

The Scalability of Urban Agriculture: Chicago Case Studies

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Abstract

Urban farming and community gardening are gaining popularity as strategies to address food insecurity and inequities in city life. Urban agriculture has been proposed as a way to enhance a city's resilience. This concept is not new, as Ludwig Hilberseimer and Alfred Caldwell demonstrated in the 1940s when they envisioned a more resilient city for the industrialized world utilizing a decentralized, linear development model within a productive living landscape. In asserting that "small farms could solve mass poverty, mass unemployment and inflation—our great national disasters," Caldwell presented a vision of small-scale farming as an act of resistance and empowerment for individuals, with the goal of initiating large-scale social and environmental transformation. This study takes Caldwell's assertion as a starting point to investigate what we can learn from existing examples of urban agriculture in order to enhance urban resilience.

The research examines three distinct approaches to urban farming currently implemented in Chicago, aiming to extrapolate their scalability and impact on broader societal and environmental change. The selected cases represent a range of farming practices and organizational types, encompassing conventional raised bed farming, aquaponics, hydroponics, and permaculture. Organizational diversity is reflected in the inclusion of a large non-profit organization, a local community group, and a private entrepreneur. Each case is analyzed based on a) The specific approach to farming technologies and practices, b) The corresponding development and implementation process leading to fruition, c) Evaluation of its transformative effects on individuals and its broader societal and environmental impact, d) Identification of perceived opportunities or barriers to growth and long-term success. The study identifies numerous opportunities for scaling up and emphasizes the varied objectives in urban agriculture. To support the growth of urban agriculture within resilient cities, a comprehensive multi-faceted, multi-scalar framework is necessary.

Keywords: sustainable development, resilient city, aquaponics, hydroponics, permaculture.

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INTRODUCTION

According to the U.S. Department of Agriculture, 10.2 percent of households are affected by “low” or “very low food security” (USDA 2021). In Chicago, a recent report showed that more than 16 percent of households in the metropolitan area, and 22 percent of households with children, currently face food insecurity (GCFD 2022). Despite these statistics, the U.S. discards nearly 38 percent of the food produced, or 241 million tons of food (ReFED 2021), highlighting the need for systemic improvements. Urban agriculture has been posited as a means to increase a city’s resilience. This concept is not new, as the example of Ludwig Hilberseimer and Alfred Caldwell demonstrated in the 1940s, envisioning a more resilient city for the industrialized world through a decentralized, linear development model set within the context of a productive living landscape. In asserting that “small farms could solve mass poverty, mass unemployment and inflation—our great national disasters,” Caldwell posited that urban farming could be a path to large-scale social and environmental transformation (Caldwell 1948; Jones and García-Requejo 2020; Jones 2022). This study takes Caldwell’s claim as a starting point to explore what can we learn from existing examples of urban agriculture as a means to increasing the city’s resilience.

The research examines three distinct approaches to urban farming currently implemented in Chicago, intending to investigate their scalability and potential impact on broader societal and environmental change. The selection of cases was deliberate, aiming to encompass a diversity of farming practices, organizational forms and leadership perspectives. The studied practices include conventional raised bed farming, aquaponics, hydroponics and permaculture—all of which are viable within an urban context. The operational leadership perspectives represented include a large corporate non-profit, a community group, and a private entrepreneur. Each case was analyzed in terms of a) The specific approach to farming technologies and practices, b) The corresponding development and implementation process leading the project to fruition, c) Evaluation of its transformative effects on individuals and its broader societal and/or environmental impact d) Identification of any perceived opportunities or barriers to growth and long-term success.

Data for this study were collected through direct observation of each site, including guided tours, review of published literature, and interviews with key representatives from each case who were responsible for operations and/or involved with the project’s initial development. The representatives interviewed were Angela Mason of Chicago Botanic Gardens and Windy City Harvest, Joseph Lesch of Lawndale Christian Health

Center, Annamaria Leon of One Straw Community Garden, and Alicia Nesbary-Moore and Lucia Leon of Herban Produce. Each interview was conducted by the author as an open dialogue centered on the four points (a) through (d). Notes were taken during each interview and each interviewee was given the opportunity to review the manuscript and comment. No changes were requested.

During the interviews, it became clear that an understanding of the existing regulatory context would enhance the study and establish a basis for comparison in other locations. Consequently, issues related to land use, water access and permits were investigated more thoroughly. The local policy and procedures are presented in the findings to serve as a foundation for general claims about the scalability of urban agriculture based on the three cases.

1. FARM ON OGDEN

1.1. Development and Implementation Process

Farm on Ogden is a non-profit farm operated by the Chicago Botanic Garden (CBG) under the auspices of Windy City Harvest in partnership with Lawndale Christian Health Center (LCHC). It is an educational-community farm working to improve food, health, and jobs in North Lawndale, Chicago. The partnership between CBG and LCHC developed over several years, beginning with a small community garden located on an urban lot owned by LCHC (Figure 1a). LCHC envisioned that this vacant property could be used to create a community garden where food could be grown by residents and sold in an adjacent eatery, Green Tomato Café (Figure 1b), as a way to promote whole community health and well-being. LCHC turned to CBG to find an operator for the small urban farm.

