

## Article

# Spaces, Systems and Infrastructures: From Founding Visions to Emerging Approaches for the Productive Urban Landscape

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**Abstract:** The proliferation of urban agriculture on an array of urban spaces is one of the more visible responses to perceived failures of contemporary food systems. This paper seeks to identify fundamental strategies connected to food system change efforts, linking these with diverse attempts at designing and planning the productive city. It first situates the contemporary concept of the productive city within a broader historical dialogue of foundational figures in urban and regional planning, architecture, and landscape architecture for whom food production was a central component of future cities. Recently, a growing number of practitioners have theorized the need for integrating urban agriculture in urban design and planning. Across this spectrum of emerging theory and practice, we identify three approaches to designing productive cities. First, *spatial design* strategies identify new territories for food production. These offer the potential for *systems design* thinking that links the individual spaces of production to other sectors of food systems that extend across networks of spaces and multiple scales. Finally, both spatial and systems design involve strategies of designing *productive infrastructures* of soils, water, nutrients, and other essential flows. The engagement with spaces of production, food systems, and productive infrastructure opens up a range of challenges as well as opportunities for emerging forms of practice and design thinking for the productive city.

**Keywords:** productive landscapes; urban design; urban agriculture; green infrastructure; food system planning



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## 1. Introduction

Cultivating cities is one of the more visible responses to the perceived failures of contemporary food systems. Urban agriculture<sup>1</sup> has proliferated on rooftops, vacant lots, parkways, and an array of other spaces within and around cities that have been repurposed as productive spaces of various scales. These productive spaces are indicators of much larger efforts to address critical problems such as disparities in access to healthy food choices, increased complexity of food chains, unsustainable consumption of energy, and global destruction of ecologies [1]. Led by a diverse range of actors from grassroots and community organizations to chefs and social entrepreneurs, a broad social movement around food system change initially outpaced designers and planners. However, in the last 20 years, many such professionals are now aligning theory and practice with the work of this movement to re-localize food systems, create new types of public spaces, and support new agroecologies so as to transform the city's conception while addressing multiple functions and providing a number of services [2–4]<sup>2</sup>.

This paper seeks to develop a provisional framework for interpreting the emerging diversity of theories, concepts, and practices of designing productive urban landscapes. It recognizes that the spaces and systems of urban food production have long and complex histories and include diverse typologies from allotment, school gardens, and community

gardens, to suburban nurseries, market farming, and peri-urban agriculture. However, spaces of food production are one component of a much larger systemic reconceptualization of productive landscapes. Since sites of production are necessarily linked to how food is moved, stored, consumed, or disposed of, it is imperative to view the productive city within a food system lens. Food systems refer to organizations of multiple processes and transformations of food across primary sectors of production, processing, distribution, marketing, consuming, and disposing of food. These sectors and spaces of the food system are also integral with other systems including transportation, housing, water, sanitation, energy, and ecological systems. This emerging conception of productive urban landscapes as integrated with food systems and other critical systems addresses larger planning goals of promoting economic growth, recreation, social equity, and environmental health, among others [2,5].

Situated within this context, we selected some early thinkers who generated influential design conceptions of cities that integrate food system change, as well as more recent designers and planners who proposed how to reform dominant food systems by projecting new strategies and approaches for urban food production. The aim of this framework is not to advocate for any particular vision or approach, but rather to map the discursive territory this work reveals. The emphasis is on the foundational and emerging design discourse around the productive city. This design discourse is often an iterative process that works between theory and practice, existing conditions, and projections of alternative futures.

While the designers and their projects theorize the productive city to different degrees, our discussion focuses on particular concepts and approaches that address fundamental issues and questions:

1. What are the historical and contemporary challenges and potentials for re-envisioning the productive city?
2. What are the foundational visions and approaches for incorporating food into urban design that could inform contemporary design thinking?
3. How does integrating food production and systems thinking change the conception and approaches of urban planning and design?

This paper aims to provide practitioners and researchers who work in the various disciplines at the intersection of food systems and urban built and natural environments a framework for engaging the diversity of foundational as well as emerging theory and practice. As a provisional framework, it provides a flexible structure for including other examples, expanding on the set of approaches, or identifying critical gaps in design thinking regarding food systems and productive cities.

## 2. Materials and Methods

The three questions above are integrated into a sequential analysis in three parts. The first two parts relate to two periods in which a number of thinkers and practitioners in the industrialized world (primarily in Western Europe and North America) placed food systems in their conceptualization of ways to transform cities. The first period covers the decades before and after the First World War. The second period covers the two decades at the start of the new millennium. In between these two periods, the place of the food system within thoughts about urban space was largely neglected. The decline and resurgence of attention to food systems are associated with important shifts in urban design and planning priorities. The third part builds on the concepts that were put forward during these two periods, identifying three approaches that can be found across the conceptualizations that are discussed in these periods. The final discussion proposes a framework that bridges these three approaches.

Section 3.1 situates the concept of the productive city within a broader historical dialogue of some of the Western foundational figures in the professions of urban and regional planning, architecture, and landscape architecture. In the broad conceptualizations of Howard, Geddes, FL Wright, Migge, and others, food production was a central component of the cities of the future [7], contributing to broader goals of improved conditions for living

and an enhanced built environment. While the work of these foundational figures is well documented, it is important to reframe their contribution from the perspective of a food systems lens. Food production (and the food system beyond that) was one of the central elements in the broad conceptualizations of the city and its transformation offered by these influential figures.

This formative period of city planning is discussed in relation to the contemporary moment when a growing number of practitioners are producing substantial writings with an explicit focus on the relation between agriculture/food and urbanism. Section 3.2 introduces a spectrum of writings that envision urban agriculture as an activity that needs to be designed and planned. These writings are part analytical framework, part manifesto and call for action, and part guide for practice. We selected six writings that represent a diversity of concepts that help to identify components of design and planning for urban agriculture: continuous productive urban landscapes (Bohn and Viljoen), food urbanism (Verzone and Woods Architects), agricultural urbanism (de la Salle and Holland), agrarian urbanism (Duany Plater-Zybek and Associates), Smartcities (CJ Lim), and R-Urban (Petrescu and Petcou/Atelier d'Architecture Autogérée).

Across this spectrum of foundational and emerging thought and practice, we identify in Section 3.3, three approaches that offer prospects for engaging the productive city: (1) spatial design approaches such as re-localizing production, linking connective corridors, or staking out new spatial typologies for production; (2) systems design approaches that expand the conception of the productive city to engage the dynamics of contemporary cities as they structure networks of flows such as soils, water, energy, and nutrients; and (3) productive infrastructure approaches across multiple scales from the site to the region, culminating in planning city-region food systems.

This engagement of design and planning with agricultural productive systems opens up a range of challenges as well as opportunities for the built environment professions. The analysis presented here provides a framework for emerging forms of design thinking and practice for the productive city.

### 3. Results

#### 3.1. *Some Foundations for the Productive City*

Food and agriculture issues were at the core of the emergence of professional urban planning and design theory in the late 19th and early 20th centuries, responding to the radical reconfigurations of city and countryside wrought by the Industrial Revolution, most significantly the spatial dislocation of rural populations and agricultural production away from urban regions. However, in this context, the role of food and agriculture was ambiguous and contested. What follows is a thematic review of how some early planning and design thinkers responded to the multiple challenges associated with these rapid and radical reconfigurations, and how these initial conceptions represent different strategies for addressing urbanization as well as food system issues. We focus initially on some of the key figures who laid the foundations for the emerging professions of urban and regional planning, architecture, and landscape architecture, and who explicitly theorized the place of production and food in the modern city. While contexts and influences differ, we identify four perspectives on how the proposals offered by these early thinkers responded to these challenges and the implications of these early visions for strategies found in contemporary discourse on designing productive cities.

