sustainability

Review

Does Urban Agriculture Improve Food Security? Examining the Nexus of Food Access and Distribution of Urban Produced Foods in the United States: A Systematic Review

Alana Siegner [1,*], Jennifer Sowerwine [2] and Charisma Acey [3]

[1] Energy and Resources Group, University of California, Berkeley, CA 94720, USA
[2] Department of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720, USA; jsowerwi@berkeley.edu
[3] Department of City and Regional Planning, University of California, Berkeley, CA 94720, USA; charisma.acey@berkeley.edu
* Correspondence: asiegner@berkeley.edu; Tel.: +1-301-943-9504

Received: 10 July 2018; Accepted: 18 August 2018; Published: 22 August 2018

Abstract: The aim of our review is to critically analyze the urban agriculture and urban food systems literature in order to understand the impact of urban-produced foods on community food security. We examine the role of city planning, food policy, and civic engagement in creating spaces for urban agriculture in cities across the United States, and whether (and how) these spaces promote food justice and food security. Bringing together multidisciplinary literature on access to urban agriculture and the distribution of urban-produced foods in a thematic, systematic review, we point out gaps in the academic research that would benefit from further study. The review integrates academic literature generated from Web of Science searches with gray literature identified through Google Alerts. We find that while there is a strong focus on elucidating the multiple benefits of urban agriculture, there are few studies that robustly measure the impact of urban farms on improving food security in low-income communities. Much of the literature is theoretical, focused on the production potential of urban agriculture, while more work is needed to understand and overcome barriers to access and distribution among communities in need. We conclude with a set of recommendations for researchers, practitioners, and policymakers who seek to create spaces in cities for food justice, equity, access, and sovereignty.

Keywords: urban agriculture; food justice; food access; food distribution; food systems policy and planning

1. Introduction

Urban agriculture (UA) has sparked growing civic interest, urban farming projects, and scholarship from academic institutions across the U.S. in the past decade [1–7]. Over the past 10 years, there has been a proliferation of articles citing the multifaceted array of benefits attributed to urban agriculture. These span city greening and beautification to improved nutrition; public, and mental health; community food security; climate change mitigation; community building; economic development and empowerment [3,6,8–12]. Those highlighting the beneficial environmental and ecological impacts of urban agriculture cite reduced urban heat island effect, improved local air quality, improved stormwater quality (and reduced quantity), increased pollinator populations, and climate mitigation services, such as carbon sequestration [13–15].

Urban agriculture is a much-celebrated part of the burgeoning local food movement aimed at improving food access among low-income communities in urban areas. However, its impact on reducing food insecurity in U.S. cities remains poorly understood [1,16]. In fact, there are few robust analyses that measure the actual social, economic and health impacts of urban agriculture, or the policy and governance environments and civic engagement frameworks in which UA models are effective in reducing food insecurity. Without understanding the actual links between UA and food security or which specific characteristics, models or approaches reduce insecurity, urban policymakers and advocates risk backing policies that could have unintended consequences or negative impacts on vulnerable individuals and communities.

In this literature review, we explore the intersection between UA and food security to better understand how and to what extent UA addresses food access challenges facing low-income communities in urban areas, and the conditions that either enable or inhibit UA initiatives. The landscape of what constitutes "urban agriculture" is extremely heterogeneous, with great diversity in definition, mission, scale, and means. UA encompasses vertical and rooftop farming, urban foraging, community and residential gardens, and commercial urban farms. Some urban farms operate as for-profit businesses, whereas others operate as nonprofits reliant on grants, subsidies and donations to sustain their operations. Urban agriculture has been defined as "reconnecting with the community through food, jobs and economic development" (Viraj Puri, CEO of Gotham Greens, quoted in [17]); for the purposes of city planning, the American Planning Association defines it as the "production, marketing, and distribution of food and other products in metropolitan areas and at their edges, beyond what is strictly for home consumption or educational purposes" (American Planning Association 2011). In its simplest form, UA is "growing food in cities" [2]. For our purposes, we define UA broadly to encompass the full range of activities involved in urban food production including self-production and subsistence agriculture. In doing so, we follow scholars who have sought to measure the contributions of a wide range of UA activities [3,6,16].

In general, we see three trends in current scholarship on UA in relation to community food security: (1) a focus on the production potential of urban lands, (2) case studies highlighting various nutritional, health, and other community benefits or outcomes from urban gardening initiatives, and (3) more critical analyses of UA through food justice and equity lenses. Some scholars, for example, have mapped vacant lots in Oakland [18] and backyard gardens in Chicago [2], predicting yield, to illustrate the production potential of UA. Others demonstrate, through case studies, the productivity of urban gardens and the value of the food they produce in meeting nutritional needs of low-income communities, particularly households involved in gardening directly (The benchmark productivity rate for urban agriculture used in Altieri's 2016 study of Eastern Bay Area urban farms is 10 kg/m^2, the production level reached by intermediate Cuban farmers when they became international leaders in UA after separation from the Soviet Union.) [19–23]. Robust theoretical analyses have emerged critiquing the risks of UA when approached without an equity lens, potentially reinforcing structural injustices and racism and negatively impacting the communities they purportedly serve (see [24] and [25] for specific examples of critiques of the hidden neoliberal ideology of urban food movements).

Deeper historical and structural challenges including poverty, racism, and divestment in specific communities and neighborhoods are increasingly being recognized as the root causes of the current problem of unequal access to sufficient supplies of safe, nutritious, affordable, and culturally acceptable food facing cities [1,26,27]. Designating land for agricultural use in urban areas may conflict with other city planning priorities around affordable housing, gentrification, and living. Because of the persistent legacy of systemic discrimination, it is neither inevitable nor guaranteed that urban agriculture will redress food system inequities; in fact, urban farms can sometimes lead to displacement through eco-gentrification [26,28–31]. This is a particularly acute concern in areas experiencing housing pressures and population growth, such as the San Francisco Bay area and New York City. UA can also perpetuate positions of privilege within the food system by benefiting those who already hold power [1].

A growing number of urban agriculture articles highlight histories of oppression, structural racism, and economic divestment that are tied up in the narrative and ability of UA to improve food access in low income communities, often described as "food deserts" [7,24,27,32]. These studies draw attention to agricultural history; complex historical relationships between minority communities and farming; land theft; and structural dynamics of power and privilege, critiquing those who uncritically accept the multiple benefits of urban agriculture. They question, "who really benefits, and who loses in specific efforts to promote urban farms in the 'sustainable city' landscape?" [24,33,34] and, "how can white food activists reframe their work so as not to fuel displacement of residents of color?" [34].

We examine the role of urban agriculture in addressing food insecurity from a systems perspective, one that considers the policies and institutions that govern the process in which food is produced, processed, distributed and consumed, in order to ask four central questions: (1) How and to what extent are urban produced foods reaching low income consumers, and to what effect? (2) What are the approaches, technologies, institutions and relationships that support or detract from UA in achieving food security goals? (3) What are the political, institutional, cultural, historical, and civic action conditions that enable or inhibit urban agriculture to address food insecurity? Lastly, (4) How can policies be designed to support the urban farmer in earning a living wage, and support low-income consumers in accessing affordable, locally produced healthy foods?

We begin the paper by describing our literature review methodology, followed by a review of the food access and food distribution literatures as they relate to the question of how low-income communities access urban produced food (see Table 1). In the food access literature, we review spatial analyses and other studies that identify challenges and opportunities for expanding healthy food access in low-income communities, with a particular focus on urban produced foods. Next, we explore what is understood about the distribution of urban-produced foods especially the challenges and tradeoffs urban farmers face between securing a viable income and meeting the food needs of low income customers. Lastly, we bring together the literatures on access to and distribution of urban produced foods to identify effective strategies urban farms employ to meet food access needs of urban communities. Our analysis reveals three key factors mediating the effect of UA on food security: the economic realities of achieving an economically viable urban farm, (Section 5.1), the role of city policy and planning (Section 5.2), and the importance of civic engagement in the urban food system (Section 5.3). We seek to highlight examples from both the scholarly and gray literatures that demonstrate how UA can improve food access, distribution, and justice, in a way that supports both consumers and producers of food in cities.

Results of this systematic review will guide a three-year research project to investigate and address urban food access challenges in the eastern region of the San Francisco Bay Area, where interest in UA abounds, yet levels of gentrification, food insecurity, and income inequality are growing.

2. Materials and Methods

Our systematic review of the food access and distribution literature builds on critical food systems research in order to better understand when, where and how urban agriculture can improve food access and dismantle structures that perpetuate inequality within the larger food system. In order to understand how UA and food insecurity are linked, we bring together the disparate bodies of literature on food access/food security with literature on urban food production and distribution. We focus on literature from the United States, in order to generate ideas relevant to the political climate surrounding city and regional planners in this country, but results are applicable for comparison or potential transferability in other countries as well. We consider both peer reviewed scholarship (from journals such as *Agriculture and Human Values, Journal of the American Planning Association, Journal of Agriculture, Food Systems and Community Development, Geoforum, Sociological Inquiry, International Journal of Urban and Regional Research*, and *Public Health Nutrition*) and gray literature from food policy organizations (i.e., Johns Hopkins Center for a Livable Future, PolicyLink, City University of New York (CUNY) Urban Food Policy Institute, Detroit Food Policy Council, and Race Forward). Both theoretical

scholarship and case studies are drawn out below to illuminate the question of whether UA improves food access (and if so, how?).

Building on a set of 150 articles from the researchers' personal databases (based on research careers in Cooperative Extension, Local Food Systems and Urban Planning), we added an additional 200 sources from five months of Google Alerts for "urban agriculture" and from bibliographies of articles in the database. The Google Alerts (screened for relevance to this review) provided valuable additions from new studies, local news outlets, and gray literature. In many ways, the Google Alerts service better captures current trends and innovative ideas in urban agriculture than the scholarly literature, and points out important areas for future academic study, especially with respect to novel distribution methods, technology, and food recovery efforts. For example, topics such as mobile food trucks, gleaning, "agrihood" developments, participatory urban food forest projects, online food exchanges (e.g., CropMobster), and food distribution apps receive better coverage in local news outlets than the current body of peer-reviewed literature, where these emerging ideas are largely absent. Many of the online platforms that allow farmers and backyard gardeners to sell, donate, or receive volunteer harvest assistance represent especially promising areas for future scholarly research (e.g., The Urban Farmers Ample Harvest, or Seed Voyage).

We used this body of literature to generate a list of key terms for several Web of Science searches to systematically identify the peer-reviewed literature from 1900 to present. The dataset construction and selection criteria are summarized in Figure 1, and Web of Science results in Figure 2.

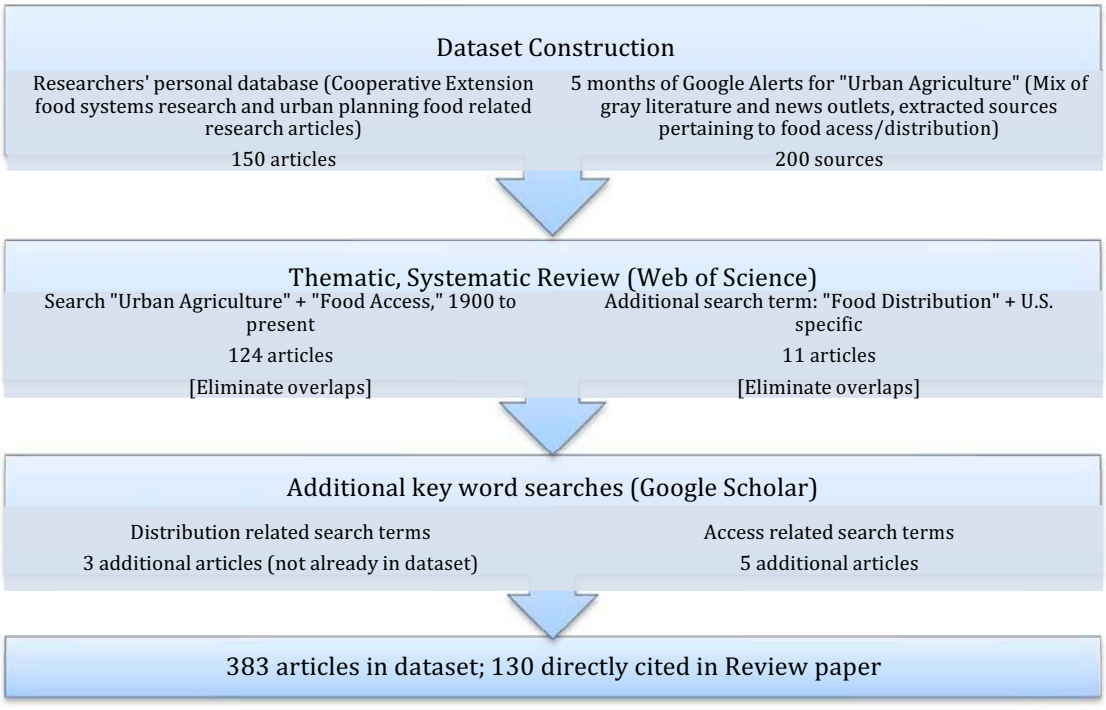

Figure 1. Selection Criteria Flow Chart.