Meanwhile, CBG had been developing other farm-based initiatives including Youth Farm. This program offers teens 15-18 opportunities for paid internships to learn about sustainable agriculture covering aspects such as planning, planting, maintenance, cooking and outreach. Additionally, their Corps program provides ex-offenders with paid transitional job training on farms along with support for long-term job placement. Around 2015, CBG initiated the Veggie Rx program in partnership with LCHC to enable their doctors to ‘prescribe’ healthy food and cooking regimens to their women and children’s health patients. That year, LCHC entered into the early phases of the development of Farm on Ogden, which began with converting an existing building on Ogden Avenue into a state-of-the-art aquaponics facility and greenhouse. Farm on Ogden opened in 2018 and continues to be operated by CBG in partnership with LCHC.



Figure 1a: LCHC urban garden. Source: Author 2021.



Figure 1b: Green Tomato Café, Chicago. Source: Author 2021.



Figure 2: Farm on Ogden (a) Aquaponics tank holding mature fish (b) Hydroponic growing beds (c) Outdoor raised beds and greenhouses. Source: Author 2021.

1.2. Technology and Practice

The design of Farm on Ogden comprises a renovated 10,000 square foot building with a parking lot, two new 35'-0" x 100'-0" greenhouses, and an adjacent open lot that was transformed into an urban farm. As part of the strategy to build a healthier community, the Farm provides a variety of opportunities for education and training through its aquaponic farm, neighborhood market, job training center, incubator kitchen, and community learning space. The two primary farming technologies employed are aquaponics and outdoor raised beds. The outdoor beds primarily serve the Youth Farm program, while the main building and greenhouses host activities related to the aquaponic farm and a retail store where the Veggie Rx boxes are distributed. According to their website, "Healthcare providers at LCHC 'prescribe' a weekly box of fresh produce to their patients, which is filled at the Farm on Ogden and accompanied by a cooking and nutrition class taught by Windy City Harvest employees." ("Farm on Ogden," n.d.)

The heart of the Farm's aquaponics system consists of ten 1,000-gallon holding tanks which hold mainly Tilapia fish (Figure 2a). The "useful life" of a fish, as part of an aquaponics system, is around 9 months from the stage of baby "fry" to "harvest." Approximately 50,000 gallons of water circulates through the whole aquaponic system, activated primarily through gravity. The water cycle starts at the holding tanks, acquiring nutrients, circulates through the hydroponic growing beds (Figure 2b) supplemented with purple LED light strips and then returns to the holding tanks. The quality of the produce is directly affected by the health of the fish. For example, too much food causes high nitrogen content in the water which in turn leads to pest like aphids that harm the produce. On the other hand, too little fish food leads to low nitrogen which causes yellowing of the plants. The system currently supports 17,000 "starts", or young plants, in its Propagation House (greenhouse) including

virus-resistant varieties such as Romaine, Butter, and Oak leaf lettuce.

1.3. Impact Assessment

Farm on Ogden aims to make a positive impact by promoting community health and providing access to employment. All aspects of the Farm's operations are used for educating and training individuals for employment opportunities in various sectors, including retail, commercial kitchens (line cook), warehousing, and janitorial services. Those trained in the intricate aquaponics technology have successfully secured employment through CBG's network of employment partners engaged in growing vegetables and cannabis in the city.

Beginning in 2003 with its first Youth Farm, Windy City Harvest has been assessing its impact through various measures, including the number of people served. Some of the recorded numbers include:

- 75 youth employed at 37 locations
- 80 percent job placement in the Corps program (previously incarcerated individuals who were not violent or sex offenders)
- 91 percent job placement for the Apprenticeship program
- 75 percent of Incubator program participants are "disadvantaged"
- 1,200 patients currently in Veggie Rx program, 10,000 boxes to date

Another measure of success is evident in the activities of the Farm's neighborhood market which sells out nearly every evening to local patrons. In 2022, the market served 2,500 customers per week and projected an increase to 5,000 customers in 2023. Farm on Ogden is expanding its impact through education, training, and increased access.



Figure 3: One Straw Community Garden. Source: Annamaria Leon 2021.

1.4. Opportunities and Barriers

A key factor in the Farm's success has been its ability to adapt to changing circumstances, address the immediate local situation and create opportunities out of adversity. For example, the neighborhood market initially sold only local farm produce. Its operators soon realized that there were significant gaps in the harvest schedule when certain foods would be unavailable locally. This in turn made it more difficult to sell other products in the market. To continue being an attractive and reliable resource for its clientele, the team decided to provide not only healthy vegetables, but the staples that often go with their consumption. Additionally, the initiative aims to promote year-round nutrition and hygiene by supplementing local produce with other healthy options, including non-food items.