##### 3.1.1. Reconfiguring the Urban/Rural Dichotomy

The Industrial Revolution and the dramatic growth of cities in the 19th century in Western Europe and North America was preceded by a revolution in agricultural production—farming systems of more intensive production, expansion of cultivation, mechanization, and increased energy inputs—that resulted not only in the ability to feed larger populations, but also in a reduced need for agricultural workers, pushing many of these to migrate to cities to serve as the available labor for industry. The scale and speed of this migration

and occupational shift scrambled established distinctions between countryside and city. Additionally, the expansive reach of railroad infrastructure opened up vast yet distant specialized areas of agricultural production so that cities no longer needed to rely on the proximities of place for sustenance. Early planning conceptions of the late 19th century aimed at bringing order to the anxiety and discord generated by the displacement of agricultural land and people; these conceptions often sought to respond to these disruptions by reconciling the growing urban/rural dichotomy.

Ebenzer Howard, a product of the intellectual reform movements of the time [8], sought to redress the extremes of increasing urban scale and alienation from the countryside, noting that “the first step to be taken towards the solution of this question” is “how to restore the people to the land” [9]. His iconic diagram for Garden Cities is perhaps one of the clearest illustrations of the objective to decentralize by resettling urban populations into smaller towns surrounded by agriculture in the form of green belts. This encodes a notion of preindustrial urban/rural proximal relationship, an image of the city set within a productive peri-urban context (Figure 1). While agriculture is close by, the greenbelt still separates it from the urban core as a single-function zone. Howard’s vision has served as a clear template for numerous cities in Europe and North America, and even influenced planning concepts of Asian cities where overlapping patches of land uses including multi-functional agricultural land had historically been more integrated within the urban core [10].

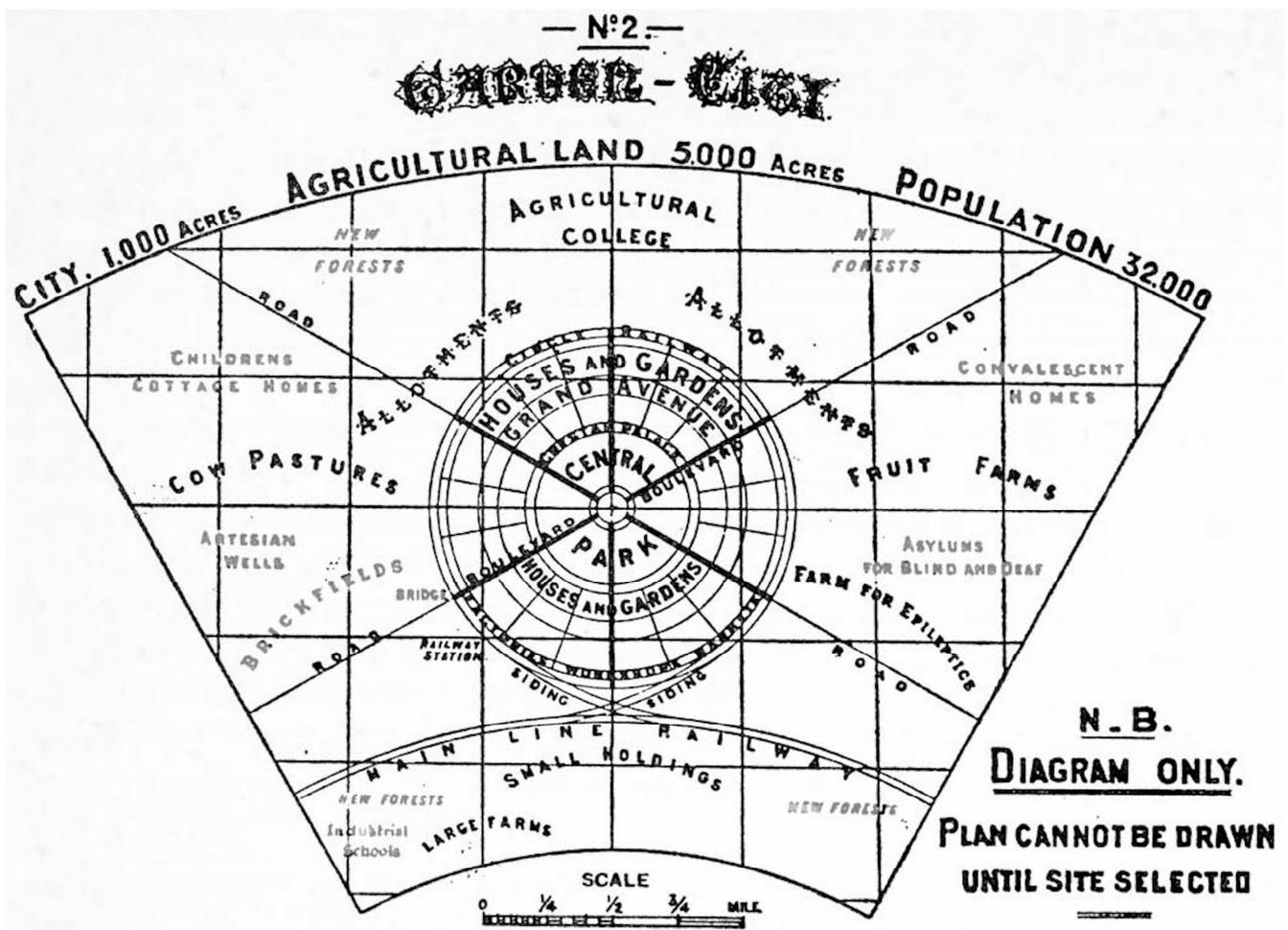


Figure 1. Ebenezer Howard’s Garden City, highlighting a number of agricultural and other land uses in the periurban belt connected to the city. Annotated diagram by Howard (1902).

Rather than a dichotomy, Patrick Geddes’ Valley Section laid out a continuum of functionally related and physiographically determined land uses along a continuum from

rural to urban. Geddes' spatial narrative reveals not only the spatial link, but also the systemic connections between productive landscapes and the city [11]. Geddes' cross-section (rather than plan view) lays the conceptual framework for Benton MacKaye, Ian McHarg and others, including contemporary landscape urbanists, to visualize flows of resources as formative agents to be actively engaged in urban planning [12,13].

### 3.1.2. Scale and Density of the Productive City

Early plans sought to reconnect and recalibrate the scale and density of the city to productive capacity of the land. Thus, metrics and proportions of land to people figure in the schemes. Howard plotted towns of 30,000, rather than large cities or small villages. In this plan, people who lived on one sixth of the land were supported by five sixths of the area cultivated by allotment gardens and smallholder farms. The German designer Leberecht Migge also based his ideal compact village-scale communities on the capacity of individual gardens and smallholders [14].

The scale and density of Le Corbusier's 1922 Contemporary City proposal for a population of three million is exponentially larger in scale, with people supported by three food-producing zones: "protected zones" for large scale agriculture, large kitchen gardens for detached suburban homes, and 10-acre groups of allotments cultivated by apartment dwellers. He proposed that one farmer would oversee the intensive cultivation of every hundred plots that would feed the population for the greater part of the year [7,15]. While the scale and density of this plan is much greater than those of Howard or Migge, it still represents a move away from the dense industrial city toward a decentralized pattern.

About the same time, inspired by the vastness of the North American great plains and the freedom of the automobile, Frank Lloyd Wright's Broadacre City goes even further toward decentralization by dissolving the urban/rural dichotomy into a matrix that mixes urban and rural functions [16]<sup>3</sup>. This visionary model, however, was grounded in the farm experience of Wright's own family in a Midwest shaped on a grand scale by Jefferson's vision of a decentralized agrarian America (Figure 2). Decentralization also became an objective of European modernists, most significantly in Ludwig Hilberseimer's *New Regional Pattern* (1945–1949). He abandoned earlier "Highrise City" schemes for Garden City-inspired proposals for lower density "settlement units" responsive to regional landscape patterns and new transportation technologies of regional highways [17].

Despite the specific differences in scale and density, the significance of these projects is that they attempt to calibrate urban patterns to the productive capacity of land—a linkage that had been lost or obscured by the sheer scale and dramatic growth of industrial cities and the distancing of productive agricultural landscapes from the city.



**Figure 2.** Cultivated spaces within Frank Lloyd Wright's Broadacre City (non-agricultural areas blocked in white). Diagram by authors based on photo of model, Museum of Modern Art, New York City.

