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Is Urban Agriculture a Game Changer or Window Dressing? A Critical Analysis of Its Potential to Disrupt Conventional Agri-food Systems

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Abstract. Is urban agriculture capable of becoming a 'game changer', contributing to the sustainable transition of our conventional agri-food systems? Or is it more likely to be 'window dressing', characterized by limited participation and influence? The answer depends upon how we measure system change. The value of urban agriculture is often measured in physical – caloric – terms. By assessing the multiple emergent effects of urban agriculture activities through an extensive, in-terdisciplinary literature review, this article provides a more informed context to a discussion of the disruptive potential of urban agriculture. Several features of urban agriculture suggest its potential to be an important contributor to agri-food system transition; however, a number of key challenges must be acknowledged and addressed. Ultimately, producing food in cities is not inherently transformative in and of itself, but the potential and observed new forms of social en-gagement emerging in many contexts create institutional conditions that can disrupt conventional agri-food systems by building social capital as much as physical capital.

Introduction

Are alternative food practices such as urban agriculture capable of becoming a 'game changer', contributing to the sustainable transition of our conventional agri-food systems? Or is it more likely to be a form of urban 'window dressing', characterized by limited participation and influence? Many citizens around the globe have been engaged in agri-food practices of multiple forms that lie outside the domains of the conventional, industrial agri-food systems in increasing numbers, in response to food safety risks and concerns about the environmental impacts of industrial agriculture, among other things, while for others such practices constitute preferred cultural and lifestyle patterns both new and longstanding. In still other cases, namely in the developing world, farmers and consumers have never been engaged in that conventional system in the first place.

Urban agriculture is an alternative food practice that has received growing attention in the academy, yet it remains on the sidelines in policy circles, which continue

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to prioritize conventional and neoliberal prescriptions for food security (Kirwan et al., 2013). This marginalization has been further supported by a number of studies, largely in the natural sciences, that express skepticism about the ability of urban agriculture to meet local caloric needs. These critics, however, reduce the analysis of urban agriculture to a form of mono-consequentialism – evaluating urban agriculture's myriad expressions along a single parameter of consequence: calories produced. By assessing the multiple emergent effects of urban agriculture activities through an extensive, interdisciplinary literature review, this article provides a more informed context to this discussion. In conclusion, this analysis suggests that several features of urban agriculture suggest its potential to be an important contributor to agri-food system transition, provided a number of key challenges are acknowledged and addressed.

Concerns about the integrity and sustainability of our conventional agri-food systems are certainly warranted. Many drivers are placing pressure on our relationships with food, including, to begin, the global population: currently at 7.5 billion, it is expected to grow to 9–10 billion by mid-century. Even at 7.5 billion, food security remains an elusive goal. An estimated 795 million people worldwide faced chronic food insecurity in 2015 (FAO, 2015) and, on the other end of the spectrum, poor diets have spawned a health epidemic in the form of overweight and obesity, for approximately 1.9 billion people (WHO, 2015).

A growing proportion of the global population is also moving to cities. Urbanization consumes farmland, while at the same time urban residents become dependent upon long and frequently international food supply chains, which are vulnerable to disasters in locations in which food is produced and processed (Satterthwaite et al., 2010). In one analysis, food-energy deficiencies in the urban areas of 12 out of 18 low-income countries were equal to or higher than in rural areas, despite higher average incomes (Ahmed et al., 2007). Various studies have shown the extent of food insecurity among low-income households in urban areas and the many short-term coping measures taken that compromise health and nutritional status (Maxwell et al., 1998; Tolossa, 2010; de Zeeuw and Dreschel 2015).

Meanwhile, indications are that conventional agriculture will have a hard time meeting increases in demand. To the contrary, we may well see a decline in production, or at least repeated occurrences of large-scale harvest failures, due to climate change. Research suggests climate change has already affected agricultural productivity negatively, with observations of production declines globally up to 2.5%, and projections for the coming decade grow increasingly negative as we progress into the twenty-first century (Porter et al., 2014). The urban poor, with limited ability to adjust to price rises or produce their own food, are at particularly high risk (Viljoen and Wiskerke, 2012). Ironically, the negative impacts of climate change on agrarian regions may drive further increases in urban migration, as small farmers can no longer sustain their rural livelihoods (e.g. Lobell and Burke, 2009), further increasing pressure on cities. Climate change aside, conventional agricultural methods have been shown to be ecologically unsustainable in many ways, including, notably, observations that such methods have stripped soil of its ability to support agricultural crops themselves, on top of their effects on biological diversity, water quality, and greenhouse gas emissions (Foucher et al., 2014). The structure of the global conventional agri-food sector, furthermore – within which an enormous concentration of power has been accorded to the 'corporate middle', consisting of agricultural input firms, processors and retailers (e.g. Weis, 2007) – simply does not lend itself to the

types of institutional feedbacks that would readily foster adaptation.