But barriers to success in urban agriculture at large are often financial, and the first one mentioned is usually the cost of land. At the Farm, LCHC is the land owner. Chicago Botanic Garden does not own the land where any of their programs in urban agriculture take place. They have made it their policy to develop partnerships, through their Windy City Harvest Program, with other organizations, like LCHC, who share their vision of building resilient and sustainable communities through food, health and jobs. CBG has determined that not owning the land allows them to maintain a stronger focus on science and education.

However, for emerging small urban farmers, land, as well as other high initial costs can pose significant obstacles. Beyond the land cost, CBG stated that in Chicago, it is costly to upgrade water service, and soil contamination in the city's urban lots often requires costly ground remediation in order for it to be used for edible crops. Raised beds are considered more feasible, however, even the initial costs of raised bed materials and soil delivery can be cost-prohibitive. To

address financial barriers, the Farm provides shared tool use and assistance with purchasing tools and equipment. Another consideration is that while vertical farming enables year-round growing, hydroponic and aquaponic systems can be costly to set up and maintain. Consequently, for a reasonable return, only the highest-value crops, such as specialty lettuces are typically considered.

For an individual farmer it is difficult to start, much less sustain, an urban farm without assistance. First of all, city policy is often daunting for neophytes to navigate. Joining the Incubator program can provide these farmers with needed guidance and mentorship. Secondly, farming is subject to weather and pests in ways that farmers cannot always control. When this happens, the Farm assists farmers in their Incubator program in selling the affected produce. The program also provides strategy consultants who train farmers to reduce reliance on government grants and develop self-sustaining operations. Nevertheless, achieving and maintaining long-term independent success remains a challenge for most.

2. ONE STRAW COMMUNITY GARDEN

2.1. Development and Implementation Process

The One Straw Community Garden is located at Douglas Boulevard and Christiana Avenue in Chicago's North Lawndale neighborhood. Named after his well-known book, *One Straw Revolution*, it embodies the "do nothing" philosophy of Masanobu Fukuoka, which essentially advocates working with nature rather than against it, and doing as little as possible to alter a site; tending to it, rather than imposing one's will onto it (Fukuoka et al. 2009).

This Certified Wildlife Habitat and permaculture garden began as part of a community-led block revitalization project (Figure 3). Under the guidance of Annamaria

Leon, neighbors on the block collaborated to create a garden that opened in 2012. Located on a corner lot on one of Chicago's beautiful boulevard streets, it is nestled among historic greystone and brownstone homes, adjacent to a school. The project aimed to create a place for school children, residents, animals and insects to enjoy; bringing joy, nourishment and beauty to the community while also conserving energy and labor.

2.2. Technology and Practice

Conversations with Leon revealed the main ideas underpinning the garden design. Consistent with Fukuoka's "do nothing" philosophy, an approach to farming known as "Permaculture", a sustainable and systems-based approach to cultivated nature was used. Leon, a certified permaculture teacher and advocate, frequently referenced these principles of permaculture: 1) Work with nature rather than against it, 2) Make the least change for the greatest possible effect, 3) Be mindful of edge effects, 4) Each element performs many functions, 5) Cycling of energy, nutrients and resources, 6) Diversity; including guilds, and 7) Efficient systems like plant stacking and time stacking.

Leon explained that the One Straw garden was designed in layers, based on the principles of an edible forest garden. According to Dave Jacke, author of *Edible Forest Gardens*:

An edible forest garden is a perennial polyculture of multipurpose plants. Most plants regrow every year without replanting: perennials. Many species grow together: a polyculture. Each plant contributes to the success of the whole by fulfilling many functions: multipurpose. In other words, a forest garden is an edible ecosystem, a consciously designed community of mutually beneficial plants and animals intended for human food production. Edible forest gardens provide more than just a variety of foods. The seven F's apply here: food, fuel, fiber, fodder, fertilizer, and "pharmaceuticals," as well as fun. (Jacke 2005)

In this community garden, the tallest trees, including fruit and nut trees, create a canopy and smaller fruit trees create an understory. Edible shrubs provide berries at a height accessible to humans and many animals, while grasses, herbs and rhizomes also contribute to the variety of food, resist erosion and enrich the ecosystem both above and underground. The last two layers are groundcover plants, or those that crawl horizontally, like strawberry, and any vertical climbers, like grapes. Some of the varieties that live in the One Straw garden are listed in Table 1.

Leon mentioned that permaculturists also think in terms of zones in garden planning. Five zones describe the domestic planning environment: Zone 0—The home (food processing, waste), Zone 1—Immediate area outdoors (kitchen garden beds), Zone 2—Less frequent but daily observations (animals, orchard, etc.), Zone 3—Occasionally visited (self-fed animals, seasonal crops), Zone 4—Wild food gathering (nuts, native fruits) and wood for fuel, Zone 5—Natural area (rarely visited, wildlife). These can be thought of not as strict rules with hard borders, but as soft guidelines or design heuristics that can be adjusted and interpreted as needed, for example, on an urban site. In the One Straw garden, the third of the site that faces the main boulevard is devoted mainly to wildlife, and is populated with plants attractive to butterflies, birds and bees. Featuring a welcoming clearing, it is the front "face" of the garden. Towards the rear, closest to the school, an increasing number of edible fruit trees and shrubs are located. Care was taken to establish welcoming entrances on each of the three accessible sides of the garden with one side facing a building. The rear area is designed as a rich and diverse forest environment for children to explore with joy and surprise. Consistent with the permaculture approach, plants were selected for multiple purposes including food, aesthetics and ecological benefits. As plants go through their natural lifecycle—growing, maturing, bearing fruit, and eventually dying—they remain in place to serve as mulch and fertilizer for the soil. This way, each plant, over its lifetime, fulfills multiple functions, and its energy is recycled back into the system.