### 3.1.3. Controlling Space vs. Systemic Change

The foundational theories on the relationship between food and landscape emphasized the clarity of spatial proximity as a solution for systemic complexity. Howard's Garden City, for instance, relied on logic that would be familiar to the contemporary local food movement that, being close to consumers, the products of the small producers would be more valuable. This proximity also helped to close the circle with waste/night soil being redistributed to the nearby farms. Even Wright's early design for Davidson Little Farms and Markets, which preceded Broadacre City, focuses on developing a model unit of efficient nutrient flows and production sequence from farm to market. However, the representations of Howard's diagrams or the neatness of aerial images of Migge, Wright, Le Corbusier, or Hilberseimer present a clarity of spatial organization removed from the complex and messy dynamics of food production, distribution, processing, marketing, or post-consumption systems [18].

The systemic aspects of these foundational concepts are "hidden" in the sense that the specific conditions to which they responded do not appear in the representations. Migge's smallholder ideal and the scale and intensity of production of the Garden City, for instance, were influenced by crises in European cereal and grain production as a result of cheaper imports from the US in the 1880s and 1890s. In this economic context, smallholders with intensive horticulturally based production methods would be more reliable than larger scale commercial farming.

As the spatial discourse in planning and design came to dominate, any degree of systems thinking was lost or bifurcated into different modes of practice (infrastructure and public health vs. physical planning and design). The aesthetic ideology of the City Beautiful movement was responsible for removing seemingly chaotic and unhygienic public markets from the centers of cities—thereby eliminating one of the primary contacts between urbanites and productive landscapes [18]. Moreover, Frederick Law Olmsted designed aestheticized landscapes that often replaced working farms at the expanding edges of cities; for instance, when he designed Franklin Park in Boston, there had been 12 working farms on that site [19]. Contemporary interest in cultivating the city has sought to recover systemic approaches as complementary to spatial planning.

#### 3.1.4. Social Organization, Agency and Justice

These foundational visions for cultivating the city raise questions about social agency, organization, and justice. Who cultivates the city and who controls its form? Howard's plan was inspired by communitarian ideas, while the ideal of the smallholder served as the fundamental social unit of Migge's proposals. Yet despite these intentions, economic factors and conventional agriculture of the time compromised their realization [8]. Moreover, centralized control as exemplified by Le Corbusier and others implied an inability of the urban population to manage the food system, requiring imposition of power by the State and its agents.

The emphasis on these visions also overshadows significant grassroots and community-based efforts to cultivate the city. Contemporaneous with early planning theories, people were claiming spaces at the margins of London, Copenhagen, and other European cities for allotment gardens. In the United States, Lawson links the growth of the community garden movements in the late 19th century through the 20th century to recession, rationing during war time, and other periods of economic challenges and social disparities [20]. There were also state-sponsored and municipal efforts. In response to a severe recession in the 1890s, the City of Detroit intervened to sponsor unemployed German and Polish immigrants to plant "potato patches". These are examples that Vitiello and Brinkley [21] cite as part of the "hidden histories" of urban agriculture and food systems overshadowed by the discourse of comprehensive visions such as the Garden City.

#### 3.2. Contemporary Conceptions of the Productive Urban Landscape

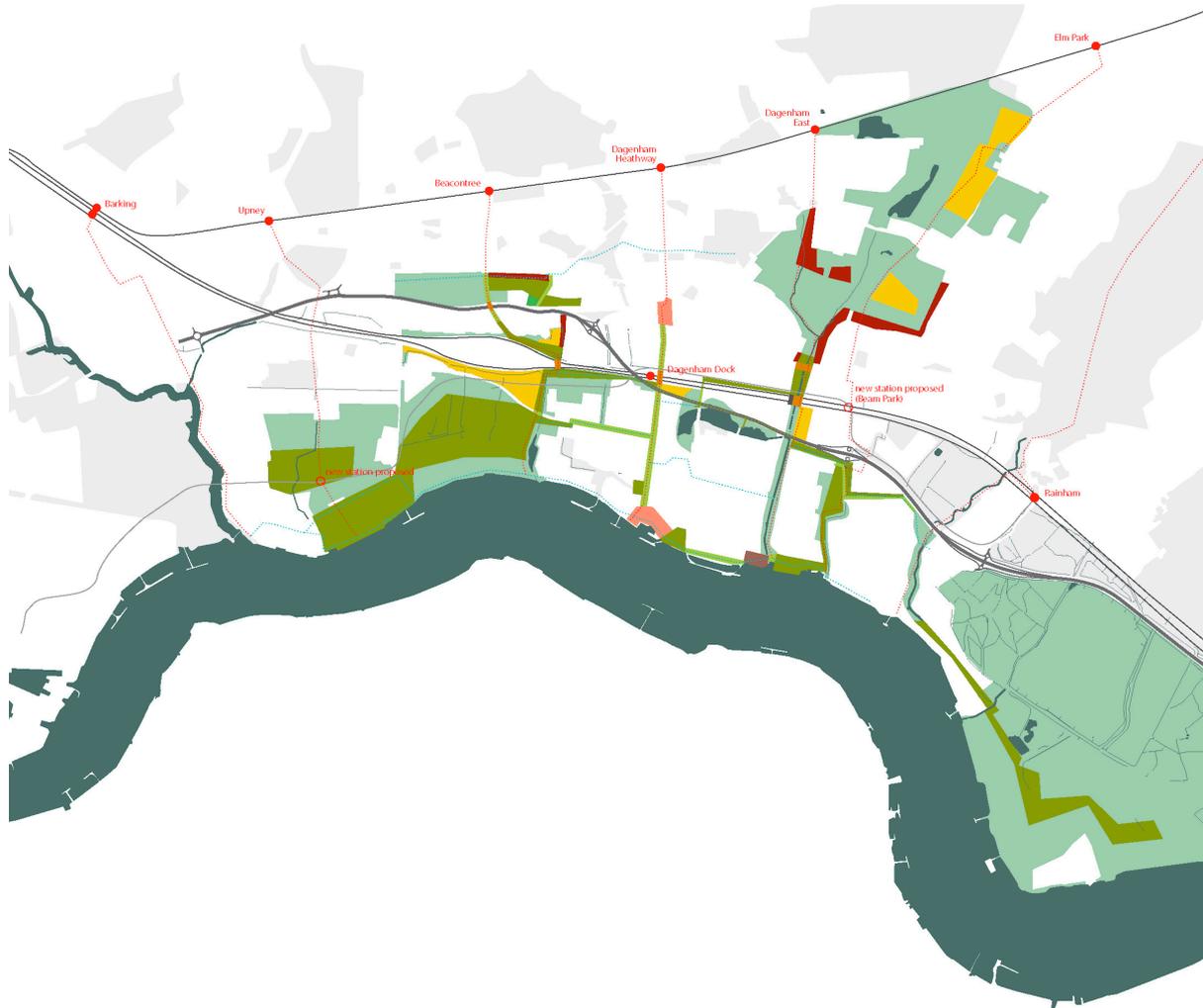
These foundational theories are significant in their attempt to respond to fundamental changes in the relationship between the city and food production. However, these comprehensive, often utopian visions could not easily be imposed on the spatial complexities of industrial cities and conflicted with many different interests. In addition, the central place of agriculture in the visions of foundational planning thinkers had been lost over a number of decades to the point that, by the end of the 20th century, agriculture and food systems were deemed a "stranger to the planning field" [22]. Key food system components such as public markets or production sites were deliberately zoned out of cities or hidden by dominant aesthetic ideologies such as the City Beautiful movement [18,22]. With the resurgence of interest in urban agriculture and food systems, planners and designers have had to reconstruct a historical discourse around the planning of food and productive spaces in the city that does not build on these foundational figures.

Critical environmental and social justice imperatives for food system change have prompted various thinkers to reassert the relationship between food and the city. Some researchers explored the ways in which food systems have been embedded historically in urban space. A landmark publication that has brought this to prominence nearly a decade ago is London architect Carolyn Steel's *Hungry City* [23]. Its strength was in combining a historical and spatial analysis of this relation, with London as a case study, to show the embeddedness of food and its fundamentals (land, market, waste, etc.) into the city as a material space—coining a new term, *sitopia* (combining the Greek terms for food and place), to convey this deep relationship [24].