Other searches for key terms relating to food access (see Table 1) including "food justice", "food security", "food sovereignty", "food apartheid", and "critical food geographies" added small numbers of articles to our systematic review. Terms were chosen based off keyword lists from articles in the database and results were screened for geographic relevance (U.S.) and mention of urban produced foods. These terms and search results bring up important questions of who prefers and uses which terms, and why. The struggle over terminology mirrors broader struggles for control, power, and self-determination. Going beyond 'food security', the term "food sovereignty" originates from La Via Campesina and the predominantly rural small producers movement in the 1990s; it is

applied to the urban space by scholars such as Alkon and Mares [35] and Block et al. [36] as a distinctly political concept that is "a transformative process . . . to recreate the democratic realm and regenerate a diversity of autonomous food systems based on equity, social justice, and ecological sustainability" [36]. Those who use "food apartheid" aim to directly implicate the segregation that is reproduced in the modern food system and food movements with respect to who can access healthy, locally produced food along racial lines [37]. These scholars foreground issues of race in their analyses in effort to name and dismantle racist legacies in the food system. Food apartheid, according to community organizer and cofounder of the Black Urban Growers organization, Karen Washington, "brings us to the more important question: 'What are some of the social inequalities that you see, and what are you doing to erase some of the injustices?'" [38]. The term 'apartheid' demands an intersectional approach incorporating race, class, education, geography and the environment.

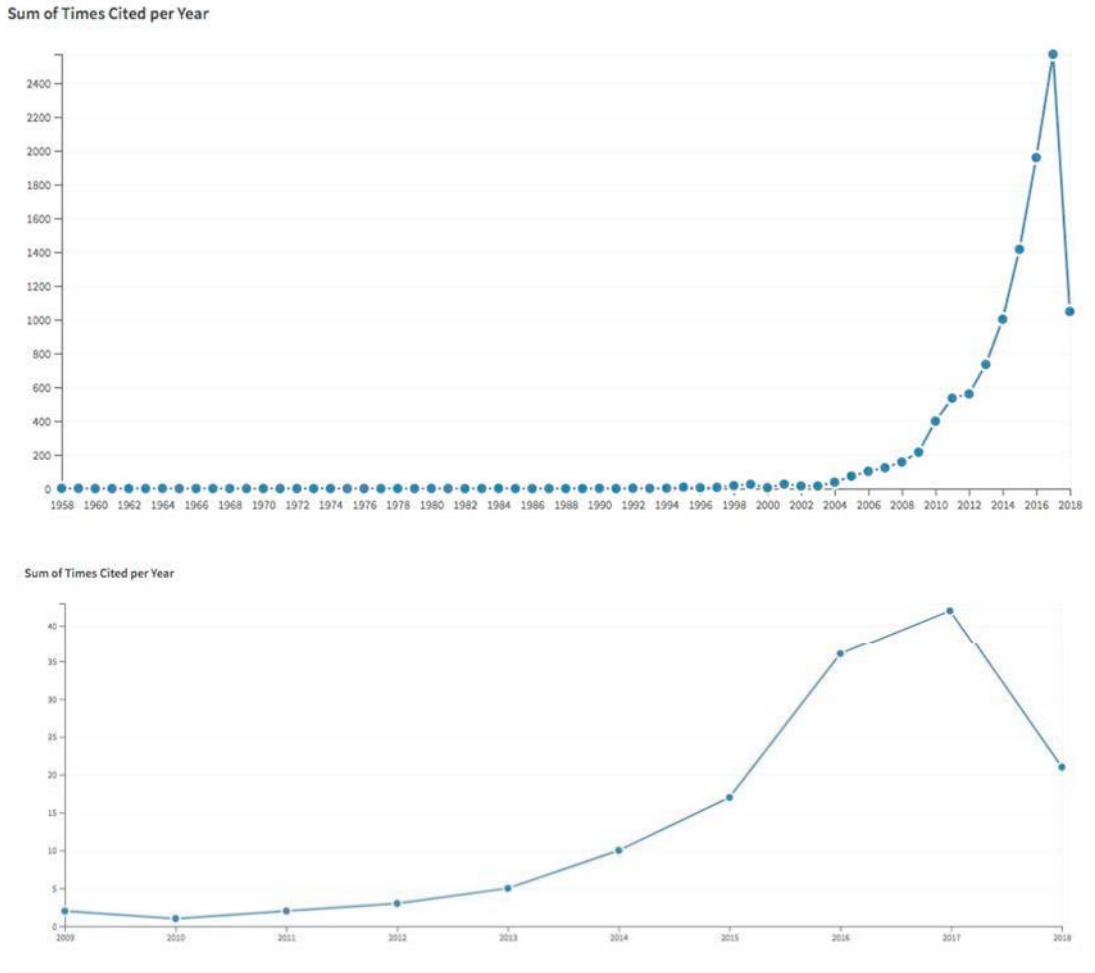

Figure 2. Urban Agriculture (Top) vs. urban agriculture (UA), Food Access, and Food Distribution (Bottom) Citations of Web of Science Search Results.

Figure 2. Urban Agriculture (Top) vs. urban agriculture (UA), Food Access, and Food Distribution (Bottom) Citations of Web of Science Search Results.

To identify the body of literature pertaining to the distribution of urban-produced foods, it was necessary to expand our search terms beyond "urban agriculture" and "food distribution" and start with "food systems", "distribution", and "urban" as key search terms. We then filtered the results of this search to exclude articles pertaining solely to location of supermarkets in food deserts, a common area of research but not the focus of this study (we are particularly interested in the distribution of urban-produced foods, rather than produce from most supermarkets). We also conducted searches for "urban foodshed" (a term introduced by permaculturist Arthur Getz in the 1990s; see [39,40]), "alternative food networks", "informal food distribution" and "short food supply chains" (a term more

locally produced food along racial lines [37]. These scholars foreground issues of race in their analyses

commonly used in Europe) in order to track down missing literature from our collection investigating the transfers of food produced in cities. This iterative search process on the distribution side reveals the difficulties in tracking informal food distribution networks, but also the importance of doing so to better understand the real impact of urban agriculture on food insecurity in cities.

Table 1. Keyword Searches for Food Systems Distribution and Access Literature.

Distribution [Related Terms]	Access [Related Terms]
• Food supply • Short food supply chains • Food Transport and Storage • Foodshed • Economic model-nonprofit, for profit • Alternative food networks (Also referred to in the literature as "alternative agri-food networks" (AFNs) and "alternative food initiatives" (AFIs); see [24,41,42].) • Sales outlet-Farmers Market, CSA, direct sales, (sliding scale) Farm Stand • Donations-Food Banks • "Green economy"	• (Community) Food security • Affordability • Physical proximity • Food justice-Structural barriers, racism, self-determination • Food sovereignty • Food desert • Culture • Education
Basic Food Systems Flowchart: Production → Distribution → Consumption/Access	

Data analysis comprised content analysis of article abstracts to identify key findings among the case studies considered, and closer reading of other review articles to identify trends and gaps in the literature. Themes were extracted from articles considered, and grouped by study type (e.g., case study, review, theoretical analysis) to determine which types of studies provide which data.

3. Food Access: Do Low-Income Urban Consumers Access Urban Produced Food?

Community food security is defined by the Community Food Security Coalition (CFSC) as "all persons obtaining at all times a culturally acceptable, nutritionally adequate diet through local non-emergency sources", with urban agriculture playing an important but integrated role in this effort. According to Horst et al. [33], expanding urban agriculture operations across cities "does not guarantee that people experiencing food insecurity will access that food ... Distribution and access matter". Food access, closely related to the term food security, constitutes the process of obtaining certain foods (in this case urban-produced) and includes educational, cultural, geographic, and economic dimensions.

The literature on fresh food access in low-income communities often focuses on food desert analyses studying lack of grocery stores; however, focusing on "lack of stores" does not address historical underinvestment patterns and underlying structural causes of food insecurity and oversimplifies the solutions landscape [27,43–46]. Other literature studies efforts to bring in fresh food through farmers markets locating in underserved communities, or through offering fresh produce (not necessarily urban produced) in corner stores [47–49]. Both efforts have met with limited success [50–52]. Less is known about the actual consumption of urban produced foods by low-income communities. When certain literature reviews (e.g., [3,6]) claim that urban agriculture improves food access among food insecure households and communities, it is often from a productivist conceptualization of "access." This productivist focus in the literature conflates existence of urban farms (and thus increase in urban food supply) with increased access, without examining where the food actually goes and who consumes it.

As critical food scholarship points out, "the focus of food access as an issue goes beyond the particular connections to health (although these are important) to be a way that issues of power, control, and inequality are written into the American landscape" [36]. Below we outline barriers to accessing urban produced foods, including physical proximity, cost of food, cost of land, cultural acceptability, and nutrition education, identified from an interdisciplinary body of literature spanning urban agroecology, public health, development economics and food geography. We then describe several successful examples of UA increasing food access, drawing on food sovereignty perspectives, summarized in Box 1. This body of literature stands to benefit from more robust data on actual consumption of urban produced foods, requiring innovative data collection methods and household observations to determine if access (obtaining food) and consumption (eating it) are in fact closely matched.

3.1. Spatial Analyses Highlight Productive Potential and Uneven Distribution of UA

In land scarce cities striving for "best and highest use" of each lot, food production in small spaces is often considered insufficient (or inefficient) for meeting the needs of food insecure households. To address those critics, the localized food systems scholarship offers a fair amount in the landscape ecology and planning literature theorizing the high productive potential of UA to address food insecurity [2,18,53,54]. Spatial analyses such as those cited above provide insights into theoretical access, while not addressing the policy, governance and practical barriers that would need to be overcome in order to realize the potential.

There is value in spatial analyses such as these, as they offer optimal siting locations and productivity quantifications that are useful targets for planners, practitioners, and evaluators seeking to verify or ground truth theoretical projections. The optimal siting analyses, using census block group data, promote food justice by prioritizing low-income communities when siting urban farms in effort to increase access [55,56]. From a global quantitative mapping analysis done with Google Earth Engine, urban agriculture was found to "positively influence food production, nitrogen fixation, energy savings, pollination, climate regulation, soil formation, and the biological control of pests, services that are worth, as a whole, as much as $160 billion" [53]. This study suggests the ability of urban agriculture to improve food security on a global scale (acknowledging significant country-to-country variability).

Other theoretical mapping analyses have also found that urban and peri-urban farms can supply significant amounts of food demand in urban centers: from 5–10% of city vegetable demand supplied by expanded UA on public lands in Oakland [18] to 30% of seasonal vegetable demand in Detroit [57], to 100% of nutritional needs in Southeastern Minnesota [54]. However, very few studies directly quantify how much urban produced food is actually being consumed by low-income food insecure communities, requiring observational and qualitative research methods. Furthermore, these and other studies focus strictly on the productive capacity of UA, while there is much more being produced by UA than food alone (community empowerment, educated food consumers, city green space, etc.), and the products of UA may not perfectly align with existing consumer taste and food purchasing behaviors [58].

What is the spatial reality of food access on the ground? A mapping analysis of Chicago by Taylor and Lovell [2] finds access to urban agriculture and urban-produced foods to be unevenly distributed, and household gardens correlate spatially with patterns of gentrification in Portland [59]. In Taylor and Lovell's analysis, they attempt to quantify production and spatial area of urban agriculture using both manual interpretation of high-resolution images and ground-truthing data from walking the city. They find production from residential gardens to be a threefold increase in food production over community gardens, and find both home and community gardens to be highly unevenly distributed: most home gardens are in Chinese and single-family-home neighborhoods, and most community gardens are in the south and west side due to higher land availability, meaning many urban core, low-income census tracts lack access to community or residential gardens. They advocate for better networking of community garden sites to increase access, strategic location of future community

gardens among neighborhoods in need, and an emphasis on creating and encouraging home gardens as a key food production strategy available to many city residents. Mack et al. [56] find that 68 urban gardens in Phoenix, AZ are currently serving just 8.4% of "food desert" residents, and through spatial analysis, 53 gardens sited strategically could serve 96.4% of such residents. From these studies, it is clear that UA projects are not necessarily occurring where they are most needed.

Again, theoretical, quantitative, and macro-level approaches to production potential masks uneven distribution of UA on the ground: "while a macro-level quantitative study of the potential in terms of land availability shows that it would be feasible to grow the basic daily vegetable needs for the urban poor in the United States, current evidence from urban farms located within lower-income communities shows that such farms are not necessarily feeding the communities in which they are located," due to a variety of factors including cost of produce and cultural desirability [16]. The sections below address these other factors influencing access.

3.2. Cost of Urban Produced Foods

Barriers to access are not just due to geographic distance, but rather an array of intersecting factors including the high costs of some urban produced foods, especially from commercial or for-profit operations. Fresh, local produce from vertical or rooftop farms such as Gotham Greens (NYC), Plenty (San Francisco) Higher Ground Farm (Boston), Freight Farms or AeroFarms (various locations) are often sold at a premium to restaurants and grocery stores, and thus unaffordable to low income households [60]. Despite claims that vertical farms can "feed the world in the 21st century" [61], it remains to be seen if vertical farms can address food access and food justice. Such farms are often following a corporate food system model of profit maximization and resource use efficiency, subscribing to capitalist logics rather than alternative, social-justice-oriented practices. Among for-profit farms, "the few profitable operations tend to be those selling to high-end restaurants and consumers, not to lower-income residents" [16].

