credit unions such as the FAO project in Tegucigalpa.
- Develop co-signatory agreements between farmer cooperatives and banks.
- Finance on-farm infrastructure development projects with flexible repayment plans.
- As demonstrated in Leuven, agricultural subsidies are vital to achieving liveable incomes for producers. Develop subsidies explicitly targeting UPA farmers.
- Create incentives for private investors to invest in UPA.

Agronomy

Many agricultural techniques and models are represented across the city case studies.

In Quito, the almost universal uptake of organic or agroecological practices among respondents is a laudable achievement. AGRUPAR undoubtedly has a large role to play in this through the ready provision of technical assistance. On-farm production of organic inputs generally reduces operational expenses and reduces chemical contamination of the environment. AGRUPAR members would undoubtedly be aligned with the CSA farmers in Leuven who follow an ethics of care.

Organic, biodynamic, and agroecological production requires more labour (related to the points on sustainable intensification above) than conventional practices and occupies more artisanal markets where a higher price is acceptable.

For home gardeners in many cities, micro-gardening techniques were a feature of their UPA practices. Micro-gardening can be done almost anywhere in almost anything. This versatility is a strong asset for the broad uptake of these practices.

Most community gardens in the study were in urban areas on small areas of land. Micro-gardening is a common practice for community gardens in Dakar. Elsewhere, space-conscious practices such as raised beds mitigate potentially compromised soil and lack of space. Many community gardens are also managed by different people with separate spaces in the garden. This encourages the spatial dividers inherent in micro-gardening or raised, contained beds.

Commercial gardens have the widest range of agronomic practices. Generally speaking, the size of the area cultivated corresponds to more input intensive farming. To achieve an economy of scale, larger land areas tend towards monocultural production. Horticultural production is generally confined to smaller commercial farms.

4 This could be compared with a phenomenon in the American healthcare system where low-income, uninsured people do not "invest" in check-ups and preventative care because of high costs and lack of "immediate need." Then, when they fall ill, the need for care becomes readily apparent and they go to the emergency room, where they accumulate massive bills. While this is a rough analogy, the construction of "need" is potentially similar, especially for low-income farmers.

The trend, noted in Tegucigalpa, that producers are less oriented towards environmentally sustainability than those who are oriented towards home consumption, also generally applies across the rest of the cases.

In the face of anthropogenic climate change, how can UPA farmers achieve greater environmental sustainability in their production practices in tandem with financial solvency?

7.4 People communicate in a garden

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Agronomy in sustainability, education, and technical assistance:

- For respondents across all six cities, "sharing good practices" is the most cited reason for joining a producer network. Expand support for farmer cooperatives and producer networks.
- Fund agricultural research in universities and other research institutions. More importantly, farmers are always experimenting – fund and incentivize on-the-ground research into best practices and innovative techniques.
- Incorporating gardens into primary and secondary school education creates greater knowledge of food systems and ecosystems. In Dakar, while there are school gardens, a lack of school canteens prevents the nutritional benefits from being realized at school. Combine school gardens with school canteens that can showcase nutritional and flavour qualities of the produce. These school gardens can also have positive multiplier effects on children's families, as seen in Tegucigalpa.
- More robust nutritional education programmes will create a broader consumer base interested in diversified diets and locally produced food.
- Provide and fund demonstration plots (a feature of all case studies) for agricultural knowledge transmission.
- Employ municipal agricultural extension agents devoted exclusively to UPA.
- Make technical services affordable and readily available, as with AGRUPAR in Quito.

Value chain

Despite our desire to engage in a more systems-thinking approach, we use a value chain to refer to the (not-so) linear trajectory from inputs to production to distribution to sales.

Recycling organic waste for fertilizer is a common practice among respondents in the case studies, linking the beginning and end of the chain. However, at the city level, the case studies did not investigate consumption patterns and obtained insufficient information on city waste management.

As mentioned above, those cultivating smaller UPA gardens often make their own inputs while commercial farmers often purchase from vendors. Some study respondents also reported sharing inputs as a primary reason for participating in producer networks. The majority of producers sell unprocessed products to customers or traders. However, some producers have value-addition processing on-site, which is a major boon to their revenue stream. In some cities, like Arusha, value-addition processing is available to producers.

A commercialization trend in Dakar, Tegucigalpa, and (to some extent) Quito involved women taking on small-scale direct sales while men handle larger commercial sales with collectors and traders. This corresponds with a still persistent division between the feminized private sphere and the masculine public sphere. While women are certainly not confined to the home, their economic influence tends to extend to direct sales in traditional markets and not much further. While this is not true of all cities in the case studies, nevertheless it is worth noting.

In a competitive market economy, how can UPA producers be further incorporated into the city food value chain?

Value chain inclusion and valorizing UPA

- Developing and regulating a regional products label (i.e. geographical indicators) can assist with the marketing of local products and secure higher prices for farmers as seen in Leuven with Straffe Streek, which is a non-profit organization in Belgium that helps promote Flemish Brabant products.
- Hold egular, publicized city markets promoting regional products. Many cities (Dakar, Leuven) hold large farmers markets infrequently (once a year/every 2 to 3 months) to showcase local products. These markets should occur more frequently and, for larger cities, should be expanded to multiple locations for further market saturation.
- As in Arusha, providing licenses to agricultural companies can provide greater access to inputs for UPA.
- For schools that may not have the space for a community garden, part of the budget should be allocated to sourcing some products from nearby UPA farmers.
- Catering procurement requirements could be set for smaller municipal events to include produce from UPA.
- In Dakar, cold storage facilities in the city are far too large for the volume of products. Repurposing existing infrastructure, and combining functions should be considered prior to new construction.
- Many farmers commercialize products in traditional markets – ensuring appropriate infrastructure maintenance is vital to the safety and sanitation of local food trade.
- In the face of COVID-19, UPA farmers in Surakarta turned to social media to commercialize their produce. Build on these grassroots innovations to develop new channels and modes for commercialization.