2.3. Impact Assessment

The concept of "permanent" agriculture traces back to the ancient traditions of agriculture that had been practiced for thousands of years. The term "permanent" was intended to suggest that they could be continued indefinitely. Examples of permanent agriculture from China, Korea and Egypt were brought to light in the U.S. by agriculturalist F.H. King in the first half of the 20th century as the negative social and environmental impacts of industrial farming practices were becoming obvious (King 2004; Hilberseimer 1944). By the 1970s, the term "permaculture" was coined (Mollison 1997a; 1997b; Holmgren 2017) to move discourse on permanent agriculture beyond arguments for and against industrialism into the broader cultural framework supporting it.

One Straw Community Garden can be viewed as a microcosm of permaculture principles as well as one component of a larger network of productive landscapes. From both viewpoints, the goal of a more integrated and sustainable relationship between land, food, and people can be seen. To assess the garden's impact, Leon suggests it be viewed within the larger frameworks

Table 1: Layers of the edible forest garden at One Straw Community Garden.

Layers of the forest	Plantings		
<i>Overstory or canopy</i>	Eastern White Pine	Chinese Elm	Weeping Katsura
	White Mulberry	Arborvitae	American Ash
	Black Tupelo	American Persimmon	
<i>Understory or low trees</i>	Redbud	Japanese Maples	Crabapple
	Wild Black Cherry	Pawpaw	Hazelnut
	Peaches	Various European and Asian Pears	European and American Plums
	Various Apples		
<i>Shrub or Berry</i>	Goji Berry	Gooseberry varieties	Black and Red Currant
	Raspberry	Nanking Cherry	Jostaberry
	Honeyberry varieties	Red and Yellow twig Dogwood	Lilacs
	Native shrub roses	Forsythia	Sumac
<i>Herbs</i>	Rue	Wild Bergamot	Anise Hyssop
	Wild Quinine	Oregano	Verbascum
	Mullein	Baptisia	Echinacea
	Prairie Dock	Compass Plant	Wild Thistles
	Comfrey	Epimedium	Sanguisorba
	Nepeta	Mint	Butterfly Weed
	Solidago	Iris	Asters
	Hostas		
<i>Groundcover / Sedges</i>	Penn Sedge	Carex flacca	Lamium
	Blue Dune Grass	Panicum	
<i>Roots</i>	Daffodils	Allium varieties	Lamium
	Strawberries	Dodecatheon	Camassia
<i>Vertical climbers and vines</i>	Virginia Creeper	Native Honeysuckle	Climbing Roses
	Native Bittersweet		

of which it is a part. She referenced the symbol of the “permaculture flower” which identifies seven essential domains to think about in shifting to a more sustainable culture: 1) Land and Nature Stewardship, 2) Building, 3) Tools and Technology 4) Education and Culture, 5) Health and Spiritual Well Being, 6) Finances and Economics, and 7) Land Tenure and Community Governance (Holmgren 2017). In addition to its impact in each of these domains, the garden should also be assessed in terms of its impact in the neighborhood, community and city as a whole. These touchpoints for widening perspectives help to steer interventions toward a less transient culture and provide a framework for decision making on specific projects.

2.4. Opportunities and Barriers

The concept of permaculture can also be used as a basis for thinking about opportunities to upscale interventions like the One Straw Community Garden. In speaking with Leon, it became clear that the ultimate aims of permaculture are broad cultural aims. Therefore, just as within the garden, each plant, each element, has a symbiotic relationship with the whole—it takes and it gives back—so too each person, each organization, is part of a broad network of people and organizations who can make a positive and lasting transformative impact on the larger community. Opportunities to harness energies, address concerns, and take action locally exist through neighborhood organizations like the North Lawndale Greening Committee (NLGC) and the North Lawndale Community Coordinating Council (NLCCC). Drawing parallels between their work in North Lawndale and socio-environmental action initiatives in West Woodlawn and Englewood, Leon outlined opportunities that exist at the city scale.

As a specific example of scaling up the permaculture concept to the city level, Leon mentioned the Boulevard Fruit project, envisioned by Chicago-based landscape architect Liz Vogel. In this project which Leon consulted on, the city’s boulevard system is conceived as the future site of a public orchard featuring edible fruit trees. The relatively straightforward idea of integrating larger fruit trees into the 200 acres of urban landscape that exists in the boulevard system transcends boundaries between Chicago’s neighborhoods, connecting them and fostering education and community. Moreover, it contributes to building a more equitable food system and creates economic opportunities.