The cost of food, especially healthy fresh produce, is often in tension with other high costs of living in urban areas (including housing and healthcare), causing low-income residents to become dependent on emergency food services and food pantries. This intersects with poor nutrition and diet-related diseases- according to the Alameda County Community Food Bank Hunger Study report, "food is often the most critical factor in our clients' health", and 40% of clients are in fair or poor health [62]. Food banks and food pantries fill important "access gaps" that urban farms could better supplement or address if cost of urban produced food was made more affordable, or through donations to food banks (as food banks often cite fresh fruits and vegetables as particularly needed donations; [62]).

Low-income households can circumvent the high costs of urban produced food from commercial farms by establishing their own backyard gardens (if possible), or adopting plots in community gardens. Through direct participation in UA, in particular (whether volunteering on urban farms or adopting plots in community gardens) food insecure individuals can offset significant percentages of fresh vegetable expenditures (Participants saved between \$240–\$720 per household per year from establishing home gardens or having access to 10×20^{1} plots, according to Santo, Palmer, & Kim's 2016 literature review from Johns Hopkins Center for a Livable Future [16].), and enhance food security through improved healthy food access [8,63–66]. As Kortright and Wakefield [63] demonstrate, studies employing qualitative methods are particularly well suited to examine actual impact of urban gardening activities on low-income households. Access via UA participation is certainly enabled when urban farms and gardens are physically proximate to low income neighborhoods, demonstrating the intersection of cost and geography in expanding access.

There are lots of examples highlighted in local news outlets of non-profit farms that give food away for free or at reduced rates (e.g., Urban Adamah, City Slicker Farms, Spiral Gardens, and the Mills College farm in the Bay Area), yet there is little scholarship on the consumption or impact of these donations/discounted offerings specifically.

3.3. Cost of Land and Labor

High costs of land and development pressures also play a significant role in limiting access to both farming and locally-produced foods, as seen in studies of Chicago, New York City, and the San Francisco Bay Area [2,67–70]. High cost of land prevents community gardens from being established in the urban core in Chicago, leads to hundreds of community gardens in NYC slated for redevelopment annually, and drives gentrification and displacement in neighborhoods around urban farms. Land tenure insecurity directly contributes to lack of access as many urban farms formerly serving minority and immigrant populations have been forcibly closed due to development priorities for privately owned lots (i.e., La Finquita in Philadelphia, PA; South Central Farm serving predominantly Latino households in L.A.; Free Farm in San Francisco; Brooklyn Community Farm in NYC). A recent article on land security indicators among California urban farmers showed that farms with higher land security also had "more financial and institutional support, and are located in census tracts with higher economic opportunity" [71]. This highlights the necessity of devoting publicly owned lands to urban agriculture in low income and minority neighborhoods, as private lands are highly vulnerable to development pressures, thus jeopardizing any gains realized by social justice oriented urban farms (explored further in Section 5.2 below).

In contexts where urban farms strive to provide living wage jobs and career or educational opportunities for low-income communities, youth, or formerly incarcerated individuals, it is often challenging to also provide food access to these same communities. Unless significant grant funding or donations exist, the goals of food security are in tension with capitalist economic realities to pay living wages and sell the product (urban produced foods) at below-market costs [72,73]. This speaks to the "unattainable trifecta of urban agriculture," that is the idea that UA can simultaneously achieve community food security, provide on-the job training and fair living wages, and generate revenue through sales to cover these costs without substantial outside investment [72], as well as the tension between farm security and food security [41,74], a theme expanded on in Section 5.1 below reviewing economic viability of urban agriculture. In examples such as City Growers and Higher Ground Farms in Boston, and Dig Deep Farms and Planting Justice in California, organizational efforts to provide jobs and job training lead to marketing of produce to high-end restaurants, retail food establishments, farmers markets, and CSAs at prices unaffordable to food insecure households [37,73].

3.4. Culture, Education, and Innovative Urban Food Sources

A fourth important food access barrier cited in the literature relates to cultural acceptability and nutrition education, widely accepted as part of food security definitions [16,35,37]. Access to culturally appropriate foods is known to be an important factor [16,75,76], yet little is understood about the effects of urban farms growing culturally relevant foods and its relation to food access. More qualitative research is needed on the cultural acceptability of urban produced foods. There is increasing evidence of the importance of culturally relevant educational materials (in multiple languages) around nutrition, food literacy, and culinary skills for improving access and actual consumption of healthy, fresh, urban-produced foods among low income, minority, or immigrant households [75,77,78]. Culinary skills and food literacy are becoming focal points of school garden programs (National Farm to School Network), and innovative organizations such as the Green Bronx Machine show how urban agriculture embedded into high-needs schools can directly improve food education, which translates into increased access and consumption [79], but additional research is needed to quantify the impact of educational school gardens on community food security.

An important development in the area of cultural acceptability is the "everyday" urban agriculture practiced by some cultural groups in cities. Recent urban foraging literature is exploring stewardship practices and culturally relevant products (both food and medicine) gathered by foragers in cities around the world, as well as the sociocultural benefits that result [80–82]. From Mien immigrants gathering dandelion bud-shoots in urban parks [83], to informal urban foragers helping maintain trees and parks in Seattle, WA ranging in age from 23 to 83 [80], to the value of edible weeds [84]

urban foraging is an activity that recognizes certain agroecosystems as "commons" for public access and management (ref. [81]; see Section 5.3 below for a full summary of "commons" literature). Urban forest justice scholars "recognize the rights of local people to have control over their own culturally appropriate wild food and health systems, including access to natural resources and to the decision-making processes affecting them" [80]. The potential to address food insecurity with foraging and gleaning activities is being explored by organizations such as Ample Harvest (national) and The Urban Farmers in Northern California; Ample Harvest's online platform supports over 42 million backyard and community gardeners in ending food waste by channeling excess produce to 1 out of every 4 food banks across the country [85]. More research is needed on these innovative forms of urban forestry as a culturally relevant mode of food access.

Box 1. Successful examples of UA creating increased access.

<table>
<tr><td colspan="3">Diversified revenue streams are key to the success of urban agriculture initiatives providing access to food insecure communities. Additional evidence of success in the literature includes examples of sustained operations over time (allowing sustained access), and evaluations (both internal and external) that demonstrate food access in underserved communities.</td></tr>
<tr><td>Sustained operations over time:
The Food Project-Boston, MA (25 years)
City Slicker Farms-Oakland, CA (17 years)
GreenThumb program-New York, New York (40 years)</td><td>Multiple revenue streams: (grants, donations, and in-kind contributions, allows farms to provide a substantial percentage of the food they grow to low-income households, via donations or discounted sales).
City Slicker Farms-Oakland, CA ref. [86]
Urban Tilth-Richmond, CA ref. [25]
The Food Project-Boston, MA ref. [73]</td><td>Evaluations demonstrating food access:
NYC Food Metrics Reports-provides annual statistics on urban farms serving NYC residents
CUNY Policy Briefs [87]-highlights importance of land security in allowing urban farms to deliver on food access/food security mission statements.</td></tr>
<tr><td colspan="3">These organizations do not rely on produce sales to cover production expenses, but rather cross-subsidize operating expenses and salaries with revenues from grants, donations, educational activities, or other services offered [73]. They combine mission-driven values, education, and public "goods" with growing food in order to attract investment for their inherent value to a community; they are seen as desirable and "worthy" places to volunteer one's time; and they attract numerous partnerships with other businesses, schools, or non-profits within the city. Building connectivity through strong social relationships with nonprofits, schools, donors, and city governments appears to be a promising mechanism for improving food access while meeting the operating expenses of an urban agriculture operation [72]. A particularly well-connected, city supported network of UA is the NYC GreenThumb program, a network of over 550 community gardens with employees/youth interns, tools and resources provided through the City. Neighborhood residents manage gardens, enabling sovereignty over planting decisions and crop varieties.</td></tr>
</table>

While some food justice scholars conclude that current shifts toward local, organic, sustainably produced foods are only accessible and affordable to those with higher economic means "or at least the cultural cachet necessary to obtain such foods through barter, trade, or other means of exchange" [7], the examples above illustrate successful alliances of food justice advocates and local government working to enable sustainable, healthy food access for all urban residents. Through strategic planning and policy design, it may be possible to move beyond ad-hoc successes in linking urban agriculture with food access. The articles reviewed in this section provide a mix of academic studies, theoretical arguments, and policy literature. Additional empirical evidence and longitudinal studies are needed to demonstrate the ability of UA to significantly improve nutrition and food insecurity among urban low-income households over time. Furthermore, consumer preference surveys of urban produced foods are a conspicuous absence in the reviewed access literature. We turn next to food distribution,

and the question of how urban produced foods get from the farm to the consumer through various distribution mechanisms.

4. Food Distribution: How Do Urban Farmers Get Their Produce to The Consumer?

What does the literature tell us about the distribution of urban produced foods? While many articles reviewed mechanisms for channeling rural or peri-urban produced foods into urban areas to increase fresh produce access (e.g., farmers markets, CSAs, direct purchase agreements), very little scholarly data exists on the distribution and accessibility of *urban* produced foods, and what does exist is largely under-theorized. In fact, very few sources reviewed explicitly name "food distribution" as a key term. Urban agriculture remains a relatively small, yet important percentage of the larger food distribution system in cities: "few, if any, urban agriculture projects, are intended to replace traditional food retail or would claim to lead to food self-sufficiency for individuals or for cities" [16]. As such, very little is understood about where and how urban farmers distribute their food including modes of transportation delivery, either individually or in aggregate, and to whom (retail, institution, anti-hunger programs). It is important to focus on the means through which food produced by different types of farm operations travels from farm to consumer, and the processes through which that food is exchanged (both monetary and nonmonetary), as this directly impacts access and consumption. The scholarly literature as well as media stories describe various modes by which fresh produce is distributed in the city to address fresh food access including both formal (CSA, farm to institution, farm stand, farm to retail, farmers' market) and informal distribution channels (crop swaps, mobile food markets, online food hubs, volunteers taking food home, household production) [37,72,73,88,89].

Applying a distribution lens to the existing literature yields similar results to the food access analysis in that several articles theorize idealized distribution systems, showing the capacity of hypothetical urban and peri-urban farms to supply distribution networks that meet most urban food demands [40,53–57]. Others highlight barriers and challenges farmers face in practice around distributing their produce to those in need while maintaining their operations [72,73]. None, in our search, focus analysis on distribution flows of urban produced foods across a city. Rather, a more common focus is on which distribution channels are best for getting produce, not necessarily urban produced, into the hands of food insecure households or residents of "food deserts" [88,90]. Is it a corner store, a large supermarket, or a small local farm stand within a mile radius that such households need in order to access fresh produce?

4.1. Distribution via Corner Stores and Supermarkets

In the case of corner stores, several studies have built on analyses of the prevalence of corner stores and liquor stores in low-income census tracts (juxtaposed with the absence of large supermarkets) and endeavored to study the effects of providing fresh produce in these stores otherwise carrying largely processed foods and sugary beverages. Results have been mixed, with some cases of pairing urban farms with corner store retailers yielding increases in sales of fresh produce [50], but others showing no increase and even resistance from corner store operators who feel that this produce will not sell and therefore become a waste disposal issue [50,91,92]. Small neighborhood groceries and mobile markets were found to be promising distribution outlets for expanding access to fresh produce in some Oakland, San Francisco, Erie County NY, and New Orleans communities [90,93–97]. However, they are unevenly distributed and conflicting in terms of providing culturally appropriate foods to all minority groups (see [90]). In most cases, (**a**) additional trust and consumer education as well as (**b**) lower costs and better infrastructure (e.g., refrigeration space) are needed in order to make small groceries and corner stores reliable, accessible, affordable, and sustainable in their operations over the long term. The effects of providing urban produce in neighborhood food retail sites is an area that stands to benefit from additional empirical research.

Supermarket access studies demonstrate mixed results on whether providing a supermarket alone is sufficient to resolve problems of "food deserts"; in fact, supermarkets can contribute to displacement

through "supermarket greenlining" [28,43,46,98,99]. Critical scholarship in the food desert literature finds that revealing food access inequities "often leads to a public response that focuses on only food stores themselves [or creation of new sites for market transactions], rather than a broader focus upon the inequities in economic investment, political and economic power, and health that the food desert issue highlights" [36]. Innovative distribution efforts for fresh produce, especially urban produced foods, ideally tie in with public education, public health, participatory research, food marketing, and cultural awareness in order to understand and meet the behaviors, preferences, and barriers to purchasing healthy food in at-risk communities.