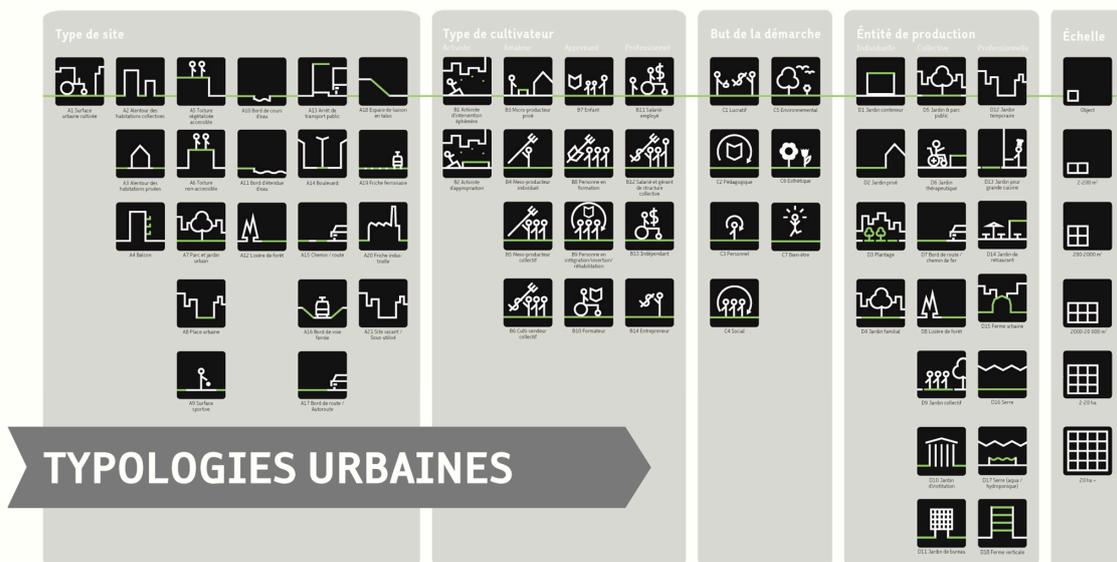
This section examines six of the contemporary attempts at reconceptualizing the place of food as a structuring component of the modern city; building on this historical understanding, visions of a future where food is the foundational building block for cities are being proposed. All these visions have been expressed in the form of book publications, often accompanied by websites, which have come out during this new millennium. Their authors are all practicing architects, landscape architects, or planners. They differ significantly from each other as conceptual efforts seeking to provide a grand vision for the city in a way that finds a place for food, and in particular food production. Nevertheless, across these contrasting statements, the productive urban landscape serves as an overarching concept. All six thinkers in this section focus on how to transform cities rather than to plan new ones.

The pioneering attempt in this regard is a book that sought to conceptualize *Continuous Productive Urban Landscapes* (CPULs) [25]<sup>4</sup>. While the book includes contributions from other researchers and expert practitioners, it was written primarily by André Viljoen and Katrin Bohn, architects based in London (he with South African origins, she with German ones), influenced in particular by their exposure to the insertion of food production in urban areas across Cuba and backgrounds in low-energy architecture and sustainable design. It set the standard for a holistic, integrative vision of the city as a productive space<sup>5</sup>. Moreover, space in the city becomes a field for design intervention—as the subtitle states, urban agriculture must be *designed* into cities if these are to become sustainable. The central tenet in this early manifesto is that it is not sufficient for urban landscapes to become productive, they have to be connected with each other to generate a continuous web. This last characteristic in their concept (the ‘C’ in CPUL) may in fact be the most challenging goal to achieve, as existing cities are well established and structured. While it is challenging to alter the existing urban landscapes into productive ones at the scale of an overall city, it is much more difficult to connect the patchwork of open and other spaces into a continuously connected one based on productive uses (Figure 3). Continuous landscapes hark back to a long history in regional planning and design, including greenbelts, radial corridor-and-wedge development, and park necklaces. Bohn and Viljoen’s key innovation was to connect this tradition with the idea that agriculture not only can be part of the urban landscape, but it also can and should be designed.

*Food Urbanism* is the term used by Verzone Woods Architectes, a firm based in Vevey, Switzerland, specialized in architectural and landscape design for the public realm. Led by Craig Verzone and Cristina Woods, the firm’s Food Urbanism Initiative<sup>6</sup> enabled it to undertake an in-depth analysis of “the overall impact of food on urban design and to study the potential of new architectural and landscape strategies” for integrating food production, processing, distribution, and consumption in cities, with Switzerland as a case study. The Initiative examined in great detail the existing fabric to identify the potential for urban agricultural initiatives “to develop design strategies at multiple scales (building, neighborhood and city) and policies for future urban development that integrate both city life and food production cycles into a more harmonious coexistence” [27]. The main achievement of this Initiative is a typological understanding of different urban components, and based on this, the development of a toolkit that enables an identification of the multiple ways in which the components of the urban landscape can incorporate components of the food system (particularly food production). Moreover, the emphasis on a scalar understanding of cities as well as a concomitant scalar approach to design interventions related to urban food systems is another important contribution (Figure 4).



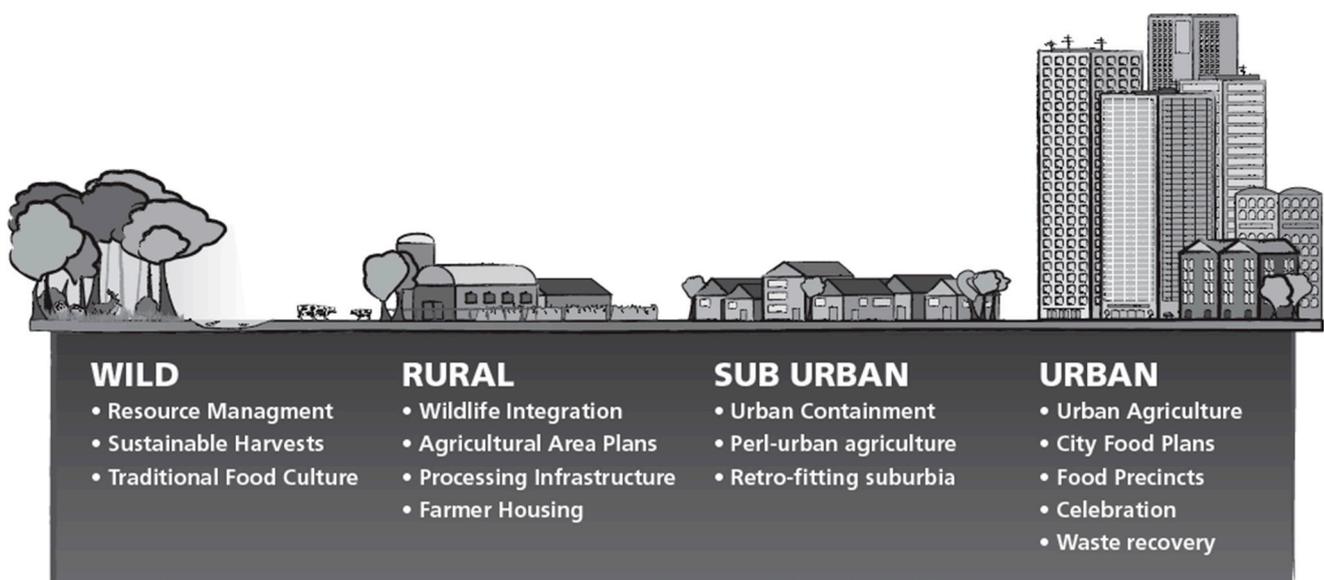
**Figure 3.** Bohn and Viljoen’s Continuous Productive Urban Landscape concept, as illustrated in their Thames Gateway proposal. Image courtesy of Bohn & Viljoen Architects.



**Figure 4.** “Synoptic table of typologies” proposed in Verzone and Woods’ Food Urbanism concept. Image courtesy of Food Urbanism Initiative-Verzone Woods Architectes.