In other words, our conventional agri-food systems exhibit a lack of resilience to crisis drivers such as climate change, have a number of detrimental ecological and social side effects, and appear to have limited ability to ensure global food security (Almås and Campbell, 2012; Tanentzap et al., 2015), defined at the World Food Summit of 1996 as the physical, social, and economic access to sufficient, safe and nutritious food that meets dietary needs and food preferences for an active and healthy life. As with other socioecological systems, the avoidance of enduring crises may require system transition – a full-scale rethinking and reordering of the structures and practices defining our socio-economic systems (Haxeltine et al., 2008; Lawhon and Murphy, 2012). Sustainability transition theorists postulate a transition is unlikely to consist of a singular revolutionary force, and more likely to consist of multiple causal pathways: emerging actors in different contexts that initiate small-scale activities that disrupt the current system, which then are upscaled to effect broader system change (e.g. Geels and Schot, 2007; Haxeltine et al., 2008). Similarly, according to reflexivity theorist Archer (1995, 2010), structural transition presupposes the congruent occurrence of multiple social interactions that serve to confront existing structures and paradigms. Several alternative agri-food practices serve as disruptions to this dominant system, and may be considered just the sort of small-scale innovations with the potential for upscaling, including urban agriculture (Holt Giménez and Shattuck, 2011).

Introduction to Urban Agriculture

Luc Mougeot (2000, p. 10) describes urban agriculture as:

> 'an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area.'

According to Smit et al. (1996), an estimated 800 million people practised urban agriculture worldwide at that time of writing (more recent estimates are unavailable). Urban agriculture has been practised for as long as there have been cities, and continues to be a prominent land use in many cities outside of the West, but it declined notably in places like the U.S., Canada, the U.K. and Australia after World War II. Urban agriculture today, however, has experienced a re-emergence of sorts, encompassing a wide diversity of practices, including small-scale and large-scale production in both public and private spaces; subsistence and market-based activities; low-input practices such as traditional garden plots; and technologically intensive practices such as indoor hydroponic production. With the prevalence of small-scale, non-commercial production, and diversity of practice and practitioners, urban agriculture falls outside the spectrum of conventional industrial agri-food systems, and this is here considered a form of alternative food practices.

Sources of Enthusiasm

Many advocates of urban agriculture would agree with the UN High Level Task

Force on the Global Food Crisis (UN, 2009), which identified urban agriculture as a key means of alleviating urban food insecurity and building resilient cities (e.g. Mougeot, 2006; Coelho et al., 2013; Muldoon et al., 2013; Obatolu and Speak, 2013; Orsini et al., 2013; Denis et al., 2015). Recent empirical assessments offer a glimpse of the scale of urban agriculture in practice today. Corbould (2013) estimates urban agriculture contributes 15–30% of global food production currently. According to Satterthwaite et al. (2010), urban and peri-urban agriculture has a significant role in food security in most low-income nations. The participation of poor households in urban agriculture is very high in many cities, particularly in sub-Saharan Africa, providing nutritious fresh produce and other food products directly, and reducing household cash expenditures on food (Gerster-Bentaya, 2015). Some families are also able to supplement their income with the sale of produce, although relatively better-off households tend to benefit to a greater extent (Gerster-Bentaya, 2015). In many cities it is also more difficult for the urban poor to access the necessary land (Smit et al., 2001; Lee-Smith, 2010). Maxwell (1995) found that about 35% of city residents in Kampala, Uganda, engage in some form of agriculture, and non-farming households in Kampala spend one and a half to two times more on food each month. In some parts of South East Asia, as much as 80% of people are involved in urban food production, with 80% of fresh vegetables and 40% of eggs consumed in Hanoi, Vietnam, coming from urban production sites (Corbould, 2013).

In Cuba, well known for its expansive urban agriculture, 50–80% of vegetables consumed are grown on urban farms (Smit et al., 2001), but practices are also quite widespread in other regions, with notable expansions observed in Western countries (Atkinson, 2013). For example, Singapore had over 10 000 urban farms in 1998, producing over 80% of poultry and 25% of vegetables consumed (Smit et al., 2001). Australians produced an estimated 153 000 tonnes of vegetables per year in their home gardens – about 70 kg per household on average (Larder et al., 2014). In the United States, a survey identified more than 9,000 community gardens run by 445 organizations, 39% of which were built in the past five years, and 90% of organizations reported increased demand for plots in that same time frame. A Canadian study estimates that gardeners in Montreal grow as much as 70% of the produce they consume during the 18-week growing season (Duchemin et al., 2008). Other studies highlight the productive intensity of urban gardening. In New York, for example, a sample of 67 gardens produced an average 1.3 pounds, or US$3 of food per square foot (Gittleman et al., 2012). (By contrast, a typical corn field in Iowa, U.S., produces 2.1 bushels per acre, and given corn prices as of early 2015, that would have generated US$7.94 per acre.)