Why permaculture has not taken hold in more places is due in part to preconceived notions of farming versus landscaping. The former is considered practical and commodified and the latter, decorative and aesthetic. The permaculture concept requires us to reconcile and integrate the two, perhaps elevating the

mundane, making the functional also beautiful. One of the distinguishing principles of permaculture—the aim of being less labor-intensive by design in order to conserve the energy of both people and land—has visual consequences. While permaculture landscapes offer value-added solutions, including food production and improved soil health, the act of allowing natural processes to unfold means experiencing a less manicured appearance than is typical for metropolitan landscaping. Therefore, the perception of unkempt landscapes poses a barrier to the wider acceptance and adoption of permaculture on the city scale. In Chicago, ordinances have been passed exempting urban farms from typical landscaping requirements. However, overcoming this barrier of public perception and fostering acceptance for permaculture solutions that challenge traditional notions of landscape and farming will require time, exposure, education, and experience.

3. HERBAN PRODUCE

3.1. Development and Implementation Process

Herban Produce is a for-profit farm located in East Garfield Park. In 2015, a developer, Core Spaces, purchased vacant land that had been unused for 50 years, aiming to make a social and environmental impact through urban redevelopment. Under the leadership of firm principal, Barry Howard, the vision for the land was to create green employment and education opportunities, provide healthy food options, and promote environmental stewardship in an underserved area of Chicago. In 2016, utilizing the city’s Neighborhood Opportunity Fund and other grants, a hydroponic greenhouse was built to permit year-round growing. In 2018, a partnership was forged with Alicia Nesbary-Moore, and Herban Produce was established as a for-profit business with a social and environmental mission and an eye toward growth and less reliance on grants. (Figure 4)

3.2. Technology and Practice

In 2020, Herban Produce expanded its site to two acres. A 4,000 square foot greenhouse was supplemented with outdoor growing space supporting 17,000 square feet of production in raised beds. An existing four-story building on the site provides interior space for hosting community events and activities. There is a small orchard with fruit trees such as Pawpaw, Asian Pear, Juneberry, and Elderberry and a small strip of prairie that attracts pollinators and helps with water retention around the farm perimeter.

Production is facilitated by hydroponic and raised bed farming methods. A farm manager and staff operate the hydroponic greenhouses and the outdoor production. The hydroponic greenhouse uses three technologies,



Figure 4a: Herban Produce, outdoor raised beds. Source: Herban Produce, 2022.



Figure 4b: Herban Produce, hydroponic greenhouse. Source: Herban Produce, 2022.

the Fodder System, Nutrient Film Technique (NFT), and Ebb and Flow System. The fodder system gets its name from being a hydroponic approach to growing seeds in trays for use as animal fodder. Growth is rapid, without soil, and uses little water. The other two systems utilize pumps to supply roots with access to nutrient-rich water, through a gravity system with continuous circulation and a flood and drain system, respectively. (“Herban Produce,” n.d.)

Raised beds are popular in urban farming, given the often unfavorable conditions of urban soil. In Chicago, soil is highly compacted, nutrient-deficient and often contaminated with lead. According to farm manager, Lucia Leon, Herban uses both compost and topsoil in their raised beds. They take a scientific approach to building a strong foundation for successful growth and harvest by studying the soil and specific nutrients contained for a targeted and efficient approach to soil amendments. Other technologies employed include A-frames and guttering to increasing outdoor growing space vertically, as well as metal hoops and insulating fabric/plastic for extending the growing season. Hoop houses are also likely to also be used in the future.

As a for-profit farm, Herban faced the challenge of finding its place in the agriculture industry. Positioned alongside Illinois specialty growers with an average of 100 acres dedicated to single crops, such as pumpkins, they needed to differentiate themselves. To access premium markets, Herban adopted the CSA (community supported agriculture) subscription model, requiring members to pay an upfront fee for a share of the harvest. With prepaid subscriptions, members receive a diverse range of produce, including carrots, kale, beet, chard, onions and potatoes, in modest amounts from a community of vendors. The farm also targets restaurant sales as a premium market, carefully selecting crops to avoid competition with commodities produced by larger counterparts located 30 miles out of town. To succeed in this space, the produce must showcase the greatest advantages of a small urban farm, such as smaller scale, closer proximity, and hand tending.

3.3. Impact Assessment

With its core social and environmental mission, Herban measures success not only by its bottom line but also by its impact on the community. Metrics such as the number of individuals employed, pounds of food donated, monetary donations, youth internships, and cooperative partnerships with local businesses are considered. The company’s ability to hire a full-time farm manager in 2020 reflects its financial health. Herban has donated food to Marillac House Food Pantry which works to end poverty in Chicago. It has partnered with Chicago’s Speer Academy (Belmont Cragin) and

Marshall High School (East Garfield Park) to offer youth internships. And through its CSA subscriptions program, Herban supports local businesses by sourcing value-added products from vendors such as Bang Bang Pie and Biscuits, Kusanya Café, Great American Cheese Collection, and Chicago Bread Club among others.