Janine de la Salle and Mark Holland, planning practitioners based in the Vancouver area, coined the term *Agricultural Urbanism* to designate how to design and plan for sustainable urban and regional food systems [28]. Through this concept, they aim “to provide frameworks and strategies for integrating food and agriculture into neighbourhoods, communities, and regional planning systems” [29] (Figure 5). The Agricultural Urbanism concept emerged from their years of experience as consultants to municipalities and developers<sup>7</sup> that are trying to figure out how the increasing variety of alternative food channels and the emerging importance of food systems, in their multiple components and connections, can be embedded in the ordinary business of planning the existing and transformed landscape. Their contribution lies particularly in relating the analysis of food systems to the methods that planners, landscape architects, and other designers use every day. Furthermore, the importance they give to the regional dimension expands the scope of the work of designers beyond the comfortable urban limits, highlighting such aims as long-term food strategy and a value-added food economy. This pushes the issue of scale and problematizes the “local”, while reinforcing the urban and regional landscapes as spaces that require policy, planning, and design.

## Action Areas for Food: Urban to Wild



**Figure 5.** Action areas for food, from ‘wild’ to ‘urban’, as conceived in de la Salle and Holland’s *Agricultural Urbanism*. Image courtesy of de la Salle and Holland.

Andres Duany’s *Agrarian Urbanism* concept attempts to incorporate agriculture into the spatial model of New Urbanism that he helped establish. To Duany and his Miami-based team at Duany Plater-Zyberk & Company, the goal is to make “the agrarian way of life” available to as many as possible while connecting it to urban place-making and anchoring it in the private market economy. They seek to establish no less than an “agrarian urban theory” based on “settlements where the entire society is involved with food in all its aspects: organizing, growing, processing, distributing, cooking and eating it” [30]. Some of the core aspects of this model, such as food-based conviviality, can be found in the writings of many of the other proponents of productive urban landscapes which preceded or were parallel to the *Agrarian Urbanism* book, including those of de la Salle and Holland. Other aspects, particularly the reliance on the conventional market system to induce change, have been contested. Just as New Urbanism relies on adapting spatial strategies

from a somewhat nostalgic interpretation of pre-World War II cities to re-form sprawling development, Agrarian Urbanism promotes an image of pre-war spatial continuity of city and countryside. Perhaps most interesting in this model is the way it gives a different twist to the transect (Figure 6)—a key concept in New Urbanism which has roots in regional planning approaches of a century earlier, as far back as Geddes’ Valley Section. Duany’s move to “place food along the transect” in Agrarian Urbanism (in contrast to its neglect in New Urbanism) enables food-centred transect principles to guide design and planning decisions across a city and its surroundings.

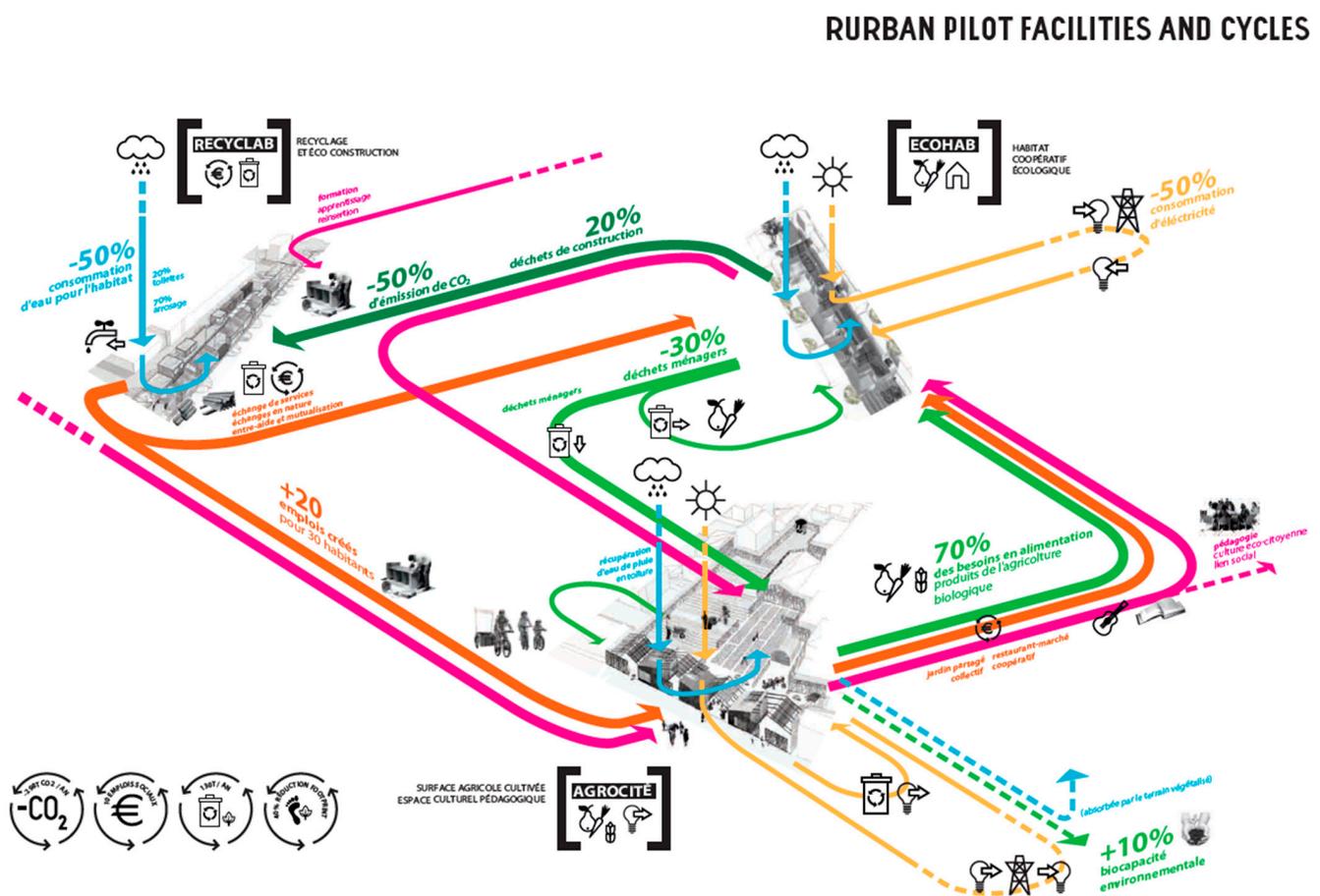


**Figure 6.** Duany’s version of the transect (above) and matrix of building types (below), central elements of his Agrarian Urbanism concept. Image courtesy of DPZ CoDesign.

CJ Lim is a Malaysia-born, London-based architecture professor, with longstanding interest in the relation of food and city. His first book on the subject, co-written with Ed Liu, is intended as a “manifesto for the Smartcity”<sup>8</sup>. Its central thesis is “the re-establishment of closed cyclical systems within urban and peri-urban areas and how they will manifest in the spaces of a notional “*Smartcity*”. At the forefront of the Smartcity manifesto is urban agriculture, wherein “the hybridization of agriculture and urban fabric can lead to an association that is symbiotic rather than parasitic” [32]. His book draws on soil-to-table-and-back-to-soil rhetoric that is present to varying degrees in most conceptualizations of productive urban landscapes but adds to it the role of “eco-warriors”, highlighting the role of storytellers and farmers. Ultimately, Lim’s chief contribution may be how he applied a new angle for productive urban landscapes, marrying the high-tech and the hyper-dense with the grounded and the open.

Romanian-born, Paris-based architects Doina Petrescu and Constantin Petcou have not yet written a single comprehensive tome that presents their vision of productive urban land-

scapes, yet they evoke such a vision through some of their writings—especially portions of a book they co-edited with Nishan Awan [33]—and through their actions. They operate through a variety of collaborative mechanisms, two of which are particularly worth noting. *L’atelier d’architecture autogérée* is a collective platform whose “projects focus on issues of self-organization and self-management of collective spaces, emerging networks and catalyst processes in urban contexts”<sup>9</sup>. *R-Urban* explores “the ecological, economic and social complementarities between . . . cooperative housing, ethic economy, urban bio-agriculture and local culture production”<sup>10</sup>. This team, through their multiple collaborations, positional writings, graphic communication, and projects on the ground, have developed a holistic, integrative way of working to generate landscapes of production within cities where food production is intricately weaved with production of culture, resources, and community, while relying on processes of self-organization, self-management, and self-regeneration (Figure 7). For them, urban landscapes have to be cyclical, emergent, non-hierarchical, and resilient.