4.2. Distribution via Farmers Markets

Farmers markets as distribution sites receive critical assessments in the literature for their ability to serve as distribution channels to low-income consumers. Alison Hope Alkon writes about the closing of a farmers' market in West Oakland, a historically African American neighborhood, juxtaposed with the white spaces of farmers markets that are thriving in neighboring Berkeley in her book *Black, White and Green: Farmers Markets, Race and the Green Economy* [100]. She theorizes the promise and limitations of the "green economy" and chronicles the food movement's anti-capitalist roots yet ultimate manifestation as reproducing capitalist inequalities. Lucan et al.'s study of farmers markets in the Bronx took issue with limited hours of operation, seasonality, affordable common produce, and availability of predominantly healthy foods among farmers markets [29] compared to nearby stores [49,51]. Accepting Electronic Benefit Transfer (EBT, or Food Stamps) payments is a basic prerequisite for farmers markets to be considered accessible to low-income consumers, a concept pioneered by the GrowNYC's Greenmarket program [101]. While farmers markets in all 50 states now accept food stamps (3200 markets and counting), the price of offerings such as a bunch of kale still exceeds the price of nearby fast food options that may offer a more filling but less nutritious meal option. Some states (including Oregon, Massachusetts, Michigan, California, Washington, Illinois and New York) are moving in the direction of matching EBT funds through various "market match" policies, a step towards improving food distribution and access at farmers markets [102].

4.3. Theorizing the Distribution "Foodshed" via Alternative Distribution Channels

The concept of a foodshed in the distribution literature, "like its analogue the watershed, can serve us as a conceptual and methodological unit of analysis that provides a frame for action" [103]. Foodshed analysis "provides a way to assess the capacity of regions to feed themselves" through proximate location of food production, distribution and consumption [104]. Applying this concept, Peters et al. [40] found that 34% of New York State's total food needs *could* be met within an average distance of 49 miles, (data skewed by New York City, which depends upon procuring foods from greater distances; most areas of the state were able to rely completely on in-state production). The foodshed, embedded in the local food systems and short food supply chain concepts, is a useful organizing principle for city planners to consider when designing effective food distribution networks, such as the example highlighted in [103]: integrating a farm into a housing development project in the South under the title of a "civic agriculture community" [103], facilitating proximate, affordable distribution channels. This exemplifies planning with a foodshed or systems thinking lens by specifying areas at the neighborhood scale for semi-commercial agriculture, neighborhood CSA, residential kitchen gardens, and residential development in order to build food access and ease of distribution into the neighborhood fabric.

If urban farmers aren't able to easily distribute their produce to consumers, either through sales or other forms of distribution, questions of improving food access are jeopardized as well, revealing the interconnectedness of the food systems framework from production to distribution to consumption. Planning for improved urban food distribution includes ideas such as food hubs, agri-hood developments, public storage and transportation options, food aggregating facilities or organizations, mobile food distribution, or state investment in public markets [42,105–107].

Mobile food distribution options are modeled and shown to increase access in Buffalo, NY, in Widener et al.'s theoretical analysis [107]. Agri-hoods have gained increasing mention in local news outlets as a real estate trend in "Development Supported Agriculture (DSA), and as many as 200 currently exist or are under construction across the country" [106]. They facilitate distribution by co-locating food producers and consumers on strategically planned sites, providing shared infrastructure resources, and making land access affordable for farmers by cross-subsidizing with real estate development. Cooper's report on food hubs in the south, a form of aggregating supply to enable expanded market access, highlights grassroots solutions developed by and for farmers of color, yet "major challenges [remain] associated with developing and maintaining food hubs within a racial equity framework" [105].

Here again, the Google Alerts provide useful insights from gray literature and local news outlets into recent and effective strategies for city planners, be it food hubs, mobile food distribution options, online platforms for gleaning, second harvest, crop swaps, or distributing excess produce from backyard gardens. These are also areas that stand to benefit from additional scholarly research in terms of quantifying impact on consumption, food insecurity, and nutrition, expanding evaluations of urban food systems to include nonmonetary and informal distribution mechanisms.

We now turn to a three-pronged analysis of how access and distribution are linked through UA *in practice*, summarizing illustrative case studies. Integrating the access and distribution literature from above, we identified three themes that speak to the efficacy of urban agriculture in meeting food access goals: economic viability, policy and planning models, and civic engagement.

5. Access and Distribution

5.1. Economic Viability

In this section, we consider the economics of urban agriculture and the "economic marginalization" [108] that prevents many operations from meeting all the social and environmental benefits of urban agriculture within a for-profit or capitalist-oriented production scheme. The urban food justice and food sovereignty movements in the U.S. are limited in practice in achieving their more radical or transformative goals due to the fact that they are operating within "a broader framework of [capitalist] market neoliberalism" [109]. The challenge has not been growing enough food per se, but rather "producing and distributing food in ways accessible and affordable for the growing urban poor" [109] while sustaining UA operations in a capitalist, production- and profit-oriented society.

Daftary-Steel, Herrera and Porter [72] declare that an urban farm cannot simultaneously (1) provide jobs to vulnerable individuals, (2) provide healthy food to low-income households and (3) generate sustainable income and/or profits from sales. Therefore, what forms of urban agriculture are economically viable in today's political economy? Operations that provide jobs, job training and professional development but sell mostly to high-end consumers (e.g., Planting Justice, Homeless Garden Project, Dig Deep Farms, City Growers), operations that are volunteer-driven or publicly funded (New York City's GreenThumb program or Berkeley Community Gardening Collaborative) and operations that cross-subsidize healthy food donations with revenues generated from other services besides food production (primarily educational) or from crowd-sourced funding (e.g., The Food Project, Urban Adamah, Food Shift Kitchen, Planting Justice) [37,73,87,110].

When it comes to economic viability, many urban farming operations openly acknowledge that they are dependent on grants and donations to sustain their operations, which is a double-edged sword. On the one hand, as long as an organization can prove itself worthy (and therefore achieve success) in receiving grants and donations, it may represent economic viability and long-term sustainability. On the other, if the organization is wrapped up in a charismatic individual leader, or fails to receive ongoing grant injections beyond one or two initial successes, it will not achieve long-term economic viability. Two cases are explored below representing either side of this coin.

Case Study 1: Growing Power

Growing Power in Milwaukee, WI, was a leader in the community or "good food" movement [36]. Operating as a nonprofit between 1993 and 2018, the organization, founded by basketball star Will Allen, "expanded people's ideas about what was possible in local food production and youth education" [89]. The son of sharecroppers, Allen has a passion for vegetables, composting, and youth mentorship that he channeled into Growing Power, making it a bastion of urban food production, healthy soil creation, urban revitalization, and youth empowerment. In 2008 he was awarded a MacArthur Genius Award worth $500,000, which fueled the organization's growth and construction of hoop houses for aquaponics systems across the city. He was operating over 100 hoop houses and distributing food to over 10,000 people via below-market-cost CSAs, farmers markets, sales to schools, and restaurants, as well as managing flourishing vermicomposting and aquaponics programs, and hosting the annual Growing Food and Justice for All conferences organized by his daughter since 2008. These are known for their efforts to "forge new partnerships around food system self-determination for low-income communities and communities of color . . . [placing] racism front and center in the context of food and agriculture" [111]. Growing Power, Inc. operations produced 40 million pounds of food and over 100,000 fish annually at its peak, selling over 40,000 pounds of carrots to schools in 2014, representing the largest sale in farm-to-school according to the USDA [112]. Visitors came from around the world, adapting Allen's knowledge of growing, composting, aquaponics, and closed loop systems (for growing both good food and good people) for their own communities. The organization received additional large grants from the Kellogg Foundation and WalMart in 2011 and 2012, but by 2014 revenue could not keep pace with expenses related to growing staff (over 200 people) and expanded operations.

Allegations of "founder's syndrome" and Allen's inability to surround himself with a high-functioning organizational management team are both cited as reasons behind Growing Power, Inc.'s ultimate dissolution in 2018 [89]. Allen, who considers farming a form of personal therapy and has always been growing "more than food," continues to grow, now under the for-profit enterprise "Will Allen's Roadside Farm." While now a for-profit business, Allen continues to prioritize serving underserved communities, teaching kids and young people with disabilities, and centering the social impact of his work. While he has said that operating a commercially viable urban farm as a nonprofit "cannot be done," there are others who still maintain that "a nonprofit, structured properly, or a co-op can be successful in larger-scale urban agriculture projects" [112].

There are lessons to be learned from this case study for those evaluating the impacts of urban agriculture. How do we evaluate economic outcomes in relation to social and educational outcomes? While Growing Power, Inc. may be considered a "failure" to learn from in economic viability terms (due to lack of board member oversight and insufficient collaborations), it is certainly a timeless social success in terms of the individuals it has inspired who are now leaders in their own urban food system and social justice enterprises, the education it has provided to thousands of youth, and the infrastructure of hoop houses, aquaponic greenhouses, and food producing sites that remain in place across Milwaukee and around the world.

Case Study 2: The Food Project

The Food Project (TFP) in Boston, MA has operated for over 25 years as a nonprofit with an operating budget over $2 million. The organization operates several farm sites in Boston as well as the surrounding suburbs in Lynn, provides food to low income and minority neighborhoods, and offers paid summer work and internships to high school students. While they do generate revenue from food production, this revenue stream is marginal compared to incomes from grants, donations, investments, and educational services provided by the organization, and food sales cover less than half of the expenses related to food production. TFP has been "able to successfully combine substantial commercial agriculture production ($412,000 in annual revenue, FY2014) with mission-driven, non-profit work. TFP's economic practices are non-capitalist, as are the logics and metrics it uses to allocate resources and assess success" [73]. They pride themselves on going beyond "mere food access" with their Real Food Hub model, combining TFP's expertise in sustainable agriculture cultivation and youth development with partner organizations' education, family services, and community development expertise to "give families the tools, skills, and resources to define healthy food options and practices that build physical, social, and cultural well-being" [73]. Compared to other "good food" organizations in Boston that struggle to provide living wage jobs, speaking to the significant challenges to economic viability that any urban agriculture initiative faces, TFP's "economic viability and sustainability rest squarely upon its ongoing ability to convince donors (of both money and time) that it is engaging in practices and achieving outcomes that are worthy of their ongoing support" [73]. However, the question of wealth transfers across economic class lines (wealthy to lower income), rather than truly reciprocal economic transfers, continues to plague the organization's quest for increased economic equity in the food system at large. Along with many organizations that rely on volunteer and unpaid food work, the question of whether this is non-exploitative and anti-capitalist rests on the nature of the work, degree of choice involved among participants, who can afford the time and ability to volunteer, and ultimate goals of the organization [73].

Alternative economic models are emerging and require further study. Examples include redistributive business models, barter and exchange networks, food aggregators, food recovery organizations, cooperatives, food hubs, and "agrihoods" [73,105,113]. Food hubs are reframed as both tools for provision of market access (enabling economic viability) and self-determination for black farm cooperatives in the South in Cooper's report [105] with potential to subvert historic racism and economic marginalization of black farmers. Key to this and other food policy reports in the gray literature is elevating voices and fostering dialogue led by communities of color.

Some alternative food initiatives (AFIs) may seek to reduce the rate of exploitation by paying more workers a living wage, while still perpetuating a capitalist economic system where some amount of labor exploitation is inevitable. Others may consider themselves truly "alternative" in the sense that they are transforming and engendering a different form of non-capitalist economic system [73]. Merging or uniting such AFIs may lead to enclaves outside the traditional capitalist political economy and create new terms of "economic viability".

5.2. Policy and Planning Models

While food, and urban agriculture, used to be "strangers to the planning field" [114] or "puzzling omissions" from American Planning Association resources prior to the early 2000s [115], there has been an increase in academic work in the past 10 years dealing with urban food systems planning. In this section we consider the policy landscape of various city and state efforts to incentivize and create space for urban agriculture. Policy is needed to (1) lower costs for low income consumers and urban farmers seeking land, (2) provide strategic location of distribution sites, and (3) encourage year-round produce supply, often enabled by greenhouse systems in urban farms.

Are current policy incentives enough to created expanded food access and community food security from urban farms? Horst et al. [33] would argue no; rather, an explicit commitment to food justice and an "equity lens" is needed for policymakers and planners to create UA spaces that benefit low income and minority communities equally if not more than already advantaged groups [33]. Due to the current landscape of "disparities in representation, leadership and funding, and insecure land tenure," unless these problems are explicitly addressed, "even the most well-intentioned initiatives will perpetuate or even reinforce the injustices that practitioners and supporters aim to address" [33]. This sentiment is echoed in Morales' chapter in *Cultivating Food Justice* [7], which calls for "applied research to discover and advance *policy objectives* related to the antiracist and economic objectives espoused by the Growing Food and Justice Initiative" [111]. This suggests that only by foregrounding issues of race and economic inequality can cities create UA spaces that address food insecurity.

In asking the question "Can cities become self-reliant in food?" Grewal and Grewal [116] find that, in a best-case scenario, the City of Cleveland *can* achieve almost 100% self-reliance in fresh produce needs, poultry and eggs, and honey, but only with huge amounts of planning support (to devote necessary commercial rooftop space as well as vacant lots to food production). Blum-evitts puts forth a foodshed assessment tool to allow planners to assess local farm capacity in relation to local food needs [117]. Theoretical work such as this is important to advance ideas of what is possible and motivate efforts to make change, although it must constantly stay in dialogue with what is happening in practice and expand beyond a production-specific focus on local food systems. Urban farms are, after all, producing a lot more than food, and "increasing food production in cities does not guarantee that people experiencing food insecurity will access that food" [33]. As such, urban farms can be valued as a secondary food source for large populations, but primary forces for social integration, food-related education, and environmental justice [118]. UA is re-valued along a broader spectrum of "products" or outputs in Figure 3 below.