Academic research focusing on urban agriculture in the West has also emphasized a host of social and cultural benefits of urban food production (relatively less attention has been paid to food security among studies of urban agriculture in the West). Specific benefits noted include mental and physical health and well-being (Bellows et al., 2003; Beckie and Bogdan, 2010; Litt et al., 2011; Zoellner et al., 2012; Zick et al., 2013; Gray et al., 2014), the cultivation of citizenship (Welsh and MacRae, 1998; DeLind, 2002; Seyfang, 2006), offering the disenfranchised access to the public sphere (Staeheli and Mitchell, 2008), and creating social capital (Firth et al., 2011). Community gardens, furthermore, are seen as a means of creating an 'urban oasis' that provides refuge from urban decay while revitalizing city neighbourhoods (Poulsen et al., 2014). Overall, these advocates in toto offer a depiction of urban agriculture that is uncritical, and verges on the overly romantic, offering images of

community gardens single-handedly solving a multitude of social and ecological ills without breaking a sweat.

Some quantitative analyses, conducted primarily at the regional level, make optimistic claims of the productive potential of urban agriculture, such as Grewal and Grewal's (2012) estimate that nearly half of fresh vegetables and all of the poultry and eggs consumed in Cleveland could be produced locally if 80% of all vacant land were put into production; a proviso that may be politically and culturally unrealistic (see also e.g. Dowie, 2010; Macrae et al., 2010; Haberman et al., 2014).

Claims of Critics

Critiques of urban agriculture emanate from both the social and agricultural sciences. Starting with the latter, several analyses gauging the productive potential of urban agriculture at higher scales have provided discouraging results. These studies all employ some variation of quantitative calculation of land availability and population, and estimate the shortfalls in productivity based on average agricultural productive potential and per capita food consumption needs (e.g. Born and Purcell, 2006; Algert et. al., 2014; Korth et al., 2014; Martellozzo et al., 2014). Martellozzo et al. (2014), for example, conclude from their global assessment that, assuming the goal of producing 300 grams per capita per day of vegetables (the recommended diet), only nine countries would be able to satisfy this production goal with less than 10% of their land, and 51 countries would have insufficient urban area to meet the recommended diet, even if 100% of available land were employed. Many of these researchers do acknowledge the high degree of uncertainty associated with such large-scale studies, and Korth et al. (2014) have gone on to note that the limits of study designs employed in all such assessments simply do not allow for any conclusions regarding urban agriculture's productive potential. Nonetheless, many of these studies imply that the positive claims of urban agriculture's productive potential are highly overrated, and they are often used to discredit urban agriculture activities.

Among social scientists, two critiques come to the fore. First, several social scientists have argued that urban agriculture and other forms of alternative agri-food practices in vogue today largely represent a white, middle-class pursuit that all too often operates with a market mentality, such as calls to 'vote with your fork' (Guthman, 2003, p. 46; see also Slocum, 2006, 2011; Guthman, 2014; Bradley and Galt, 2014). Because of these exclusionary tendencies, urban agriculture and other food practices do little to confront racial and class inequities, and at their worst can perpetuate them, by promoting food products that are inaccessible both economically and culturally to low-income and ethnic minority communities, and excluding the participation of the members of such communities in urban food production (Lyson, 2014). Participation from people who face real and significant hardship with the conventional food system, contrarily, are the most likely to lack the resources to participate in the first place (Kearns, 1995; Staeheli et al., 2002; Hassanein, 2003; Fyfe, 2005; Ghose and Pettygrove, 2014). Even in the developing world, the benefits of urban agriculture accrue disproportionately to the middle classes (Satterthwaite et al., 2010).

Others have offered rather scathing accounts of urban agriculture's alleged neoliberal leanings. These critics argue that urban agriculture perpetuates a neoliberal rationality by locating solutions to social problems within the market rather than the state (Newman and Lake, 2006; Holt-Giménez and Wang, 2011; Alkon and Mares,

2012), while politics is further obscured by discourses of individual and community 'self-help' mantras (Roberts and Mahtani, 2010). Pudup (2008, p. 1228) suggests that urban gardens are 'designed as spaces in which gardening puts individuals in charge of their own adjustment(s) to economic restructuring and social dislocation', and in effect urban gardens serve to pass on state responsibility for the maintenance of public spaces to local residents (Rosol, 2012). Even well-intentioned initiatives are inclined to become co-opted by the very neoliberal forces they aim to overcome (Guthman, 2007, 2008). Urban food banks and other support organizations, furthermore, have the potential to depoliticize food insecurity and hunger as they gain more power in metropolitan regions (Henderson, 2004; Warshawsky, 2010, 2011). States do indeed assert influence over urban gardens, as Domene and Saurí (2007) argue, by strictly regulating where and how they exist, thus constituting a mechanism by which governments ensure quiescence rather than state confrontation among citizens (Elwood, 2004; Ghose, 2005; Perkins, 2010). Rather than disrupting existing sociopolitical structures, in other words, urban agriculture practitioners only serve to reinforce neoliberal hegemony (Perkins, 2010).