**Figure 7.** Petrescu and Petcou’s R-Urban concept, adapted to reflect their realizations on the ground in the Paris region. It illustrates a project that the designers implemented in two Paris suburbs, composed of three interrelated units: (1) Agrocité (combining an agricultural production area and a pedagogical and cultural space); (2) Ecohab (ecological cooperative housing); and (3) Recyclab (recycling and ecological construction). Image courtesy of Petrescu and Petcou.

### 3.3. A Framework of Approaches

The concepts sketched out in the previous section vary significantly, but recurring themes cut across many of these and other relevant conceptualizations. These connect to multiple urban as well as food-related concerns that are increasingly catching the attention

of many people, beliefs in what needs to be done about such issues, and strategies that have emerged to address them. The following themes could be found in the arguments made by several of the foundational and contemporary thinkers who are discussed in this article and are reflected in the projects that these thinkers proposed or implemented:

- localism as an alternative to the dominance of globalization
- productivity and resourcefulness as a reaction to massive waste
- metabolism/circularity as a metaphor that counters the linearity of flows that dominate the world nowadays
- connectivity as a rejection of the disjointed world view that leads to actions that do not account for consequences
- systems thinking that ties together large sets of resources and connects them together
- infrastructures as a way to focus attention on various investments that underpin the functioning of systems, particularly urban systems.

Based on a review of foundational theories and a survey of the relevant contemporary writings in the two previous sections, we identify three key contemporary and emerging approaches, drawing on various concerns, beliefs, and strategies. These approaches—spatial design, systems design, and productive infrastructure—taken together, can integrate agricultural production and food priorities into a holistic planning and design of urban landscapes.

### 3.3.1. Spatial Design Approaches

Just as 19th and early 20th century planning theories reacted to the dislocations caused by the agricultural and industrial revolutions with plans that attempted to restore spatial coherence and more proximal relationships between food production and urban consumption, a number of contemporary approaches employ similar spatial strategies. However, contemporary alternatives are originating from grassroots efforts rather than visionary proposals by design and planning professions. Alarmed by the expanding scale and dislocations caused by globalization and corporate consolidation and the impacts of these trends on public health, the environment, and economies, grassroots community groups, NGOs, chefs, consumers, and others have coalesced into a broader social movement around resisting and reforming food systems through different approaches (permaculture, Slow Food, food sovereignty, local food, etc.). One common aim across the diverse groups is to respatialize food systems, including strategies for reducing “food miles” with shortened supply chains and embedding farming in local ecologies [35]. While the proliferation of community gardens, farmers markets, CSAs, and other forms of direct spatial engagement has become a set of conventionalized spatial tactics, this convergence of discourses around food and place provides an opening for landscape architecture, design, and planning.

These spatial tactics can play an important role in initiating change. Some have disparaged as inconsequential to the larger urban situation the sometimes ragged look of community gardens on vacant lots or the small transient nature of farmers markets occupying the margins of a parking lot [36]. However, these efforts have demonstrated how to transform almost any space—rubble strewn lots, rooftops, and parking lots—into productive space and, in the process, how this affects the social spaces and neighborhoods around them [37,38]. Many designers are recognizing the spatial politics embedded in such places; consequently, they are working with various actors on the ground to tactically use community gardens, markets, etc. as ways to challenge conventional land use and activate public space in new ways<sup>11</sup>. These seemingly small efforts effectively construct new metaphors for cultivating the productive city. Names like Brooklyn Grange, East New York Farms, or D-Town Farm mark boldly the very spatial anomaly of their enterprise.

Design in turn has played a critical role in the spatial expansion—in numbers, scale, and locations—of productive urban spaces. From vertical farms to agri-burbs and farming inserted into boulevards and strip malls, almost every possible spatial typology has been retrofitted for food production [39]. The Food Urbanism work of Verzone Woods maps out a typology of new projects from the human/object scale to the building, neighborhood, city

region, and global scales. Planners in Chicago, Baltimore, and other cities are changing codes to admit agriculture and market uses that had been zoned out of cities. Beyond the immediately comprehensible scale of the site or the change in zoning code, how do all these multiple projects influence the larger spatial conception of the city?

The objective of restoring spatial coherence and connectivity through New Urbanism's urban/rural transect recalls approaches from the 19th century. The image of spatial proximity within the Garden City also remains powerful as demonstrated in the Food City 2030 plan for Fayetteville, Arkansas, which calls for retrofitting the suburban fringe with agricultural functions forming clear edges and neighborhood centers. However, restoring the visual connections between productive spaces and the city does not necessarily restore the systemic gaps in urban food systems. By relying on 19th century models, some of these approaches may miss opportunities for responding to the potentials of more dynamic contemporary urban processes, new economies, and changed political relationships.

In one sense the CPUL proposals for connecting space updates the urban park plans of Olmsted's Emerald Necklace in Boston, Horace Cleveland's Minneapolis park system, and many other similar proposals, by adding productive programming which had been marginalized by pastoral aesthetic ideology. The CPUL plans for knitting together a diverse typology of existing spaces and uses to provide multiple functions in complex urban systems are more closely aligned with the objectives of Landscape Urbanism than with 19th century aesthetics.

Some of the writers about productive urban landscapes focus on certain parts of the urban landscapes, showing in words (and sometimes in action) how these spaces can be transformed from waste spaces into productive resources. For instance, artist/architect Fritz Haeg proposes the concept of Edible Estates to describe how the largest wasted assets in many cities—lawns in residential areas of all sorts—can become landscapes that are both artistic and productive [40].

Instead of utopian schemes or 19th century concepts of urban form, new proposals for the productive city address very contemporary processes and emergent urban forms created by the uneven effects of globalization such as shrinking cities, gentrification, the intensifying global centers of finance, and the fragmentation and sprawl at the peripheries. These situations offer new spatial opportunities. Whereas the Garden City sought to control the scale of the town with a greenbelt, creating a static space, new approaches to the urban periphery are more dynamic. Sievert's *Zwischenstadt* (in-between city) acknowledges that the fragmented urban edge is actually a site of hybridity, dynamism, and polycentricity. Meanwhile the extensive pattern of urban voids of old industrial cities, from Detroit and St Louis in the US to the old coal towns in the English Midlands and the French–Belgian border, offer a unique moment to shape new urban morphologies. Urban agriculture is a central component in many of these visions and linking vacant land into larger patterns is a common strategy. The recent framework plan for Detroit developed by Stoss identifies productive landscapes as one of the primary systems in the reimagining of the city (Figure 8). Cleveland, Ohio and Flint, Michigan, as well as other shrinking cities, are using GIS analysis to determine how planning policy can adapt the process of abandonment and vacancy to create land uses that restore ecological patterns with the potential for productive agricultural use [41].