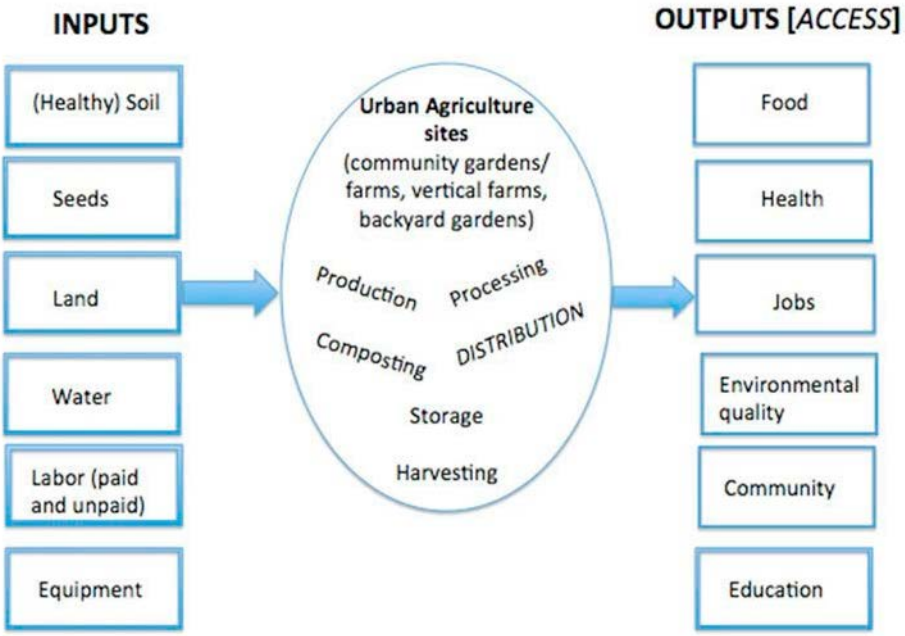

Figure 3. Multiple Inputs and Outputs of Urban Agriculture.

Creating urban agriculture incentive zones is one possible approach to policy and planning likely to benefit the properties via tax breaks [119]. Policies such as California's AB 551, the Urban Agriculture Incentive Zone Act, have come under criticism for not going far enough to build a just food system, relying on private rather than public spaces to support UA [120]. It is unclear whether incentive zones will be widely adopted by cities and counties in California, and whether they will meaningfully address food access or food sovereignty, especially when the land to be required to devote a percentage of land to urban agriculture is only 5 years. Incentives are used to promote urban agriculture, primary beneficiaries of the policy are often the privileged class of property owners rather than low-income households or non-property-owning urban farmers.

Cities with some sort of food policy regulating, allowing for or promoting urban agriculture include the City of Baltimore [120], City of Somerville, Detroit, Portland, Madison, Seattle, San Francisco, San Jose, Los Angeles, San Diego, Austin, Minneapolis, New Orleans, Milwaukee, Boston, and Chicago. Many policies allow for commercial sales of urban-produced food within the city as "approved sources" (food can be sold or donated, e.g., [121]), allow for value-added processing and sale of urban produced foods in people's home kitchens (bringing an important revenue generation option to many low-income urban farmers; e.g., California Cottage Food Act), create tax incentives for property owners to convert land into urban farms (e.g., California Urban Agriculture Incentive Zones), amend zoning regulations (e.g., Chicago Urban Agriculture Zoning Amendment), or set up urban beekeeping pilot projects (increasingly part of Google Alerts for UA; see Canada's "Bee City" designation or Toronto's "Pollinator Protection Strategy" adopted by the city council for relevant policy examples). The Baltimore example is especially worthy for its long-term planning approach to structuring urban agriculture into the landscape with density, access, and equity explicitly considered. For a review of city urban agriculture policies, see the American Planning Association special issue on Food Planning [122].

However, legalizing the ability to grow food in cities (urban agriculture defined broadly) is not enough to promote equity and justice, nor resolve all the legal conundrums related to compliance with the terms of legislation (see Sustainable Economies Law Center website "Food Program" page for guidance materials provided to producers, as well as recommendations to improve legislative language going forward). In other words, creating incentive zones for certain types of UA practices is not the same as creating supportive policies to allow and encourage the existence of the diverse array of practices and practitioners that constitute UA. Especially in cities with growing population

array of practices and practitioners that constitute UA. Especially in cities with growing population and housing pressures (e.g., NYC, SF Bay Area), particular attention must be paid in policymaking to avoid advancing gentrification and displacement. This is less of a concern in cities without such housing pressures (e.g., Detroit, Milwaukee, Baltimore), but development is a threat that must be considered especially when siting urban farms on private land. By recognizing research that points to rising property values around urban farms and gardens and risks of gentrification [29–31], policy and planning has the power to subvert this process by proactively designing policy and zoning ordinances to benefit rather than hurt residents of low-income communities. Another promising policy direction pioneered by the City of Seattle is to dedicate public lands in low-income neighborhoods to UA, which Seattle does through its P-Patch program [123].

City Planning Spotlight: NYC

Planning Spotlight: NYC
nIN IN In
agriculture defined broadly) Inot the same as c type of data sets ons (reduce text)
antityThe CUNY Urban Food Policy Institute issues a series of policy briefs that are particularly relevant for planners and researchers evaluating or implementing UA policies. They emphasize the need for additional data on urban agriculture sites (location, production metrics, contact information, lots or new sites available for UA, etc.*) aggregated within a single city-wide, user-friendly website or database, as operations are constantly shifting and evolving due to the precarious nature of many urban farms and data exists across multiple platforms that make policy coordination difficult. The City of New York developed a strategy with public investment to track the outcomes through an annual "Food Metric Report," issued most recently in 2017 that tracks rates of food insecurity, the "meal gap" (mapped by borough and neighborhood), number of meals served by City food service programs (including school food), number of farmers markets, retail store healthy food initiatives, nutrition education offerings, number of school and community gardens, and job training programs [124].*

The briefs emphasize that "the primary goal of urban agriculture is to create healthier, livable, more resilient communities, not [necessarily] to produce large amounts of food" [87]. Recognizing this reality and responding to civic activism, NYC public departments and officials have made some efforts (i.e., transfer of properties to the GreenThumb program) to save urban gardens slated for development. NYC provides funding and other support for a variety of urban agriculture initiatives that have strengthened its foundations within the city landscape, from jobs training initiatives (e.g., Farm School NYC and GreenThumb), to community gardens in housing developments (e.g., Via *Verde housing development), to school-based greenhouse projects (e.g., NY Sun Works' Greenhouse Project) to commercial farms (e.g., Brooklyn Grange). However, there is room for better coordination across bureaucratic silos; primarily, "urban agriculture policies should be integrated with affordable housing policies, neighborhood planning and zoning initiatives to more systematically design gardens and farms into new residential developments" [87]. In a policy brief explicitly addressing gentrification, Cohen outlines a series of strategies for resisting displacement: forging alliances with housing organizations, aligning "just green enough" and "just food enough" strategies [125], and civic engagement in negotiating terms for new development projects such as community benefits agreements.*

Other policy recommendations gleaned from the literature include: creation of a citywide UA task force with citizen representatives; efforts to tie in local "good food" ("Good" food being "not only healthy but also produced in a manner that respects animals and the environment and supports economic viability for all those along the way from farm to table" [69]) policies with city Climate Action Plans to promote both urban agriculture and alternative food waste management (Composting and anaerobic digestion were found in [126] to be the most effective component of reducing urban food systems' Greenhouse gas or GHG emissions) alongside climate benefits; devote public lands to urban farms and gardens in perpetuity; "retrofit" affordable housing developments with community gardens (following an affordable home solar installation model); provide public storage, transport, and aggregation options for urban farmers; and convert corner stores into neighborhood groceries offering fresh produce from local farms. Many of these efforts have potential to address many city priorities at once, for example: food access, nutrition and fitness, transportation, community development and crime reduction [97]. Providing land access for low-income and minority farmers is an important step towards ensuring a food supply that is culturally appropriate, desirable,

and marketable to food insecure urban communities. Strategic public land grants (or land provided by land trusts) have potential to redress historic exclusions of minority farmers from land access, resources, legal expertise, and opportunities for wealth accumulation. By publicly confronting land insecurity and tenure arrangements, policymakers can directly respond to research on UA's uneven development [1,25,71]. Overall, there are multifaceted criteria in creating a balanced, equitable city food system (See [127] for consideration of justice and sustainability at all scales and the mix of solutions needed for food system reform).

5.3. Civic Engagement and Advocacy

The most common form of civic participation in UA is through volunteer activities on urban farms. Smaller numbers of citizens are becoming involved in advocating for UA policies and improved zoning regulations that support food access goals, holding cities accountable to UA projects. Through direct participation, citizens are already voting with their feet in favor of UA initiatives (as summarized in [73]). Existing literature states, "'participants in a community garden continually express a heightened sense of self-esteem gained from sharing knowledge and skills with each other.' Such community connections can, in some cases, lead towards participation at the larger [policy] level" [36]. By expanding civic engagement into the local policy realm, it is more likely that sites designated, set aside, or incentivized for urban agriculture development will be strategically located, address food insecurity and food justice concerns, and provide long-term access for UA [87]. Civic engagement can take many forms, including participating in neighborhood organizations, contacting elected officials and city councilmembers to communicate multiple values of UA, aligning UA with existing city plans/ordinances, or participating in food policy councils.

Citizens volunteering on UA initiatives are participating in building community economies, often non-capitalist and non-exploitative in nature (depending on the form and structure of participation; see [73] for a discussion of exploitative vs. non-exploitative unpaid work). Civic engagement advances the idea of creating "public commons" through urban agriculture, an idea related to ecological economics and explored in David Bollier 's book *Think Like a Commoner: A Short Introduction to the Life of the Commons*. A commons "integrates economic production, social cooperation, personal participation, and ethical idealism into a single package;" it is a paradigm of "self-help and collective gain" and an "alternate self-governance structure for resource management and 'living well'" [128]. The commons paradigm espouses a political philosophy grounded in grassroots civic activism, and proposes different "foundational premises for a new political economy" based on social connections and rediscovering "people's knowledge" of natural systems in their local contexts [128]. Simply put, a commons is a resource + a community + a set of social protocols. There is no "standard formula or blueprint . . . nor is the commons some panacea or utopia;" rather it is an evolving model of self-provisioning and local stewardship.

Bollier 's call to action (or "call to the commons") resonates with the work of many in the UA world. However, we must consider who is able to participate in creating such a space (who has time, energy, ability, agency, desire) (Desire is hindered in some cases by negative racial associations with farm labor held by African-American and Latino communities; as some authors state in summarizing work of black-led food justice organizations: "Clean Greens [in Seattle] also grapples with historical traumas of slavery that hinder the ability of even a black-led food justice organization to engage black residents in farming" [34]. By centering black food geographies, Ramírez argues such historical traumas can be overturned and re-envisioned, reclaiming urban farm spaces as centers of black liberation.), Who participates, in both policy and urban farming as an activity, is a crucial factor in determining whether outcomes will subvert or reinforce existing power, privilege and structural inequities. As Ramírez states, "While recreating neglected urban spaces into 'productive' spaces to grow food is inspiring and beneficial on one level, the prevalence of white bodies inhabiting garden spaces reifies uneven geographies and catalyzes gentrifying forces" [34]. It is the role of inclusive policy processes and watchdog citizen activists to counteract this retrogressive tendency of UA projects.

One example of grassroots political action, working around rather than through institutional channels of policymaking, is the Catatumbo Collective's people-to-people reparations project. Developed by three immigrant women spearheading an urban agriculture organization in Chicago, the people-to-people reparations map locates minority-run farming projects (both urban and rural) on a map of the United States, providing a brief description of the project and their specific needs, and then a link or contact info so that visitors can donate directly to the project. In their own urban agriculture work, the three women found few resources providing historical or cultural context such as "history of resistance and resilience of Indigenous people and people of color" [129]. They were thus motivated to publicize some of that history and provide a means of addressing it directly through their mapping project by supporting "those who have borne the brunt of labor exploitation, land theft, and discriminatory agricultural policy" [129]. This project has already led to funding for several farmers' projects, as well as land gifts to create several minority-owned farms. While the founders recognize the need to continue litigation and action through formal policy channels, they honor the urgency of needing to "start right away" by facilitating "transfers of wealth." They are also contributing to a more updated database of farmers of color, often underrepresented in USDA farm censuses.

There is room for more participatory action research linking researchers to citizens and civic engagement projects (e.g., [130]). This will allow for data to be shared and transferred more easily, and for the network of UA and food justice participants to strengthen through ties to research institutions and each other. Researchers have an important role to play in addressing data gaps and strengthening the network of urban farmers who have clearly identified needs and are ready to work towards appropriate, measurable solutions (see Table 2 for recommendations broken down by actor). Engagement cannot be siloed in individual organizations or projects; it must extend and connect with larger progressive social movements to create policies enabling economic equality.