3.4. Opportunities and Barriers

Staff at Herban mentioned barriers faced by small independent for-profit urban farms, particularly the challenges in achieving and sustaining financial independence. While Herban has its own land, they have observed in other cases that the significant leap to land ownership is often a major hurdle. One potential opportunity discussed is for small growers to explore partnerships with established charitable organizations that have access to land, as exemplified between Just Roots and the St. James Catholic Church Food Pantry.

Another barrier mentioned is the challenge of accessing good markets, crucial for maintaining a business without outside financial support. Restaurant clients will often require 30 lbs. of produce per day compared to the 30 lbs. per week typically needed for a farmers’ market. Urban farm collectives offer small growers the opportunity to access larger markets through partnerships. CSA subscription programs, such as Herban’s, which collaborates with local businesses to provide supplementary products like coffee, bread, and cheese, along with initiatives like the Urban Canopy’s Local CSA and the Unified Grower’s Collective, showcase opportunities for accessing markets through collective efforts here in Chicago.

The cost for small urban farmers to produce food is high, while profit margins on food are low, and the marketplace is competitive. Consequently, many struggle to sustain themselves long-term. Large organizations often have the resources to pursue grants, but individuals who turn to urban farming for financial self-sufficiency often find themselves too busy working or lacking the expertise needed to secure grants. Furthermore, recent research studies comparing conventional with more regenerative, human-centered farming practices and food systems suggest that so-called “cheap” farm labor and practices have external costs that are not adequately factored in, leading to an incomplete understanding of the “true cost” of food (Gemmell-Herren, Baker, and Daniels 2021). One recent study showed that “food is roughly a third cheaper than it would be if these externalities were included” (Hendriks et al. 2023). This research suggests that the true cost of food must be more widely known to level the playing field for small urban farms who are choosing to use state-of-the-art science and technology and best practices. As consumers, we should consider the cost of food from a more holistic

perspective, factoring in external premiums (which were estimated to be almost double) into our everyday decision-making. With 99.9 percent of businesses in the US being small businesses (SBA 2023) and 91 percent of US farms being small farms, the success of more small farms is essential for urban agriculture to be a viable form of urban resilience in the long-term.

Despite the challenges, Herban believes there are advantages to being a small-scale farm operation. For one, there is flexibility in not being limited by large and expensive machinery. Because a corn harvester does not work for potatoes, such an investment often determines the crops produced. Without these constraints, smaller farms can manage more diverse crops which, in turn, lends more resistance to pests and less depletion of certain soil nutrients than single-crop farms. They can also positively impact soil in a shorter amount of time and for lower costs in a smaller farm and utilize raised beds which are out of the question at large scales.

One of the biggest opportunities recognized by Herban is diversity, which it incorporates through various layers in its business—from its staff to its plantings, methods of farming, income streams, and community engagement. Nesbary-Moore says that small urban farm owners need to be creative and, in addition to farming, should explore opportunities beyond the crops. Their rentable event space currently provides a means to engage with the community in fresh and meaningful ways and, in the future, they hope to implement more activities to position themselves as an agritourism destination.

According to the U.S. Department of Agriculture (USDA) and the National Agricultural Law Center, “Agritourism is a form of commercial enterprise that links agricultural production and/or processing with tourism to attract visitors onto a farm, ranch, or other agricultural business for the purposes of entertaining or educating the visitors while generating income for the farm, ranch, or business owner” (“Agritourism Overview,” n.d.). There are many examples that qualify as agritourism ranging from pumpkin patches, demonstration farms and u-pick operations, to wine tastings and bed and breakfasts.

FINDINGS

Each of the three cases brought forth different approaches to increasing urban resilience through urban agriculture. However, this study revealed perceived barriers residing within the domains of architecture and planning. Specifically, issues related to land use, water access and permits were identified. To gain a clearer understanding of existing requirements and limitations in Chicago, these issues were further researched.

With regard to land use, it was found that in 2011, the City of Chicago amended its zoning ordinance in

an effort to “promote the expansion of community gardening and urban farming within city limits” (“City of Chicago,” n.d.). Currently, community gardens are permitted in all residential, commercial, and business districts, including the downtown district, with the limitation of an area of 25,000 square feet— just over half an acre and equivalent to eight typical 25 feet by 125 feet Chicago lots (CZO 2023). Urban farms, or spaces for agriculture not restricted in size, are permitted in all manufacturing and commercial districts, on all rooftops in the downtown area, and in some business districts. In essence, spaces for urban agriculture that are 25,000 square feet or less are permitted in most districts in Chicago, while larger ones are allowed in areas other than residential and pedestrian-oriented business areas.