Clean Conjectures Meet Messy Reality

Delving more deeply into the empirical literature reveals that the effects of urban agriculture are far more nuanced than the literature described above would imply, and it is to these nuances that we must pay attention, in order to offer a more robust evaluation of urban agriculture's potential contribution to sustainability transitions in conventional agri-food systems. There are indeed sources of concern, yet there are simultaneously indications of outcomes that offer substantial encouragement, and the unique interactions of both types of drivers in specific regional contexts will shape the future trajectories for urban agriculture.

Reasons for Concern

First, the real source of concern in relation to production is not its general limitations, but rather its specific limitations. The high degree of geographic variation in agronomic conditions, and in the economic and knowledge capacity to adopt advanced technological growing techniques to adapt to those conditions, translates into social inequities in access to urban agriculture in ways that are not immediately determined – although certainly indirectly influenced – by the politics of race and class. Extending the growing season in northern cities, for example, would require access to technologies that significantly increase the required input costs. As another looming concern that also points to a source of inequity, several studies have identified contaminated soil and water in urban production sites. Heavy metals can be introduced into the soil through historic land use, atmospheric deposition from urban combustion emissions or industrial pollutants (Chen et al., 1997; Wei and Yang, 2010), and waste-water usage (Mapanda et al., 2005). Such sites are highly likely to be concentrated in inner-city neighbourhoods, which also tend to house lower-income families.

Second, while limited support for allegations of white dominance beyond the regional context can be found in the extant literature, limited participation among the urban poor does indeed appear to be geographically persistent, and this pat-

tern extends to the developing world (Smit et al., 2001; Lee-Smith, 2010). Even well-intentioned middle-class advocates can unintentionally marginalize the urban poor (and ethnic minorities) through discursive framing that reflects class-situated values and lifestyles (Lyson, 2014).

Security of land tenure is also a concern for all those practicing urban agriculture in public spaces. Many existing sites in the developed and developing world alike are threatened by urban development pressure, which is unlikely to diminish in the coming years of continued rural to urban migration. Perez-Vasquez et al. (2005) note that urban agriculture sites in developing world cities are particularly vulnerable, but development pressure is not limited to the South. Cabannes and Raposo (2013) highlight the plight of primarily immigrant urban farmers in Lisbon, who do not hold any certainty regarding their land-use rights, and their activity can be terminated at any time by political decisions favouring urban development. Even in London, despite being historically recognized and protected, the number of public urban agriculture sites (allotments) has been decreasing (Cabannes and Raposo, 2013).

Those organizations supporting urban agriculture, many of which are relatively new, also exhibit a degree of fragility, in contrast to the entrenched power of local states, which may or may not have the political will and administrative capacity to support urban agriculture. Most urban agriculture support organizations, for example, are dependent upon limited funding, which constrains their long-term viability, and reduces their capacity, especially for political advocacy (Warshawsky, 2014; Drake and Lawson, 2015). According to a survey of community garden organizations across the U.S. and Canada conducted by Drake and Lawson (2015), 80% of small gardens depend upon government for financial support, which accords tremendous influence to local authorities over which forms and expressions of urban agriculture emerge, and which do not (Ernwein, 2014). Regardless of the level of direct financial support, restrictive planning policies and zoning provisions can act as barriers to urban agriculture initiatives (Roehr and Kunigk, 2009; LeJava and Goonan, 2012), even in the form of explicit restrictions on urban agriculture (e.g. Bryld, 2003). In some cases, even sympathetic municipal governments face an uphill battle, having limited institutional capacity for food and agriculture policy, previously the domain of higher levels of government (Pothukuchi and Kaufman, 1999).

Sources of Encouragement

The reasons for concern noted above are indeed formidable, and would require reckoning to allow for expansion of urban agriculture to the level of 'game changer'. There are nonetheless several observable outcomes of current initiatives that offer reasons to believe such an expansion is plausible.

To begin, as noted earlier, a large number of empirical studies identify the direct health and nutritional benefits of urban gardening, notably, among children (e.g. Guitart et al., 2014). But beyond personal health, several studies also suggest that participation in producing food is an entry point for other forms of personal reflexivity (e.g. Veen et al., 2014). Beatley and Newman (2013) note the important role that direct contact with nature in all of its manifestations can play in human well-being, thus encouraging greater integration of 'nature-scapes' like gardens into cities. Such experiences, moreover, create avenues toward greater ecological reflexivity, even when initial motivations to participate have little to do with ecological concern. Experiencing empowerment over one's relationship to food, in its turn, can

also open reflexive space for consideration of other pressing social equity concerns. As observed by White (2011, p. 414), for example, food 'becomes a point of entry to discuss how African Americans might gain control over other aspects of their lives, including, for example, access to affordable housing, clean water and decent public education.'