Table 2. Recommendations.

For Researchers	For Policymakers	For Urban Farmers and UA Participants
Generate more robust empirical analyses of the impact of urban farms on the commonly cited "multiple benefits," and particularly on addressing food insecurity.	Secure long-term public land tenure for UA, and ensure it is distributed equitably across class and race	Advocate for justice-oriented UA policy at city council meetings and via local Food Policy Councils
Increase research attention on parameters that create food justice outcomes within UA operations (at city, state, and site level)	Revalue UA as a public good and integrate/align with other public funding priorities (including schools, transportation, public health, economic dev. goals, etc.)	Collaborate and partner with other UA sites/networks, and aligned interests across the city (housing, schools, youth and family services, neighborhood organizations, etc.)
Consider the production impacts of home gardens as well as larger UA sites (community gardens and commercial operations) when evaluating the potential *and actual* food contributions of UA	Link UA and housing policy to both provide urban gardens to residents of affordable housing and low-income communities, and prevent displacement via eco-gentrification	Quantify your impact to back up advocacy efforts and increase success in attracting grants/donations
Generate more robust analyses of distribution successes & challenges exploring transportation, infrastructure, and investment needs.	Guarantee a "right to food" in your jurisdiction that includes, but is not limited to efforts to incentivize UA	Define a clear focus for your work and stick to a mission, rather than trying to deliver all the benefits of UA at once
Map the current landscape of urban ag locations overlaid with neighborhoods experiencing food insecurity and barriers to access in order to identify strategic sites for UA; map distribution channels and food flows as well	Communicate with food policy organizations, food justice advocates, and urban farmers to understand their needs and provide support from city infrastructure	Help set up more home gardens for individuals in order to democratize access to food production
Partner with food justice activists and citizen groups working in UA to conduct participatory analyses of on-ground UA realities, including consumption of UA foods.	Promote backyard and home gardens as part of urban food production planning	Places voices of communities of color at the forefront, create space and/or leadership roles for disadvantaged groups within the organizational structure.

6. Reframing UA as A Public Good: Using an Equity and Systems Lens to Integrate UA into Municipal Planning and Policy Efforts

According to the literature, access to urban-produced foods is directly tied to the economic realities of urban farming operations. Daftary-Steel, Herrera, and Porter [72] make a compelling case for building coalitions to provide the necessary political and financial support to fund UA, as well as tackling the "root causes" of food insecurity through social services. From what limited studies exist, it seems clear that economic viability of urban farms is largely dependent on income far beyond sales capacity of the urban farm. Public and private investment in UA is necessary to allow urban farms to focus on equity & inclusion rather than sales. Civic engagement elevates UA priorities within city government and has an impact–evidence from New York shows that civic engagement in an advisory capacity to city council meetings holds elected officials accountable and achieves better results when it comes to preserving urban farms threatened by development [87].

Moving the conversation into the policy realm is vital. It is important to communicate to policy makers that urban farms are producing a lot more than pounds of food; they are also "distributing" social goods, creating a "commons", and providing connection to nature, community, and education (culinary, nutrition and food literacy), and these in turn are part of improving community food security. The primary benefits of UA organizations are often education (around nutrition and food literacy), social integration, economic opportunity, and local environmental quality improvements. Producing enough food to transition a community from "food insecure" to "food secure" is not necessarily going to happen through urban farming alone; however, supplementing food intake with locally produced, healthy fruits and vegetables is an important step in building food security and community health. As such, researchers and UA practitioners may consider generating more robust data on the health, environmental and social benefits of UA to promote among policy makers the idea of UA as a public good, worthy of public investment in the same vein as schools, transportation and education.

In conducting this literature review, using a combination of academic and gray literature, we recognize a significant gap between scholarship and practice. Urban agriculture is not a panacea that will automatically produce all the social, environmental, and economic "goods" attributed in the literature at large without proper structuring or policy frameworks in place. A more realistic, and holistic picture of urban agriculture can be advanced by further rigorous evaluation of what particular organizations are choosing to focus on, how much food they are producing currently (vs. potential), how they are distributing their food, and where they need support. It is not just about whether urban farms have the *potential* to feed food insecure people, but whether they actually do, depending on locally specific modes of distribution, channels of access, and policy climates. Key ideas from the literature about how to enable socially just, economically viable urban agriculture stem from critical food geographies, alternative food networks, food sovereignty frameworks, and co-located affordable housing and urban farming sites. Additionally, the gray literature including articles posted in the media, farm and non-profit reports, and policy briefs provide a rich repository of data and direction for researchers to examine innovative models, collaborations and policies.

It is important to acknowledge that urban agriculture is not the only solution to food insecurity and food access; in fact, it is a devolution of responsibility for policymakers to expect or institutionalize urban farms to serve as primary subsistence or primary food-producing sites run by and for low income communities without external support. This can place a double burden on struggling households to find the time, money, land and expertise to feed themselves without city support: "the emphasis on 'grow your own' reinforces self-help and government austerity arguments, absolving government of the responsibility to address the structural and institutional causes of food insecurity" [33]. Urban agriculture is part of the solutions portfolio to improve food justice and food access, but must be complemented and reinforced by other policy, planning and civic engagement efforts to provide affordable, healthy food through neighborhood groceries, food hubs, cooperative markets, culinary and nutrition education programs, farm to school programs or other means of addressing structural causes of food insecurity (e.g., poverty and job access). Civic engagement from food justice advocates,

critical scholarship from multidisciplinary perspectives, and alliances between housing, transportation, and food policy are all necessary components of an urban agriculture landscape that improves access and meets the needs of both producers and consumers.

We are convinced of the general "goods" that urban agriculture can provide to a community. In order to make the positive potential into reality, practitioners and policymakers must plan strategically and explicitly around social justice and equity, "foster[ing] dialogue between the localized and situated, and national and overarching food systems" [111]. A food system that advances food justice, access, and economic equality contains many components, among them the opportunity to cultivate and distribute local produce to those lacking adequate nutrition. Thus, urban farms have an important role to play in localized, just food systems.

Researchers can address key data gaps including the actual tracking and consumption of urban-produced food. We can answer lingering questions including: where does the food go, how much is accessed vs. wasted, what are consumer preferences around accessing urban-produced foods, and where do institutions need to fill in gaps in access and/or distribution channels? Results of this investigation will be applied to our ongoing study of urban agriculture in the East Bay region of the San Francisco Bay Area, characterized by a high amount of urban agriculture interest and activities (and deep history in the origins of the alternative food movement), yet undergoing rapid gentrification with persistent high levels of food insecurity and income inequality. Using an array of data collection methods, we aim to deepen our understanding of how urban-produced foods are distributed to (and consumed by) food insecure households, identifying key barriers and opportunities in both the policy and practical realms including support for food recovery efforts on urban farms. We hope to explore and advance solutions to food justice and access within urban agriculture in this specific context, and encourage other food systems researchers to do the same.

Author Contributions: Conceptualization, A.S., J.S. and C.A.; Methodology, A.S.; Software, A.S.; Validation, A.S., J.S., and C.A.; Formal Analysis, A.S.; Investigation, A.S.; Resources, A.S., J.S. and C.A.; Data Curation, A.S.; Writing-Original Draft Preparation, A.S.; Writing-Review and Editing, J.S., and C.A.; Visualization, A.S.; Supervision, J.S. and C.A.; Funding Acquisition, J.S. and C.A.

Funding: This research was funded by the Foundation for Food and Agriculture Research (FFAR), Seeding Solutions, Urban Food Systems Program, grant number 534678 and The APC was funded by FFAR.

Acknowledgments: We would like to acknowledge the support in compiling research for this review article provided by our research team, in particular Edith Friedman, Jesse Williamson, and Dana Moskowitz.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

References

1. McClintock, N.; Miewald, C.; McCann, E. The Politics of Urban Agriculture: Sustainability, Governance, and Contestation. In *The Routledge Handbook on Spaces of Urban Politics*; Jonas, A.E.G., Miller, B., Wilson, D., Eds.; Routledge: London, UK, 2017.
2. Taylor, J.R.; Lovell, S.T. Mapping Public and Private Spaces of Urban Agriculture in Chicago through the Analysis of High-Resolution Aerial Images in Google Earth. *Lscape Urban Plan.* **2012**, *108*, 57–70. [CrossRef]
3. Golden, S. *Urban Agriculture Impacts: Social, Health, and Economic: A Literature Review*; UC SAREP: Davis, CA, USA, 2016.
4. Reynolds, K.; Cohen, N. *Beyond the Kale: Urban Agriculture and Social Justice Activism in New York City*; University of Georgia Press: Athens, GA, USA, 2016.
5. Santo, R.; Yong, R.; Palmer, A. Collaboration Meets Opportunity: The Baltimore Food Policy Initiative. *J. Agric. Food Syst. Community Dev.* **2014**, 193–208. [CrossRef]
6. Hagey, A.; Rice, S.; Flournoy, R. *Growing Urban Agriculture: Equitable Strategies and Policies for Improving Access to Healthy Food and Revitalizing Communities*; PolicyLink: Oakland, CA, USA, 2012.
7. Alkon, A.H.; Agyeman, J. *Cultivating Food Justice: Race, Class, and Sustainability*; MIT Press: Cambridge, MA, USA, 2011.

8. Alaimo, K.; Packnett, E.; Miles, R.A.; Kruger, D.J. Fruit and vegetable intake among urban community gardeners. *J. Nutr. Educ. Behav.* **2008**, *40*, 94–101. [CrossRef] [PubMed]
9. Carmody, D. A Growing City: Detroit's Rich Tradition of Urban Gardens Plays an Important Role in the City's Resurgence. Available online: https://urbanland.uli.org/industry-sectors/public-spaces/growing-city-detroits-rich-tradition-urban-gardens-plays-important-role-citys-resurgence/ (accessed on 21 March 2018).
10. Daigger, G.T.; Newell, J.P.; Love, N.G.; McClintock, N.; Gardiner, M.; Mohareb, E.; Horst, M.; Blesh, J.; Ramaswami, A. Scaling Up Agriculture in City-Regions to Mitigate FEW System Impacts. In Proceedings of the FEW Workshop: "Scaling Up" Urban Agriculture to Mitigate Food-Energy-Water Impacts, University of Michigan, Ann Arbor, MI, USA, 5–6 October 2015; pp. 1–68.
11. Draper, C.; Freedman, D. Review and analysis of the benefits, purposes, and motivations associated with community gardening in the United States. *J. Community Pract.* **2010**, *18*, 458–492. [CrossRef]
12. Purcell, M.; Tyman, S.K. Cultivating Food as a Right to the City. *Local Environ.* **2015**, *20*, 1132–1147. [CrossRef]
13. Lovell, S.T. Multifunctional Urban Agriculture for Sustainable Land Use Planning in the United States. *Sustainability* **2010**, *2*, 2499–2522. [CrossRef]
14. Harrison, T.; Winfree, R. Ecology of Organisms in Urban Environments: Urban drivers of plant-pollinator interactions. *Funct. Ecol.* **2015**, *29*, 879–888. [CrossRef]
15. Kulak, M.; Graves, A.; Chatterton, J. Reducing greenhouse gas emissions with urban agriculture: A Life Cycle Assessment perspective. *Landsc. Urb. Plan.* **2016**, *111*, 68–78. [CrossRef]
16. Santo, R.; Palmer, A.; Kim, B. *Vacant Lots to Vibrant Plots: A Review of the Benefits and Limitations of Urban Agriculture*; Johns Hopkins Center for a Livable Future: Baltimore, MD, USA, 2016.
17. Meehan, S. Urban Farm Coming to Former Sparrows Point Steel Mill Site in Baltimore County. Available online: http://www.baltimoresun.com/business/bs-md-sparrows-point-farm-20180508-story.html. (accessed on 10 May 2018).
18. McClintock, N.; Cooper, J. *Cultivating the Commons: An Assessment of the Potential for Urban Agriculture on Oakland's Public Land*; Portland University Press: Oakland, CA, USA, 2010.
19. Algert, S.J.; Baameur, A.; Renvall, M.J. Vegetable Output and Cost Savings of Community Gardens in San Jose, California. *J. Acad. Nutr. Die.* **2014**, *114*, 1072–1076. [CrossRef] [PubMed]
20. Altieri, M.; Pallud, C.; Arnold, J.; Glettner, C.; Matzen, S. *An Agroecological Survey of Urban Farms in the Eastern Bay Area to Explore Their Potential to Enhance Food Security*; Research Highlights; Berkeley Food Institute: Berkeley, CA, USA, 2016; Available online: http://food.berkeley.edu/wp-content/uploads/2017/10/Urban-Farms-Web-1.pdf (accessed on 25 June 2018).
21. Allen, P. Mining for Justice in the Food System: Perceptions, Practices, and Possibilities. *Agric. Hum. Values* **2008**, *25*, 157–161. [CrossRef]
22. Armstrong, D. A Survey of Community Gardens in Upstate New York: Implications for Health Promotion and Community Development. *Health Place* **2000**, *6*, 319–327. [CrossRef]
23. Blair, D.; Giesecke, C.C.; Sherman, S. A Dietary, Social and Economic Evaluation of the Philadelphia Urban Gardening Project. *J. Nutr. Educ.* **1991**, *23*, 161–167. [CrossRef]
24. Alkon, A.; Guthman, J. *The New Food Activism: Opposition, Cooperation, and Collective Action*; University of California Press: Oakland, CA, USA, 2017.
25. McClintock, N. Radical, Reformist, and Garden-Variety Neoliberal: Coming to Terms with Urban Agriculture's Contradictions. *Local Environ.* **2014**, *19*, 147–171. [CrossRef]
26. McClintock, N. Cultivating (a) Sustainability Capital: Urban Agriculture, Ecogentrification, and the Uneven Valorization of Social Reproduction. *Ann. Am. Assoc. Geogr.* **2018**, *108*, 579–590. [CrossRef]
27. McClintock, N. From Industrial Garden to Food Desert: Unearthing the Root Structure of Urban Agriculture in Oakland, California. *Cultiv. Food Justice Race Class Sustain.* **2011**, *89*, 90–120. Available online: http://www.web.pdx.edu/~ncm3/files/McClintock_Cultivating_Food_Justice.pdf (accessed on 22 August 2018).
28. Anguelovski, I. Healthy Food Stores, Greenlining and Food Gentrification: Contesting New Forms of Privilege, Displacement and Locally Unwanted Land Uses in Racially Mixed Neighborhoods. *Int. J. Urban. Reg. Res.* **2016**, *39*, 1209–1230. [CrossRef]
29. Cohen, N. Feeding or Starving Gentrification: The Role of Food Policy; CUNY Urban Food Policy Institute. Available online: https://static1.squarespace.com/static/572d0fcc2b8dde9e10ab59d4/t/5aba9936575d1fe8933df34e/1522178358593/Policy-Brief-Feeding-or-Starving-Gentrification-20180327-Final.pdf (accessed on 20 April 2018).