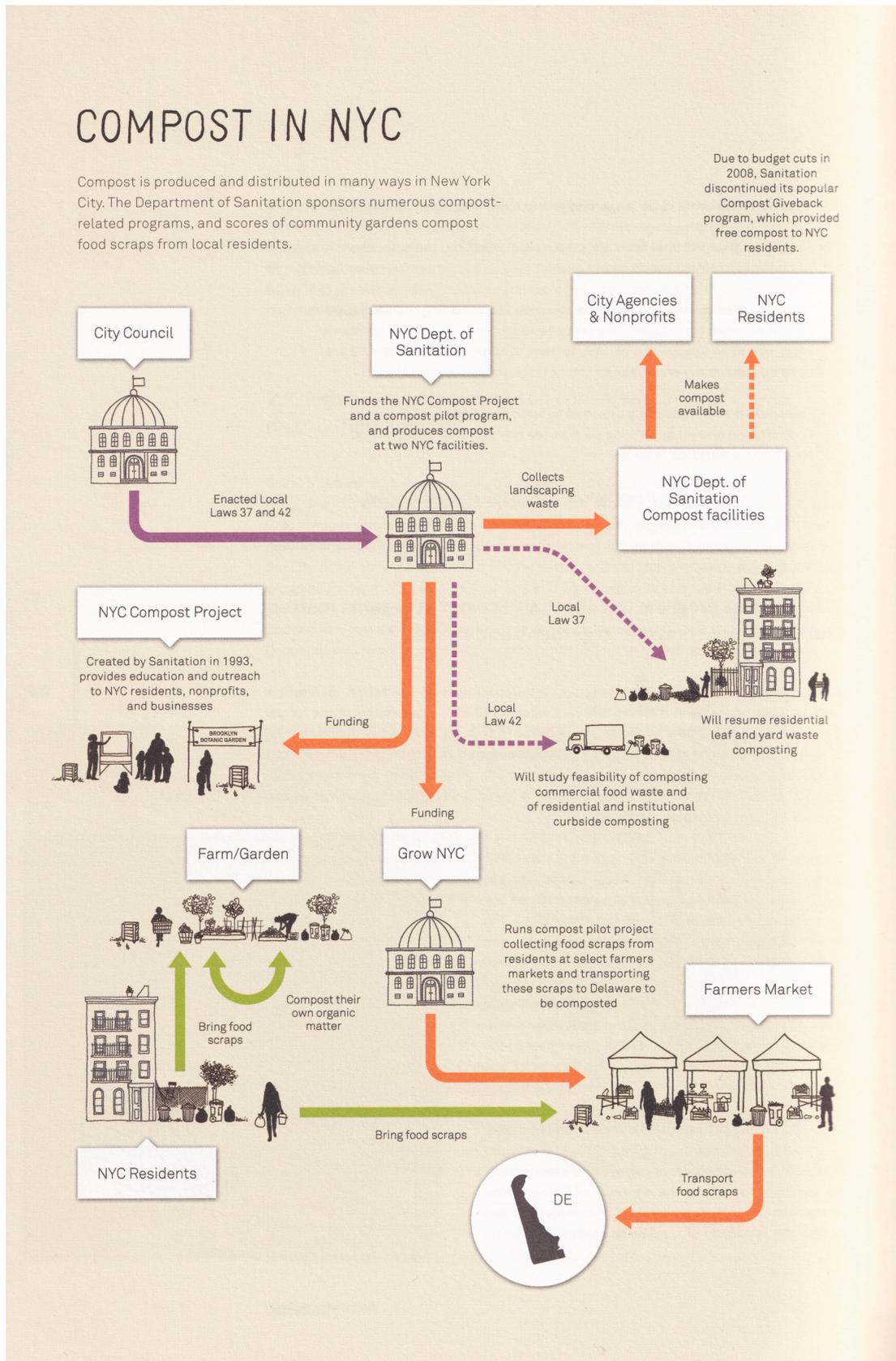


**Figure 8.** Aerial view of Lafayette Greens in downtown Detroit. Image from authors.

### 3.3.2. Systems Design Approaches

With systems of transportation, finance, migration, and shipping ever more dynamic and global, emphasis on spatial coherence or proximity gives way to system relationships. Metaphors of the city as organizing flows of capital, goods, and people, or metabolic flows of nutrients, water, and energy, radically reframe the approach to the productive city. Systems thinking and design re-aligns the spatial understanding of the presence and role of food in the city (the diagram replacing the site plan); this extends across scales, linking individual sites (even if not spatially contiguous) systemically to the metropolitan region and beyond.

Individual urban agriculture sites are vulnerable to many different forces, from development threats to vandalism [42], however, a systems approach links many scattered sites into a network of mutual support and integrates them into larger social, environmental, and spatial systems. In the last decade, effective organizational networks have created more sustainable, resilient urban agriculture systems. For example, community gardening in Detroit was in decline as Federal and city support disappeared. In 2003, a consortium of groups—Michigan State University, Earthworks Garden at the Capuchin Soup Kitchen, and the non-profit agency, the Greening of Detroit—formed the Detroit Agricultural Network and the Garden Resource Program [43]. In 2013, the network became a separate organization, Keep Growing Detroit, which now supports over 1900 gardens in diverse contexts<sup>12</sup>. Similarly, the Five Borough Farm study in New York City developed by the Design Trust for Public Space reimagined New York City as a dispersed network of over 700 different urban agriculture sites (Figure 9) [44].



**Figure 9.** Compost system in New York City as analyzed in the Five Borough Farm project. Image courtesy of the Design Trust for Public Space.

In addition to the spatial approach of “scaling up” urban agriculture, the strategy of “scaling out” links sites of production to other sectors of the food system—aggregating distributing, processing, marketing, eating places, and post consumption—expanding the scope and impact of individual sites. The increasingly common practice of food system assessments and plans looks at each sector in space and how it functions in relation to other sectors [22]. This systems thinking opens up many points for possible intervention in shaping city and region. For example, the Green Markets in New York City, initially conceived by an architect and planner in the 1970s, have been a key driver of agricultural diversification and growth in the Hudson Valley.

A systemic approach also has the potential to address larger structural relationships that underlie urban food challenges. Early practices of “redlining”, the consolidation and expansion of the size of grocery stores, policy environments that allow private corporations to determine locations, all have contributed to the creation of a set of interrelated disparities, including access to affordable healthy food. Understanding these systemic relationships is necessary for developing effective responses, going beyond increasing production of urban agriculture to include building new distribution networks and markets.

A particular approach has emerged in recent years, rapidly connecting several movements and establishing a presence in the international discourse related to urbanization, environment, and food supply: City Region Food Systems (CRFS). A website established by a cluster of international partners states that CRFS “encompass the complex network of actors, processes and relationships to do with food production, processing, marketing, and consumption that exist in a given geographical region that includes a more or less concentrated urban centre and its surrounding peri-urban and rural hinterland; a regional landscape across which flows of people, goods and ecosystem services are managed”<sup>13</sup>. The rise of the CRFS concept can be explained by its ability to connect food system thinking with both local urban-focused interests and broader visions that reach beyond narrow city limits.

### 3.3.3. Productive Infrastructure Approaches

Food system assessments reveal that the flows of food through production, storage, processing, marketing, and even eating require infrastructural support and coordination across the complexities of these processes. Food systems create and depend on infrastructural systems, in the form of physical support systems—from soil to highways to kitchens—or social/virtual-telecommunication networks and databases or the organizational capacities of industries or non-profit groups.

Approaching food systems as infrastructures also integrates food production with other critical landscape infrastructures. In Philadelphia, the Redevelopment Authority responsible for managing land use and other infrastructure coordinates with the water authority to promote urban agriculture. Their support of projects such as Mill Creek Farm in West Philadelphia is part of a strategy for reducing stormwater runoff.

Infrastructure funding has been critical for imagining significant transformation at the building scale of projects such as Brooklyn Grange. While the view of crop rows with the New York skyline in the background creates a stunning iconic juxtaposition, less visible is the infrastructural collusion of the scene with soil and stormwater infrastructures (Figure 10). “Green infrastructure” such as this is indicative of an approach to infrastructural design that breaks down a reductive engineering approach to link across what were treated as separate systems (water and food, for instance).



**Figure 10.** View of Brooklyn Grange, New York City. This project demonstrates a green infrastructure approach, reducing stormwater and urban heat island effect. Image from authors.

The networked urban agriculture of the Five Borough Farm project mentioned above integrates several types of infrastructures, starting with urban soils as a vastly unrecognized ecological infrastructure<sup>14</sup>, to city water supply and stormwater systems. It works on building community capacity and organizational structures, promoting systems of native plants, and developing the physical and institutional frameworks for organic waste and compost recycling. It also establishes a community-sourced database for documenting the metrics of the performance of the network.

An infrastructural approach of such network designs complements spatial objectives by providing the means to re-integrate complex systems across multiple spatial scales. The significance of networked landscape infrastructures is how they work with contemporary systems of flows while reconnecting with the particulars of place to create coherent and resilient systems. The three approaches outlined in this section are thus complementary and often integral to each other.