Collective engagement in food production and processing also creates opportunities for cultural vitalization, and cross-cultural interchange. Whereas social mores prohibit expressions of cross-cultural curiosity and exchange on topics such as religion, family, and politics, food represents a discursive safe space for engagement across cultural divides, and these 'food bridges' are greatly enhanced when such engagements extend to participation in production and processing. Both Gray et al. (2014) and Minkoff-Zern (2014) illuminate how urban gardens bring forth cultural and embodied knowledge that provides immigrant communities connections to their own cultural dietary and agricultural heritage, and connections with neighbours too. Similarly, Taylor and Lovell (2014) note how participation in home gardening among immigrants becomes a means of continuing cultural practices and traditional agroecological knowledge, which in turn offers local food systems unique, culture-specific assemblages of food plants, through the common practice of gifting among home gardeners (which also has tremendous benefits for agro-biodiversity).

Each of these previous two elements describes personal and social benefits of urban agriculture that suggest positive contributions to cities, and which may provide sources of support for their continuation. Other studies, however, suggest a more explicit political potential for urban agriculture to disrupt conventional agri-food systems, despite – or perhaps because of – their sub-political character. Numerous urban agriculture activities, in other words, are instituting changes with notable ramifications for agri-food politics, often in a manner that escapes the purview of those elites that benefit from the current agri-food system. While much attention has been drawn to the support for local foods among the middle classes, Galt et al. (2014) note that alternative food practices often emerge in precisely those marginalized and ghettoized communities that have been abandoned by the state (see also Alkon and Agyeman, 2011). Advocates in New York City, for example, introduced a significant shift in local food retailing with the successful passage of a seemingly minor municipal policy change that enabled the beneficiaries of the federal Supplemental Nutrition Assistance Program (SNAP) (a form of low-income assistance for food purchasing) to use their allowances at farmer's markets (Cohen and Ilieva, 2015). As a result, 132 of New York City's 141 farmer's markets now accept SNAP benefits; annual SNAP purchases at farmer's markets increased from US$26 000 in 2006 to US$1 113 893 in 2013 (NYC Food Policy Center, cited in Cohen and Ilieva, 2015); and more than half of the farmer's markets are now located in low-income neighbourhoods (Baronberg and Aycock, cited in Cohen and Ilieva, 2015). McClintock (2014), on the other hand, suggests urban agriculture expresses the potential to inject a moral economy of exchange into local marketplaces, in reference to Oakland's City Slicker Farms' 'pay what you can' pricing mechanisms and similar attempts by urban agriculture food justice advocates to offer affordable local foods. Such initiatives are what Gibson-Graham would call forms of 'new economic becomings – sites where ethical decisions can be made, power can be negotiated, and transformations forged' (cited in Galt et al., 2014, p. 143).

Similarly, Larder et al. (2014) comment upon the contributions to subversive politics that all assertions of food sovereignty represent, even the activities of backyard

gardeners. The grass-roots origin of numerous local organized initiatives is also noteworthy: in a survey of U.S. and Canadian community gardens, Drake and Lawson (2015) found that 81% of the community gardens created in the past five years were initiated 'from the bottom up'.

The fourth and final factor that I consider to offer an important opening for transformational change pertains to the socioecological constitution of agriculture itself. As noted by Galt et al. (2014, p. 136), 'with a bit of land, water, sun, and seed, agriculture/gardening is open to everyone', and the diversity of production systems characterizing urban agriculture look very different from industrial monocultures, expressing the realization of alternative modes of production. While differences in access should not be glossed over, agriculture represents one of a very small handful of political-economic domains that defies complete co-optation under capitalism. After all, it relies on biological and ecological processes that have occurred for millions of years, and have been actively domesticated by humans for 10 000 years, processes which capital has not been able to fully co-opt. As (Classens, 2015, p. 235) notes, despite concerted efforts through technological industrialization, within agriculture 'capital(ism) is continually stymied by nature', involving as it does living organisms that require particular periods of growing time, and are perishable. Ultimately, complete control over the means of production is impossible, rendering the production of food in backyards, on rooftops, and avenue medians revolutionary and yet unstoppable affronts to conventional agribusiness.

Window Dressing or Game Changer?