30. Voicu, I.; Been, V. The Effect of Community Gardens on Neighboring Property Values. *R. Estim. Econ.* **2008**, *36*, 241–283. [CrossRef]
31. Whittle, H.J.; Palar, K.; Hufstedler, L.L.; Seligman, H.K.; Frongillo, E.A.; Weiser, S.D. Food Insecurity, Chronic Illness, and Gentrification in the San Francisco Bay Area: An Example of Structural Violence in United States Public Policy. *Soc. Sci. Med.* **2015**, *143*, 154–161. [CrossRef] [PubMed]
32. Sbicca, J. Growing Food Justice by Planting an Anti-Oppression Foundation: Opportunities and Obstacles for a Budding Social Movement. *Agric. Hum. Values* **2012**, *29*, 455–466. [CrossRef]
33. Horst, M.; McClintock, N.; Hoey, L. The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature. *J. Am. Plan. Assoc.* **2017**, *83*, 277–295. [CrossRef]
34. Ramírez, M.M. The Elusive Inclusive: Black Food Geographies and Racialized Food Spaces. *Antipode* **2014**, *47*, 748–769. [CrossRef]
35. Alkon, A.; Mares, T. Food Sovereignty in US Food Movements: Radical Visions and Neoliberal Constraints. *Agric. Hum. Values* **2012**, *29*, 347–359. [CrossRef]
36. Block, D.R.; Chávez, N.; Allen, E.; Ramirez, D. Food Sovereignty, Urban Food Access, and Food Activism: Contemplating the Connections through Examples from Chicago. *Agric. Hum. Values* **2012**, *29*, 203–215. [CrossRef]
37. Bradley, K.; Galt, R.E. Practicing Food Justice at Dig Deep Farms & Produce, East Bay Area, California: Self-Determination as a Guiding Value and Intersections with Foodie Logics. *Local Environ.* **2014**, *19*, 172–186. [CrossRef]
38. Brones, A. Karen Washington: It's Not a Food Desert, It's Food Apartheid. Available online: https://www.guernicamag.com/karen-washington-its-not-a-food-desert-its-food-apartheid/ (accessed on 11 June 2018).
39. Kloppenburg, J.; Hendrickson, J.; Stevenson, G.W. Coming in to the Foodshed. *Agric. Hum. Values* **1996**, *16*, 33–42. [CrossRef]
40. Peters, C.J.; Bills, N.L.; Lembo, A.J.; Wilkins, J.L.; Fick, G.W. Mapping Potential Foodsheds in New York State: A Spatial Model for Evaluating the Capacity to Localize Food Production. *Renew. Agric. Food Syst.* **2009**, *24*, 72–84. [CrossRef]
41. Guthman, J.; Morris, A.W.; Allen, P. Squaring Farm Security and Food Security in Two Types of Alternative Food Institutions*. *Rural Sociol.* **2009**, *71*, 662–684. [CrossRef]
42. Pensado-Leglise, M.; Smolski, A. An Eco-Egalitarian Solution to the Capitalist Consumer Paradox: Integrating Short Food Chains and Public Market. *Syst. Agric.* **2017**, *7*, 76. [CrossRef]
43. Handbury, J.; Rahkovsky, I.; Schnell, M. *Is the Focus on Food Deserts Fruitless? Retail Access and Food Purchases Across the Socioeconomic Spectrum*; Working Paper 21126; NBER: Cambridge, MA, USA, 2015; Available online: http://www.nber.org/papers/w21126 (accessed on 25 June 2018).
44. Cummins, S.; Macintyre, S. "Food Deserts"—Evidence and Assumption in Health Policy Making. *Br. Med. J.* **2002**, *325*, 436–438. [CrossRef]
45. Bedore, M. Geographies of Capital Formation and Rescaling: A Historical-geographical Approach to the Food Desert Problem. *Can. Geogr. Géogr. Can.* **2016**, *57*, 163. [CrossRef]
46. Galvez, M.P.; Morland, K.; Raines, C.; Kobil, J.; Siskind, J.; Godbold, J.; Brenner, B. Race and Food Store Availability in an Inner-City Neighbourhood. *Public Health Nutr.* **2008**, *11*, 624–631. [CrossRef] [PubMed]
47. Larsen, K.; Gilliland, J. A Farmers' Market in a Food Desert: Evaluating Impacts on the Price and Availability of Healthy Food. *Health Place* **2009**, *15*, 1158–1162. [CrossRef] [PubMed]
48. Wang, H.; Qiu, F.; Swallow, B. Can Community Gardens and Farmers' Markets Relieve Food Desert Problems? A Study of Edmonton, Canada. *Appl. Geogr.* **2014**, *55*, 127–167. [CrossRef]
49. Sadler, R.C. Strengthening the Core, Improving Access: Bringing Healthy Food Downtown via a Farmers' Market Move. *Appl. Geogr.* **2016**, *67*, 119–128. [CrossRef]
50. Gudzune, K.A.; Welsh, C.; Lane, E.; Chissell, Z.; Anderson Steeves, E.; Gittelsohn, J. Increasing Access to Fresh Produce by Pairing Urban Farms with Corner Stores: A Case Study in a Low-Income Urban Setting. *Public Health Nutr.* **2015**, *18*, 2770–2774. [CrossRef] [PubMed]
51. Lucan, S.C.; Maroko, A.R.; Sanon, O.; Frias, R.; Schechter, C.B. Urban Farmers' Markets: Accessibility, Offerings, and Produce Variety, Quality, and Price Compared to Nearby Stores. *Appetite* **2015**, *90*, 23–30. [CrossRef] [PubMed]

52. Misyak, S.; Ledlie Johnson, M.; McFerren, M.; Serrano, E. Family Nutrition Program Assistants' Perception of Farmers' Markets, Alternative Agricultural Practices, and Diet Quality. *J. Nutr. Educ. Behav.* **2014**, *46*, 434–439. [CrossRef] [PubMed]
53. Clinton, N.; Stuhlmacher, M.; Miles, A.; Uludere Aragon, N.; Wagner, M.; Georgescu, M.; Herwig, C.; Gong, P. A Global Geospatial Ecosystem Services Estimate of Urban Agriculture. *Earth's Future* **2018**, *6*, 40–60. [CrossRef]
54. Galzki, J.; Mulla, D.; Peters, C. Mapping the Potential of Local Food Capacity in Southeastern Minnesota. *Renew. Agric. Food Syst.* **2014**. [CrossRef]
55. Parece, T.E.; Serrano, E.L.; Campbell, J.B. Strategically Siting Urban Agriculture: A Socioeconomic Analysis of Roanoke, Virginia. *Prof. Geogr.* **2017**, *69*, 45–58. [CrossRef]
56. Mack, E.A.; Tong, D.; Credit, K. Gardening in the Desert: A Spatial Optimization Approach to Locating Gardens in Rapidly Expanding Urban Environments. *Int. J. Health Geogr.* **2017**, *16*, 37. [CrossRef] [PubMed]
57. Colasanti, K.J.A.; Hamm, M.W. Assessing the Local Food Supply Capacity of Detroit, Michigan. *J. Agric. Food Syst. Community Dev.* **2010**, *1*, 41–58. [CrossRef]
58. Manskar, N. These NYC Farms Are Growing More Than Food. Available online: https://patch.com/new-york/new-york-city/these-nyc-farms-are-growing-more-food (accessed on 24 April 2018).
59. McClintock, N.; Mahmoudi, D.; Simpson, M.; Santos, J. Socio-Spatial Differentiation in the Sustainable City: A Mixed-Methods Assessment of Residential Gardens in Metropolitan Portland, Oregon, USA. *Landsc. Urban. Plan.* **2016**. [CrossRef]
60. Holt, S. Can Vertical Farms Reap Their Harvest? It's Anyone's Bet. Available online: https://civileats.com/2018/07/02/can-vertical-farms-reap-their-harvest-its-anyones-bet/ (accessed on 2 July 2018).
61. Despommier, D. *The Vertical Farm: Feeding the World in the 21st Century*; St. Martin's Press: New York, NY, USA, 2010.
62. Alameda County Community Food Bank. Hunger: Alameda County Uncovered. 2014. Available online: https://www.accfb.org/wp-content/uploads/2017/08/ACCFB-HungerStudy2014-smaller.pdf (accessed on 15 June 2018).
63. Kortright, R.; Wakefield, S. Edible Backyards: A Qualitative Study of Household Food Growing and Its Contributions to Food Security. *Agric. Hum. Values* **2011**, *28*, 39–53. [CrossRef]
64. Gray, L.; Guzman, P.; Glowa, K.M.; Drevno, A.G. Can Home Gardens Scale up into Movements for Social Change? The Role of Home Gardens in Providing Food Security and Community Change in San Jose, California. *Local Environ.* **2014**, *19*, 187–203. [CrossRef]
65. Algert, S.; Diekmann, L.; Renvall, M.; Gray, L. Community and Home Gardens Increase Vegetable Intake and Food Security of Residents in San Jose, California. *Calif. Agric.* **2016**, *70*, 77–82. [CrossRef]
66. Saldivar-tanaka, L.; Krasny, M.E. Culturing Community Development, Neighborhood Open Space, and Civic Agriculture: The Case of Latino Community Gardens in New York City. *Agric. Hum. Values* **2004**, *21*, 399–412. [CrossRef]
67. Smith, C.M.; Kurtz, H. Community Gardens and Politics of Scale in New York City. *Geogr. Rev.* **2003**, *93*, 193–212. [CrossRef]
68. Schmelzkopf, K. Incommensurability, Land Use, and the Right to Space: Community Gardens in New York City. *Urban Geogr.* **2002**, *23*, 323–343. [CrossRef]
69. Reynolds, K. Disparity Despite Diversity: Social Injustice in New York City's Urban Agriculture System. *Antipode* **2015**, *47*, 240–259. [CrossRef]
70. McClintock, N.; Cooper, J.; Khandeshi, S. Assessing the Potential Contribution of Vacant Land to Urban Vegetable Production and Consumption in Oakland, California. *Landsc. Urban Plan.* **2016**, *111*, 46–58. [CrossRef]
71. Arnold, J.; Rogé, P. Indicators of Land Insecurity for Urban Farms: Institutional Affiliation, Investment, and Location. *Sustainability* **2018**, *10*, 1963. [CrossRef]
72. Daftary-Steel, S.; Herrera, H.; Porter, C. The Unattainable Trifecta of Urban Agriculture. *J. Agric. Food Syst. Community Dev.* **2015**, *6*, 19–32. [CrossRef]
73. Biewener, C. Paid Work, Unpaid Work, and Economic Viability in Alternative Food Initiatives: Reflections from Three Boston Urban Agriculture Endeavors. *J. Agric. Food Syst. Community Dev.* **2016**, *6*, 35–53. [CrossRef]