With regard to water access, according to the City of Chicago Department of Water Management, water for urban farming in Chicago can be accessed through existing private water sources, such as a hose on the property or neighbor’s property (with prior agreement), or collected in rain barrels or totes (when properly treated). If a farm with greater water requirements has long-term land use security and the financial means, a new dedicated water line may be installed for an estimated \$30,000 to \$40,000. Alternatively, limited and temporary access is allowed through the city’s fire hydrant system with a use permit and a proper backflow preventer. It should be noted that between the initial presentation of this research in March 2022 and today, the City of Chicago implemented changes across its website to simplify the process for starting an urban farm. Information is now readily available, and the pricing structure for hydrant permits has been revised from approximately \$1,500 per application to \$126.72 for the first 3,000 square feet and \$54.36 for each additional 3,000 square feet (“Navigating Urban Agriculture,” n.d.) which is less than half of the 2022 cost for a 25,000 square foot growing space.

At the outset of this research, there were approximately 75 urban farms and 650 community and school gardens throughout Chicago (Advocates for Urban Agriculture 2019). Urban farms and community gardens were already recognized in the Chicago Zoning Ordinance as acceptable land uses in many districts. The efforts to lower the cost of water for urban growing and make the requirements and processes more transparent and accessible demonstrate Chicago’s ongoing commitment to promoting best practices for urban agriculture and empowering new initiatives. Entities outside the city government are also contributing to the promotion of urban agriculture in Chicago. Since 2002, the advocacy group known as Advocates for Urban Agriculture has supported urban agriculture initiatives through such efforts as providing access to funding and technical assistance, as well as advocacy and education. During



Figure 5: Aims of urban agriculture; scientific-educational, cultural, economic-social. Source: Author 2023.

the course of this research, they completely revamped their website to make access to information even more straightforward and reflect their new mission as a BIPOC-led organization working to empower marginalized and indigenous people. Another noteworthy initiative is the Chicago Urban Agriculture Mapping Project, launched in 2015 to provide the public with a comprehensive view of the state of urban agriculture in Chicago. The map now displays 826 growing spaces within Cook County, Illinois ("Chicago Urban Agriculture Mapping Project," n.d.). With its supportive government and urban policy, active grower and consumer network, and advocacy and education partners, Chicago's urban agriculture is flourishing.

In summary, the study revealed three distinct aims of urban agriculture in Chicago: 1) scientific-educational, 2) cultural, and 3) economic-social (Figure 5). Each of these aims contributes unique benefits and facets of resilience to the city. Farm on Ogden exemplifies education, focusing on training, education, and science coupled with a mission to improve community health. Through the partnership between Chicago Botanic Garden and Lawndale Christian Health Center, the Farm integrates two distinct areas of expertise and resources to address the complex and interrelated issues of food, health, and employment. Scaling-up opportunities stem from expanding the reach of job training/education and providing healthy food, impacting urban resilience by promoting knowledge, health and financial independence.

One Straw Community Garden offers a different perspective, facilitating transformative change at the local level through the lens of permaculture. It is an example of how a community garden, through participatory action work, becomes a conscientious and transformative act of resistance, positively influencing social and environmental sustainability and resilience, while also raising awareness of the central role of food and agriculture in culture. As the name of the garden suggests, this community garden is envisioned as just one of many small acts that, over time, will collectively amount to a healthier culture and city life for all. This case suggests that to scale up impact, each one of us can sow the seeds and spread the straw and nature will do the rest.

Herban Produce is an example of a small entrepreneurial farm that is taking a mindful approach to making a living in the city. Embracing state-of-the-art best-practices from the scientific community, Herban navigates the balance between financial viability and positive social and environmental impact. Herban depends on community support and reciprocates by giving back to the community. In doing so, its owners and operators become active members of the community and the consumers become invested in its success. This case demonstrates that small-scale farms have a place in urban agriculture, and greater numbers of small urban farms succeeding will increase the city's socio-economic resilience and provide intangible benefits such as a sense of security and self-determination.

This study also identified several opportunities for scaling up the impact of urban agriculture to enhance urban resilience. Among the most significant were: 1) education and training to increase the number of people with knowledge and skills, 2) leveraging existing city-wide physical infrastructures (such as boulevards) for food production, and 3) strengthening strategic partnerships, such as unified collectives, to redirect wasted energies of competition toward more effective cooperative action for greater impact and creating supportive networks. It is worth noting that the study did not include a large-scale for-profit urban farm. Exploring cases such as Gotham Greens, a New York-based company with sites also in Chicago, Providence and Baltimore, could offer additional insights into how inter-city networks could be mobilized to help increase urban resilience beyond local geo-political borders and into the broader region.