The two most compelling arguments supporting a 'window dressing' future for urban agriculture relate to its agronomic productive potential, and its alleged compatibility with neoliberalism. Neither of these critiques, however, is sufficiently solid to provide a conclusive projection of urban agriculture's future potential. First, claims to the productive limits of urban agriculture tend to be based on quantitative assessments that can only provide the crudest of estimates of productive potential, and fail to acknowledge the role of intensive small-scale practices. The conditions supporting agriculture, and the technologies and agronomic strategies available to increase productivity, are so widely variable that any macro-scale assessment of production on the basis of 'average' productivity is of extremely limited utility. Some cities in northern climates are restricted to 100-day growing seasons, while those closer to the equator can produce 365 days per year, for example. Moreover, small-plot intensive growing practices that include companion planting, vertical growing beds, etc. can greatly increase spatial production intensity. The rapid expansion, furthermore, of advanced technologies enabling indoor production, including high efficiency lighting and hydroponics, offer yet another production breakthrough. To take one extreme example, industrial vertical gardens several stories high can produce an extraordinary volume of food on limited acreage.

As for accusations of neoliberal compliance, as noted by Classens (2015, p. 235), these critics on the whole obliterate the role of agency, and 'both human agency and non-human agency are swallowed up within the cavernous processes of neoliberalization'. McClintok (2013) and others have catalogued the means by which urban agriculture projects challenge the very commodification of food. Urban agriculture transforms urban spaces from their conventional role as a space of consumption to spaces of production (Cabannes and Raposo, 2013). To judge urban agriculture

solely on the basis of its neoliberal or radical tendencies is to diminish its multiple expressions, rationalities, and meanings.

More to the point, both arguments suffer from mono-consequentialism, a form of analysis wholly insufficient for complex systems. Instead, the analysis of multiple drivers and outcomes is called for (Agrawal and Chhatre, 2011). This article has identified formidable challenges to the viability of urban agriculture, including variable agronomic conditions that translate into inequities in access, exclusion of the poor, vulnerability to development pressures, and political weakness among advocacy organizations. On the other hand, there are also several reasons to believe that urban agriculture will at the very least persist, and possibly expand considerably in some regions, offering a vital vector for regional urban sustainability and food security, and agri-food system transition more broadly. These include: its ability to nurture personal and in particular ecological reflexivity; its tendency to build 'food bridges' across cultural groups, thereby potentially reducing ethnic tensions in rapidly growing cities; its numerous forms of disruption through sub-political avenues; and, finally, the very defiance of agriculture to succumb to capitalist rationalities. It is the interaction of these drivers and their evolution over time that will ultimately shape the pathways taken by urban agriculture. As a recent study of urban producers in North America showed, participation in urban agriculture can build community *and* continue to support individualistic consumerism, offer opportunities for reconnecting to nature *and* reinforce the core values of neoliberalism, and the long-term outcomes of such interactions remains to be seen (Mincyte and Dobernig, 2016).

Any expectations that urban agriculture is capable single-handedly of either feeding global urban populations, or revolutionizing the global industrial agribusiness sector will inevitably disappoint. Systemic, paradigmatic change will not arise abruptly as a result of urban agriculture alone. Rather, the system shifts taking place describe an uneven process, with multiple actors and processes involved, leading to emergent outcomes. Food production taking place in cities is not inherently transformative in and of itself. It is the new forms of engagement with the political ecology of the city offered by urban agriculture, and their coincidence with other disruptive forces both within and beyond agri-food systems that are worthy of note, and of further sociological attention.

References

Agrawal, A. and Chhatre, A. (2011) Against mono-consequentialism: multiple outcomes and their drivers in social–ecological systems, *Global Environmental Change*, 21(1), pp. 1–3.

Ahmed, A.U., Hill, R.V., Smith, L.C., Wiesmann, D.M. and Frankenberger, T. (2007) *The World's Most Deprived: Characteristics and Causes of Extreme Poverty and Hunger*, 2020 Discussion Paper 43. Washington, DC: International Food Policy Research Institute.

Algert, S.J., Baameur, A. and Renvall, M.J. (2014) Vegetable output and cost savings of community gardens in San Jose, California, *Journal of the Academy of Nutrition and Dietetics*, 114(7), pp. 1072–1076.

Alkon, A.H. and Agyeman, J. (2011) Introduction: the food movement as polyculture, in: A.H. Alkon and J. Agyeman (eds) *Cultivating Food Justice: Race, Class, and Sustainability*. Cambridge, MA: MIT Press, pp. 1–20.

Alkon, A.H. and Mares, T. (2012) Food sovereignty in US food movements: radical visions and neoliberal constraints, *Agriculture and Human Values*, 29(3), pp. 347–359.

Almås, R. and Campbell, H. (eds) (2012) *Rethinking Agricultural Policy Regimes: Food Security, Climate Change, and the Future Resilience of Global Agriculture*. Bingley: Emerald Group Publishing.