74. Allen, P. *Together at the Table: Sustainability and Sustenance in the American Agrifood System*; The Pennsylvania State University Press: State College, PA, USA, 2004.
75. Kato, Y. Not Just the Price of Food: Challenges of an Urban Agriculture Organization in Engaging Local Residents. *Sociol. Inq.* **2016**, *83*, 369–391. [CrossRef]
76. Beckie, M.; Fletcher, F.; Whitfield, K.; Bogdan, E. Planting roots: Urban Agriculture for Senior Immigrants. *J. Agric. Food Syst. Community Dev.* **2010**, *1*, 77–89. [CrossRef]
77. Cummins, S.; Flint, E.; Matthews, S.A. New Neighborhood Grocery Store Increased Awareness of Food Access but Did Not Alter Dietary Habits or Obesity. *Health Aff.* **2014**, *33*, 283–291. [CrossRef] [PubMed]
78. Rodier, F.; Durif, F.; Ertz, M. Food Deserts: Is It Only about a Limited Access? *Br. Food J.* **2017**, *119*, 1495–1510. [CrossRef]
79. Green Bronx Machine–Fuel the Machine. Available online: https://greenbronxmachine.org/ (accessed on 11 June 2018).
80. Poe, M.; McLain, R.; Emery, M.; Hurley, P. Urban Forest Just and the Rights to Wild Foods, Medicines, and Materials in the City. *Hum. Ecol.* **2016**, *41*, 409–422. [CrossRef]
81. McLain, R.J.; Poe, M.R.; Urgenson, L.S.; Blahna, D.J.; Burrolph, L.P. Urban Non-Timber Forest Products Stewardship Practices among Foragers in Seattle, Washington (USA). *Urban For. Urban Green.* **2017**, *28*, 36–42. [CrossRef]
82. Shackleton, C.; Hurley, P.; Dahlberg, A.; Emergy, M.; Nagendra, H. Urban Foraging: A Ubiquitous Human Practice Overlooked by Urban Planners, Policy, and Research. *Sustainability* **2017**, *9*, 1884. [CrossRef]
83. Kell, G. Foragers Find Bounty of Edibles in Urban Food Deserts. Available online: http://news.berkeley.edu/2014/11/17/urban-foraging/ (accessed on 2 July 2018).
84. Stark, P.; Carlson, T. Reaping Without Sowing: Urban Foraging, Sustainability, Nutrition and Social Welfare. Available online: https://food.berkeley.edu/programs/research/seed-grant/reaping-without-sowing/ (accessed on 8 February 2018).
85. Ample Harvest. America's Solution to Food Waste and Hunger. Available online: http://ampleharvest.org/ (accessed on 31 May 2018).
86. Curran, C.J.; González, M.-T. Food Justice as Interracial Justice: Urban Farmers, Community Organizations and the Role of Government in Oakland, California. *Univ. Miami Inter-Am. Law Rev.* **2011**, *43*, 207–232.
87. Cohen, N. *Policy Brief: New Directions for UA in NYC*; CUNY Urban Food Policy Institute: Harlem, NY, USA, 2016; Available online: https://static1.squarespace.com/static/572d0fcc2b8dde9e10ab59d4/t/5807af3c9de4bb0ab89dc12e/1476898621115/Policy+Brief-+New+Directions+for+UA+in+NYC.pdf (accessed on 20 April 2018).
88. McCracken, V.; Sage, J.; Sage, R. *Bridging the Gap: Do Farmers' Markets Help Alleviate Impacts of Food Deserts?* Institute for Research on Poverty: Madison, WI, USA, 2012; Available online: https://www.irp.wisc.edu/wp/wp-content/uploads/2018/05/dp140112.pdf (accessed on 18 May 2018).
89. Satterfield, S. Behind the Rise and Fall of Growing Power. Available online: https://civileats.com/2018/03/16/behind-the-rise-and-fall-of-growing-power/ (accessed on 14 March 2018).
90. Short, A.; Guthman, J.; Raskin, S. Food Deserts, Oases, or Mirages?: Small Markets and Community Food Security in the San Francisco Bay Area. *J. Plan. Edu. Res.* **2007**, *26*, 352–364. [CrossRef]
91. City of Richmond. Urban Agriculture Assessment. Available online: https://www.ci.richmond.ca.us/2530/Urban-Agriculture-Assessment (accessed on 15 May 2018).
92. HOPE Collaborative. A Place with No Sidewalks: An Assessment of Food Access, the Built Environment and Local, Sustainable Economic Development in Ecological Micro-Zones in the City of Oakland, California in 2008. Available online: http://www.hopecollaborative.net/wp-content/uploads/2015/05/hp_aplacewithn-sidewalks.pdf (accessed on 22 August 2018).
93. Satterfield, S. Can This Market Be a Model for Getting Good Food into Neighborhoods Shaped by Racism? Available online: http://civileats.com/2016/05/25/can-peoples-community-market-begin-to-undo-a-history-of-structural-racism/ (accessed on 18 February 2018).
94. Raja, S.; Ma, C.; Yadav, P. Beyond Food Deserts: Measuring and Mapping Racial Disparities in Neighborhood Food Environments. *J. Plan. Edu. Res.* **2008**, *27*, 469–482. [CrossRef]
95. Zepeda, L.; Reznickova, A.; Lohr, L. Overcoming Challenges to Effectiveness of Mobile Markets in US Food Deserts. *Appetite* **2014**, *79*, 58–67. [CrossRef] [PubMed]

96. Bodor, J.N.; Rose, D.; Farley, T.A.; Swalm, C.; Scott, S.K. Neighbourhood Fruit and Vegetable Availability and Consumption: The Role of Small Food Stores in an Urban Environment. *Public Health Nutr.* **2008**, *11*, 416–420. [CrossRef] [PubMed]
97. Bolen, E.; Hecht, K. *Neighborhood Groceries: New Access to Healthy Food in Low-Income Communities*; California Food Policy Advocates: Oakland, CA, USA, 2003.
98. Gatrell, J.D.; Reid, N.; Ross, P. Local Food Systems, Deserts, and Maps: The Spatial Dynamics and Policy Implications of Food Geography. *Appl. Geogr.* **2011**, *31*, 1195–1196. [CrossRef]
99. Unger, S.; Wooten, H. *A Food Systems Assessment for Oakland, CA: Toward a Sustainable Food Plan*; Mayor's Office of Sustainability: Oakland, CA, USA, 2006.
100. Alkon, A.H. *Black, White and Green: Farmer's Markets, Race and the Green Economy*; Geographies of Justice and Social Transformation; University of Georgia Press: Athens, GA, USA, 2012.
101. GrowNYC's Greenmarket Program Ensures New Yorkers Have Access to the Freshest, Most Nutritious Locally Grown Food. *NYC Food Policy Center*. 2018. Available online: http://www.nycfoodpolicy.org/grownycs-greenmarket-program-ensures-new-yorkers-access-freshest-nutritious-locally-grown-food/ (accessed on 2 July 2018).
102. SNAP at Farmers' Markets | Snap to Health. Available online: https://www.snaptohealth.org/snap-innovations/snap-at-farmers-markets/ (accessed on 24 May 2018).
103. Chen, S. Civic Agriculture: Towards a Local Food Web for Sustainable Urban Development. *APCBEE Proced.* **2012**, *1*, 169–176. [CrossRef]
104. Horst, M.; Gaolach, B. The Potential of Local Food Systems in North America: A Review of Foodshed Analyses. *Renew. Agric. Food Syst.* **2015**, *30*, 399–407. [CrossRef]
105. Cooper, D. *Reframing Food Hubs: Food Hubs, Racial Equity, and Self-Determination in the South*; Race Forward: City, USA, 2018; Available online: https://www.raceforward.org/system/files/pdf/reports/RaceForwardCSI_ReframingFoodHubsFullReport_2018.pdf (accessed on 20 April 2018).
106. Wallace, H. Suburban "Agrihoods": Growing Food and Community. Available online: https://civileats.com/2014/07/09/suburban-agrihoods-growing-food-community/ (accessed on 7 June 2018).
107. Widener, M.J.; Metcalf, S.S.; Bar-Yam, Y. Developing a Mobile Produce Distribution System for Low-Income Urban Residents in Food Deserts. *J. Urb. Health* **2012**, *89*, 733–745. [CrossRef] [PubMed]
108. Weis, T. *The Global Food Economy: The Battle for the Future of Farming*; Zed Books: London, UK, 2007.
109. Clendenning, J.; Dressler, W.H.; Richards, C. Food Justice or Food Sovereignty? Understanding the Rise of Urban Food Movements in the USA. *Agric. Hum. Values* **2016**, *33*, 165–177. [CrossRef]
110. Brown, P.L. Kale, Not Jail: Urban Farming Nonprofit Helps Ex-Cons Re-Enter Society. *The New York Times*, 18 May 2018. Available online: https://www.nytimes.com/2018/05/17/business/urban-farming-exconvicts-recidivism.html (accessed on 18 May 2018).
111. Morales, A. Growing Food and Justice, Dismantling Racism through Sustainable Food Systems. *Cultiv. Food Justice Race Class Sustain.* **2011**, *149*, 149–176. Available online: https://cultivatingalternatives.com/2012/10/28/growing-food-and-justice-dismantling-racism-through-sustainable-food-systems-alfonso-morales/ (accessed on 22 August 2018).
112. Sussman, M. Will Allen Returns to his Roots. Available online: https://shepherdexpress.com/api/content/3451251a-6e7e-11e8-b34f-12408cbff2b0/ (accessed on 14 June 2018).
113. Doherty, M. Detroit "Agrihood" Sparks Discussion on Urban Farming. Available online: https://www.onegreenplanet.org/vegan-food/detroit-agrihood-sparks-discussion-urban-farming/ (accessed on 7 March 2018).
114. Pothukuchi, K.; Kaufman, J.L. The Food System: A Stranger to the Planning Field. *J. Am. Plan. Assoc.* **2000**, *66*, 116–124. [CrossRef]
115. Morgan, K. Feeding the City: The Challenge of Urban Food Plan. *Int. Plan. Stud.* **2009**, *14*, 341–348. [CrossRef]
116. Grewal, S.S.; Grewal, P.S. Can Cities Become Self-Reliant in Food? *Cities* **2012**, *29*, 1–11. [CrossRef]
117. Blum-evitts, S. Designing a Foodshed Assessment Model: Guidance for Local and Regional Planners in Understanding Local Farm Capacity in Comparison to Local Food Needs. Masters Theses 1911—February 2014 2009. Available online: https://scholarworks.umass.edu/theses/288 (accessed on 5 July 2018).

118. DeDomenica, B.; Gordon, M. Food Policy: Urban Farming as a Supplemental Food Source. *J. Soc. Chang.* **2016**, *8*, 1–13. Available online: https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?referer=https://www.google.com.tw/&httpsredir=1&article=1109&context=jsc (accessed on 22 August 2018).
119. Havens, E.; Alcala, A.R. *Land for Food Justice? AB 551 and Structural Change*; Land and Sovereignty Policy Brief #8; Food First: Oakland, CA, USA, 2016; Available online: https://foodfirst.org/wp-content/uploads/2016/06/UrbanAgS2016_Final.pdf (accessed on 20 April 2018).
120. City of Baltimore. Urban Agriculture Plan (2013). Available online: https://www.baltimoresustainability.org/homegrown-baltimore-plan/ (accessed on 2 July 2018).
121. California Community Food Producer Act, AB 1990. (2014). Available online: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1990 (accessed on 2 July 2018).
122. Special Issue: The Food Factor. Available online: https://www.planning.org/planning/2009/aug/ (accessed on 20 May 2018).
123. Seattle Department of Neighborhoods. P-Patch Community Gardening. Available online: http://www.seattle.gov/neighborhoods/programs-and-services/p-patch-community-gardening (accessed on 2 July 2018).
124. NYC Food Policy. Food Metrics Report 2017. The City of New York; 2017. Available online: https://www1.nyc.gov/assets/foodpolicy/downloads/pdf/2017-Food-Metrics-Report-Corrected.pdf (accessed on 14 June 2018).
125. Curran, W.; Hamilton, T. Just Green Enough: Contesting Environmental Gentrification in Greenpoint, Brooklyn. *Local Environ.* **2012**, *17*, 1027–1042. [CrossRef]
126. Mohareb, E.A.; Heller, M.C.; Guthrie, P.M. Cities' Role in Mitigating United States Food System Greenhouse Gas Emissions. *Environ. Tech.* **2018**, *52*, 5545–5554. [CrossRef] [PubMed]
127. Born, B.; Purcell, M. Avoiding the Local Trap: Scale and Food Systems in Planning Research. *J. Plan. Educ. Res.* **2006**, *26*, 195–207. Available online: https://pdfs.semanticscholar.org/2410/c65a10ecef66214181f4971a53294e2adc48.pdf (accessed on 22 August 2018). [CrossRef]
128. Bollier, D. *Think Like a Commoner: A Short Introduction to the Life of the Commons*; New Society Publishers: Gabriola Island, BC, Canada, 2014.
129. Posner, E. An Agricultural Movement for People-to-People Reparations Puts Itself on the Map. *Rural America in These Times*, 2018. Available online: http://inthesetimes.com/rural-america/entry/21140/catatumbo-collective-soul-fire-farm-racial-justice-reparations-agriculture (accessed on 18 May 2018).
130. Haletky, N.; Taylor, O. Urban Agriculture as a Solution to Food Insecurity: West Oakland and People's Grocery. *URB. ACTION* **2006**, *49*, 1–9.