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Governance

Governance touches upon all the aforementioned recommendations. Good governance is imperative in the planning and implementation phases of UPA projects. Despite the grassroots nature of many urban agriculture initiatives, with urban farms sprouting up like wildflowers, without proper care UPA can wither in inhospitable environments.

In all the cities studied, policy is implemented to create more enabling environments for UPA. In many of the studies, this takes the form of national level policies that are enacted and implemented at the municipal level.

At a different level, several of the cities have signed the Milan Urban Food Policy Pact (MUFPP), pledging them to an international agreement to develop sustainable food policies at the city level. While such an agreement is not binding, in the way that national level policies are, it contributes to international cooperation and accountability for establishing positive change in city food systems.

Of the case studies, none of the national level policies that were adapted into city actions explicitly targeted UPA. Most were federal policies for agriculture or food security. These federal policies were often harvested to finance specific UPA projects at the city level. Only Leuven has an extant city level food policy. Quito has the Agri-Food Pact Strategy that has been adopted by the municipality without yet obtaining the status of an ordinance. In Dakar, the Rufisque municipality has a food policy with broad community support. All three of these were developed with the cooperation and inclusion of a broad spectrum of stakeholders.

7.5 UPA multi-stakeholder dialogue

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With the MUFPP, places like Dakar are moving towards increasingly devolved governance, having robust city food policy is imperative to ensure citizens capture the benefits of increasing city autonomy.

Facing new challenges in an increasingly decentralized and ever-changing world, how can municipal authorities plan and govern to prioritize UPA in their cities?

Governance through inclusion and cooperation

- As demonstrated in Dakar, Leuven and Quito, multi-stakeholder approaches ensure the broad support of the community and enhance cooperation between relevant actors. This can be imitated elsewhere by involving a representative range of stakeholders from varying backgrounds in ideation for food policy. There should be flexibility in both meeting times and meeting place to enable the participation of farmers. Using technology effectively for group meetings has become second nature during COVID-19, online meetings should be an option to promote greater inclusion.
- Municipal authorities should take civil society organizations and farmer cooperatives into account in planning.
- The development of a city food plan and food policy should be accompanied by stable budget allocations. The growth of AGRUPAR in Quito attests to the power of even a small, dedicated budget in scaling up initiatives.
- Other city food policies can and should be used as a model, blueprint, and inspiration for other municipal actors to develop and complement their own policies.
- Clear communication between institutions will allow similar projects to merge, eliminating overlap between initiatives.
- Cross-sectoral collaboration through the creation of city food councils will avoid some of the pitfalls of uncoordinated actions taken by a single department.
- Conceptualizing and mapping the city food system as an integrated, complex whole will allow for more robust policy actions.

Conclusion

The farmers and gardeners surveyed and interviewed in these case studies are already involved in making the food system more sustainable. Each one is rendering environmental services, to different degrees, for their neighbours and fellow citizens. All of them increase the resilience of the food supply by making a contribution towards the total food needs of the city in which they live. Urban and peri-urban agriculturalists are doing the same in every city around the world. This report has illustrated some of the challenges, benefits, practices and policies related to UPA in six cities. There are many more.

UPA is not a silver bullet; it is certainly nothing so violent. The producers partially profiled in this report are generating and growing the kind of food systems they would like to be part of. Undoubtedly they all have different visions of what a sustainable food system looks like, but diversity of vision can be harnessed to productive ends. Urban planners, city politicians, private investors, and other decision-makers can join with urban and peri-urban farmers to create a more sustainable food system together – bringing together diverse perspectives and visions to create silver seeds, ideas that can grow and germinate in the soil of the city.

Recommendations from Leuven "Food Connects"

- When drafting a food or urban or peri-urban food strategy start by mapping the initiatives and actors already present – build upon existing initiatives.
- When drafting the strategy keep in mind how it will be implemented. Ensure actions are tangible from the beginning to avoid losing stakeholders who are more practically oriented.
- The entire city council should be on board when you start working on the strategy.
- Work in a participatory way – involve producers, citizens, civil society organizations and research institutions.
- Connect with your farmers and listen to their needs. Every farmer is different – some will find it more difficult to switch to sustainable agriculture, work to include alternative and mainstream farmers.
- Look for inspiration from cities with an existing strategy, establish contact with them and exchange best practices.
- Hire an expert, if you have the budget, to help facilitate the multi-stakeholder process (highly recommended).
- Make ambitious goals –not everything needs to be possible short term. Have some goals that are long-term targets to strive towards.
- When implementing the strategy, ensure good collaboration between different city departments. Reach an agreement for working definitions of terms such as healthy, sustainable, and local and use common standards for all food-related actions.
- Avoid fragmentation. Choose a limited number of topics and focus your energy on making progress in these areas.
- Appoint a coordinator to oversee the implementation, serve as a point of contact, and make connections between different organizations and initiatives.
- Allocate a budget for the implementation of the strategy. With many organizations in the city eager to start a project, have funds to support them and make bigger projects possible.

Urban and peri-urban agriculture producers profiled in this report are generating and growing the kind of sustainable food systems they would like to be part of. All have different visions, but diversity of vision can be harnessed to productive ends.

The city-case studies found in this report can help urban planners, city politicians, private investors, and other decision-makers join with urban and peri-urban farmers to create a more sustainable food system together – bringing together diverse perspectives and visions to create silver seeds, ideas that can grow and germinate in the soil of the city.

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