Archer, M. (1995) *Realist Social Theory: The Morphogenetic Approach*. Cambridge: Cambridge University Press.

Archer, M. (2010) Routine, reflexivity, and realism, *Sociological Theory*, 28(3), pp. 272–303.
Atkinson, A. (2013) Urban and peri-urban agriculture: part four: introduction, *City*, 17(3), pp. 361–364.
Beatley, T. and Newman, P. (2013) Biophilic cities are sustainable, resilient cities, *Sustainability*, 5(8), pp. 3328–3345.
Beckie, M.A. and Bogdan, E.A. (2010) Planting roots: urban agriculture for senior immigrants, *Journal of Agriculture, Food Systems and Community Development*, 1(2), pp. 77–89.
Bellows, A.C., Brown, K. and Smit, J. (2003) *Health Benefits of Urban Agriculture*. Venice, CA: Community Food Security Coalition.
Born, B. and Purcell, M. (2006) Avoiding the local trap: scale and food systems in planning research, *Journal of Planning Education and Research*, 26(2), pp. 195–207.
Bradley, K. and Galt, R.E. (2014) Practicing food justice at Dig Deep Farms & Produce, East Bay Area, California: self-determination as a guiding value and intersections with foodie logics, *Local Environment*, 19(2), pp. 172–186.
Bryld, E. (2003) Potentials, problems, and policy implications for urban agriculture in developing countries, *Agriculture and Human Values*, 20(1), pp. 79–86.
Cabannes, Y. and Raposo, I. (2013) Peri-urban agriculture, social inclusion of migrant population and Right to the City: Practices in Lisbon and London, *City*, 17(2), pp. 235–250.
Chen, T.B., Wong, J.W.C., Zhou, H.Y. and Wong, M.H. (1997) Assessment of trace metal distribution and contamination in surface soils of Hong Kong, *Environmental Pollution*, 96(1), pp. 61–68.
Classens, M. (2015) The nature of urban gardens: toward a political ecology of urban agriculture, *Agriculture and Human Values*, 32(2), pp. 229–239.
Coelho, D., Garcia, M., Salandini, M. and Bogus, C. (2013) Urban agriculture as strategy to promote food and nutrition security, *Annals of Nutrition and Metabolism*, 63(Suppl. 1), p. 1044.
Cohen, N. and Ilieva, R.T. (2015) Transitioning the food system: a strategic practice management approach for cities, *Environmental Innovation and Societal Transitions*, 17, pp. 199–217.
Corbould, C. (2013) *Feeding the Cities: Is Urban Agriculture the Future of Food Security?* Dalkeith: Future Directions International.
DeLind, L.B. (2002) Place, work, and civic agriculture: common fields for cultivation, *Agriculture and Human Values*, 19(3), pp. 217–224.
Denis, N., Fiocco, D. and Oppenheimer, J. (2015) *From Liability to Opportunity: How to Build Food Security and Nourish Growth*. Published online <http://www.mckinsey.com/industries/ chemicals/our-insights /from-liability-to-opportunity-how-to-build-food- security-and-nourish-growth>..
de Zeeuw, H. and Dreschel, P. (2015) *Cities and Agriculture: Developing Resilient Urban Food Systems*. Abingdon: Routledge.
Domene, E. and Saurí, D. (2007) Urbanization and class-produced natures: vegetable gardens in the Barcelona Metropolitan Region, *Geoforum*, 38(2), pp. 287–298.
Dowie, M. (2010) *Food among the Ruins: Should Detroit Be Converted into a Farming Mecca?* Published online: <http://www.alternet.org/story/146667/food_among_the_ruins%3A_should_detroit_be_converted _into_a_farming_mecca>.
Drake, L. and Lawson, L.J. (2015) Results of a US and Canada community garden survey: shared challenges in garden management amid diverse geographical and organizational contexts, *Agriculture and Human Values*, 32(2), pp. 241–254.
Duchemin, E., Wegmuller, F. and Legault, A.M. (2008) Urban agriculture: multi-dimensional tools for social development in poor neighbourhoods, *Field Actions Science Reports*, 1(1), pp. 43–52.
Elwood, S. (2004) Partnerships and participation: reconfiguring urban governance in different state contexts, *Urban Geography*, 25(8), pp. 755–770.
Ernwein, M. (2014) Framing urban gardening and agriculture: on space, scale and the public, *Geoforum*, 56, pp. 77–86.
FAO (Food and Agriculture Organization of the United Nations) (2015) *The State of Food Insecurity in the World 2015*. Published online <http://www.fao.org/3/a-i4646e/index.html>.
Firth, C., Maye, D. and Pearson, D. (2011) Developing 'community' in community gardens, *Local Environment*, 16(6), pp. 555–568.
Foucher, A., Salvador-Blanes, S., Evrard, O., Simonneau, A., Chapron, E., Courp, T., Cerdan, O., Lefèvre, I., Adriaensen, H., Lecompte, F. and Desmet, M. (2015) Increase in soil erosion after agricultural intensification: evidence from a lowland basin in France, *Anthropocene*, 7, pp. 30–41.
Fyfe, N.R. (2005) Making space for 'neo-communitarianism'? The third sector, state, and civil society in the UK, *Antipode*, 37(3), pp. 536–556.
Galt, R.E., Gray, L.C. and Hurley, P. (2014) Subversive and interstitial food spaces: transforming selves, societies, and society–environment relations through urban agriculture and foraging, *Local Environment*, 19(2), pp. 133–146.
Geels, F.W. and Schot, J. (2007) Typology of sociotechnical transition pathways, *Research Policy*, 36(3), pp.