CONCLUSION

The three urban agriculture cases in Chicago scale the impact of urban agriculture by 1) improving access and health, 2) education and training outreach, 3) harnessing creativity and diversity, and 4) making a collective impact through physical or social networks (Figure 6). The study demonstrates that due to the variety of aims of urban agriculture, a multi-faceted, multi-scalar framework is needed for discourse. Because urban agriculture encompasses various objectives and operations, different approaches will bring different

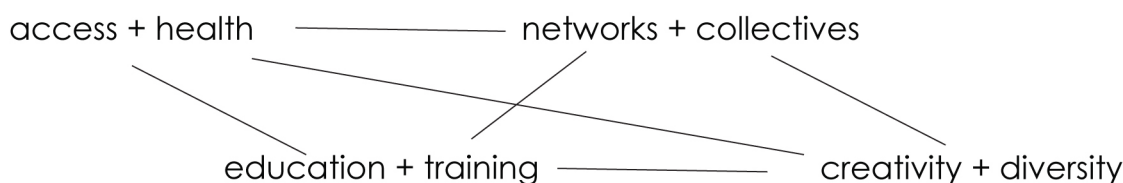


Figure 6: Approaches to scaling up impact. Source: Author 2023.

benefits to the city measured by various indicators of success. At the micro-scale, technical issues of starting and running a farm were identified involving specialized knowledge and expertise. Some of these issues are common to the three types of farms studied, like the science of soil health (or other growing medium) and access to land and water, for example (Figure 7a). Additionally, each type of farm presents unique issues related to business planning and operations. Choices about financing, farming techniques, who owns the land and performs the work, as well as how the farm's produce is distributed determine the form and nature of the operation and the ways it can impact urban conditions more broadly (Figure 7b). At the macro-scale, the study suggests that all three types of farms are contributing to shaping the future of urban agriculture in Chicago, emphasizing social and environmental responsibility. The exploration of these cases serves as a step toward defining a multi-dimensional framework for evaluating the collective impact of urban agriculture on the city's resilience. These examples provide insights into how individuals, farm operators, community members, urban citizens and global citizens can reflect on their actions at different scales.

The study clarified the regulations on urban agriculture in Chicago from an architectural and planning perspective. It showed the steps that the City of Chicago has taken ranging from supportive zoning, to more affordable water, to improved access to information to promote urban agriculture. The study also demonstrated the active engagement of the local urban grower community in defining, securing and advancing its future. Beyond Chicago, the United States Department of Agriculture is demonstrating support for urban agriculture through initiatives like the newly formed Advisory Committee on Urban Agriculture and Innovative Production. This committee is engaged in public discourse to develop recommendations for the USDA Secretary, focusing on "extending support and building frameworks to support urban agriculture, including issues of equity, climate resilience and nutrition access" (USDA, n.d.). The membership currently represents a variety of interests including urban and innovative producers, higher education and the extension system, non-profits, finance and supply chain, and business/economic development, with a geographical spread across various states. One of the twelve original members selected is from Chicago, and happens to be one of the founders

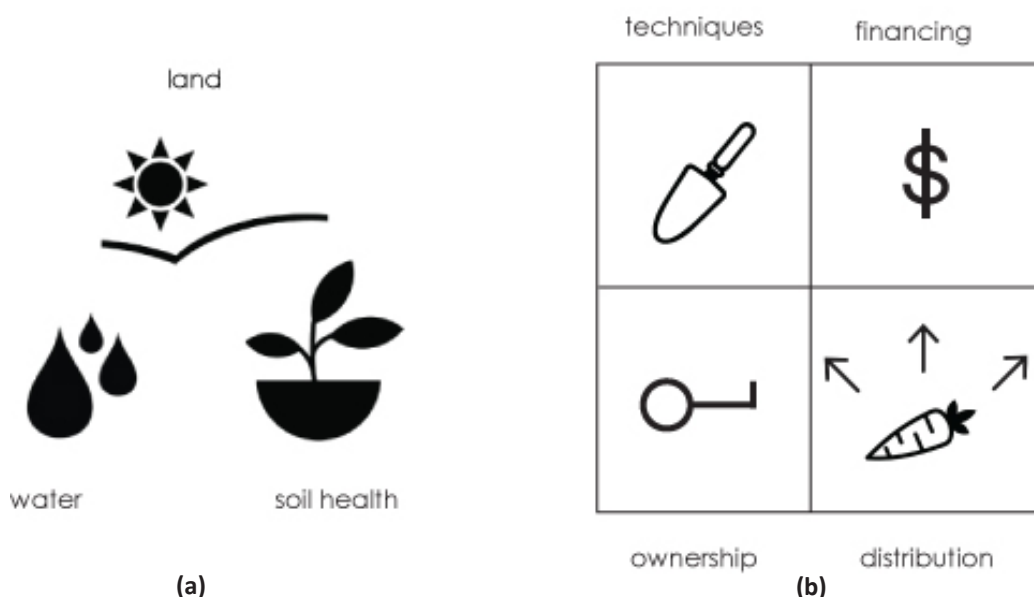


Figure 7: Issues in urban farming (a) common to all types, (b) specific to the business. Source: Author 2023.

of Farm on Ogden. While there are no architects or planners among the original twelve committee members, the staggered terms of these members allow for the inclusion of new members each year. We are in a period of increasing local and national support for and understanding of urban agriculture as well as growth of the industry. What was once envisioned by Hilberseimer and Caldwell for a better future is now taking shape.

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