This can be seen in the emergence of foodshed planning as an effort to re-spatialize food systems and rebuild regional food system infrastructure. A series of recent studies—including the San Francisco Foodshed Report, the Philadelphia Foodshed Study by the Delaware Valley Regional Planning Authority, and the New York City Regional Foodshed Initiative by the Columbia Urban Design Lab—employ the concept of a foodshed, defined as a geographic area within which the food for a population originates. It borrows the geospatial metaphor of watersheds and the instrumental purpose of creating a boundary for managing a critical process and resource. However, unlike a watershed, delineating a foodshed is determined less by topography than by the influence of short-haul transportation to outline a radius around a city of typically 100 to 200 miles. The effect of foodshed planning and design is to create the infrastructure for a networked territory by linking food systems sectors with other regional infrastructures.

Such an approach as that of the foodshed integrates spatial and systemic understanding. It has the potential to develop comprehensive yet dynamic integration of food and the

city by responding to the conditions of contemporary cities. A foodshed is a form of infrastructure that integrates ecological and cultural systems. Understood in this sense, it echoes Bélanger's description of the role of landscape infrastructure in providing frameworks for multiscale systemic change:

"If there is to be a 'new urbanism' it will not be based on the twin fantasies of order and omnipotence; it will be the staging of uncertainty: it will no longer be concerned with the arrangement of more or less permanent objects but with the irrigation of territories with potential" [45].

The three approaches identified above represent different starting points and strategic emphasis for planning and design productive cities. They can be seen as complementary rather than exclusive categories. For instance, while spatial approaches have created new typologies of productive spaces, these spaces can form networked systems of spaces, linking different food system sectors and supporting urban infrastructures such as stormwater management. The foodshed concept is a spatial concept that is only viable through system integration and new forms of transportation, storage, and organizational infrastructure.

#### 4. Concluding Discussion: Looking Back and Forward

The three questions posed at the end of the introductory section structured the main section of this paper, as each part in it sought to address one question. Together, the themes that emerged across the three parts provide elements of a framework. The approaches to conceptualizing the fundamental relationship between food and urban landscapes outlined in the third part are derived from analysis of the diversity of contemporary approaches in the second part, situated against the foundational visions and efforts in planning and design in the first part.

Both periods represent significant moments of change and fragility of food systems. Although there was a significant gap between these two periods when the integration of food has been largely missing from the discourse of design and planning practice, significant efforts and critical imperatives have sought to put it back on the table. While the economic, social, and political contexts are significantly different, there are certain parallels in the approaches.

In both foundational visions and contemporary responses, spatial strategies are the primary means of restructuring food systems and urban landscapes, albeit with a range of different conceptions of how that is achieved. The proliferation of new typologies of productive spaces offers ways of reintegrating the fundamental relationship of the built environment with food in emerging urban patterns. Contemporary means of analyzing, representing, and intervening in the dynamics of systems has also greatly expanded the nature and complexity of urban agriculture, markets, and ways in which food systems become spatialized. The role of food in forming social relationships in the city is also fundamental to both periods—from the social reforms of Howard's or Migge's visions, to the social justice concerns of grassroots efforts that have established the groundwork behind much of the contemporary efforts to reform food/city relationships.

The consequences of the absence of consideration during much of the 20th century of food systems and productive landscapes by planners, designers, and many other professionals involved in shaping cities are immeasurable. Among others, the decades-long gap between the foundational visions and contemporary efforts to integrate productive food systems into urban landscapes has had significant consequences for public health and environmental quality [22]. The structural violence caused and inequities in access to healthy food options, for instance, are now a critical part of social-justice objectives in the planning and design of productive urban landscapes. This rediscovery of place-based urban food systems is an opportunity for working towards more equitable food access.

Present-day designers and planners are encountering a series of common challenges, similarly to some that their predecessors a century earlier had. These lead to a number of questions that include:

- How do food systems work at different scales and how can improvements in these systems be made across the multiple scales of urban territories?
- How can the capacity—both organizational and infrastructural—of various actors working on productive spaces be strengthened?
- How can the flows of labor, energy, and other resources be managed for effective urban food systems?
- How can visions such as those reviewed in this paper (or even pieces of these visions) be implemented in the context of the dominant neo-liberal economy?

These challenges need to be seen within the broader scope of conceptions of the productive city. Just as foundational theorists in planning, architecture, and landscape architecture responded to the radical restructuring of cities of the Industrial Revolution, the current moment poses new challenges as global capital, forced mobility of labor, climate change, fast-moving epidemics, and other forces collapse historic relationships of core and periphery, rural and urban.

At the same time, greater awareness of the necessity to address the challenges and recognition of the multiple problems resulting from the divide between food and urban systems is presenting an opening at the current moment. The presence of such opportunities leads to questions faced by present-day actors of the built environment—questions that researchers could help answer in the future. These include:

- How can the growing recognition of the necessity and urgency of addressing such vital problems be translated into concrete actions that place the urban environment at the center of solutions to food system problems?
- How can actionable spatial, systemic, and infrastructural responses to urban food problems be conceived and realized within the context of structural inertia that confronts attempts at addressing complex problems related to cities as well as food and agriculture?
- What are the implications of the emergent practices and actors working in productive urban landscapes for social relationships and social justice?

The strategies for an expanded role of urban agriculture and food systems summarized above—spatial, systemic, and infrastructural—provide a framework for developing the potential for cultivating new urban ecologies, economies, and cultures that place food at their core.

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## Notes

<sup>1</sup> We understand urban agriculture here in its broadest sense. See for instance the one by Smit et al. (2001 [1]): “... an industry that produces, processes, and markets food, fuel, and other outputs, largely in response to the daily demand of consumers within a town, city, or metropolis, on many types of privately and publicly held land and water bodies found throughout intra-urban and peri-urban areas”.

<sup>2</sup> Evidence of how the interest in food systems has become established among researchers and practitioners of the urban built environment (and how such an interest covers a wide range of issues and approaches) can be found in recent special issues of two academic journals, *Journal of Urbanism* (guest edited by Susan Parham) and *Urban Design International* (guest edited by June Komisar and Joe Nasr) (Parham 2020 [5]; Komisar and Nasr 2019 [6]).

- 3 While Wright first proposed Broadacre City in the 1940s, he had suggested the prototype “Davidson Little Farms Unit” in 1932–1933. See <https://www.moma.org/collection/works/161772> (accessed on 1 December 2022).
- 4 *Second Nature*, Viljoen and Bohn’s 2014 sequel and companion to the *CPULs* book [26], builds on their continued work in the past decade. *Second Nature* draws on their experience in prototyping urban agriculture initiatives and presented the “CPUL City Action Plan”—a four-strand strategy for the initial implementation of CPULs.
- 5 See blog of Productive Urban Landscape Research: <https://blogs.brighton.ac.uk/pulr/> (accessed on 1 December 2022).
- 6 See <https://www.vwa.ch/projet/food-urbanism/> (accessed on 1 December 2022) and Verzone and Woods (2020).
- 7 See <https://www.urbanfoodstrategies.com/> (accessed on 1 December 2022).
- 8 A second edition of the book was published in 2019. CJ Lim also published a companion book, *Food City* (Lim 2014 [31]).
- 9 See <http://www.urbantactics.org/> (accessed on 1 December 2022) and Petrescu, Petcou and Nilsson (2019) [34].
- 10 See <http://r-urban.net/> (accessed on 1 December 2022).
- 11 See, for instance, Bohn and Viljoen’s efforts to organize communal meals as visible acts of reclaiming public space, as in the “continuous picnic” next to the British Museum in London or the “town meal” in the center of the mid-sized English town of Middlesbrough.
- 12 <http://detroitagriculture.net/about/> (accessed on 1 December 2022).
- 13 <http://www.fao.org/in-action/food-for-cities-programme/approach-old/crfs/en/> (accessed on 1 December 2022).
- 14 See the work of the Urban Soils Institute in New York City, <https://urbansoils.org/> (accessed on 1 December 2022).

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