399–417.
Gerster-Bentaya, M. (2015) Urban agriculture's contribution to urban food security and nutrition, in: H. de Zeeuw and P. Dreschel (2015) *Cities and Agriculture: Developing Resilient Urban Food Systems*. Abingdon: Routledge, pp. 139–161.
Ghose, R. (2005) The complexities of citizen participation through collaborative governance, *Space and Polity*, 9(1), pp. 61–75.
Ghose, R. and Pettygrove, M. (2014) Urban community gardens as spaces of citizenship, *Antipode*, 46(4), pp. 1092–1112.
Gittleman, M., Jordan, K. and Brelsford, E. (2012) Using citizen science to quantify community garden crop yields, *Cities and the Environment (CATE)*, 5(1), art. 4.
Gray, L., Guzman, P., Glowa, K.M. and Drevno, A.G. (2014) 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 Environment*, 19(2), pp. 187–203.
Grewal, S.S. and Grewal, P.S. (2012) Can cities become self-reliant in food?, *Cities*, 29(1), pp. 1–11.
Guitart, D.A., Pickering, C.M. and Byrne, J.A. (2014) Color me healthy: Food diversity in school community gardens in two rapidly urbanising Australian cities, *Health and Place*, 26, pp. 110–117.
Guthman, J. (2003) Fast food/organic food: reflexive tastes and the making of 'yuppie chow', *Social and Cultural Geography*, 4(1), pp. 45–58.
Guthman, J. (2007) The Polanyian way? Voluntary food labels as neoliberal governance, *Antipode*, 39(3), pp. 456–478.
Guthman, J. (2008) Neoliberalism and the making of food politics in California, *Geoforum*, 39(3), pp. 1171–1183.
Guthman, J. (2014) Doing justice to bodies? Reflections on food justice, race, and biology, *Antipode*, 46(5), pp. 1153–1171.
Haberman, D., Gillies, L., Canter, A., Rinner, V., Pancrazi, L. and Martellozzo, F. (2014) The potential of urban agriculture in Montréal: a quantitative assessment, *ISPRS International Journal of Geo-Information*, 3(3), pp. 1101–1117.
Hassanein, N. (2003) Practicing food democracy: a pragmatic politics of transformation, *Journal of Rural Studies*, 19(1), pp. 77–86.
Haxeltine, A., Whitmarsh, L., Bergman, N., Rotmans, J., Schilperoord, M. and Köhler, J. (2008) A conceptual framework for transition modeling, *International Journal of Innovation and Sustainable Development*, 3(1–2), pp. 93–114.
Henderson, G. (2004) 'Free' food, the local production of worth, and the circuit of de-commodification: a value theory of the surplus, *Environment and Planning D: Society and Space*, 22(4), pp. 485–512.
Holt-Giménez, E. and Shattuck, A. (2011) Food crises, food regimes and food movements: rumblings of reform or tides of transformation?, *Journal of Peasant Studies*, 38(1), pp. 109–144.
Holt-Giménez, E. and Wang, Y. (2011) Reform or transform? The pivotal role of food justice in the U.S. food movement, *Race/Ethnicity: Multidisciplinary Global Contexts*, 5(1), pp. 83–102.
Kearns, A. (1995) Active citizenship and local governance: political and geographical dimensions, *Political Geography*, 14(2), pp. 155–175.
Kirwan, J., Ilbery, B., Maye, D. and Carey, J. (2013) Grassroots social innovations and food localisation: an investigation of the Local Food programme in England, *Global Environmental Change*, 23(5), pp. 830–837.
Korth, M., Stewart, R., Langer, L., Madinga, N., Da Silva, N. R., Zaranyika, H., van Rooyen, C. and de Wet, T. (2014) What are the impacts of urban agriculture programs on food security in low and middle-income countries: a systematic review, *Environmental Evidence*, 2, art. 7.
Larder, N., Lyons, K. and Woolcock, G. (2014) Enacting food sovereignty: values and meanings in the act of domestic food production in urban Australia, *Local Environment*, 19(1), pp. 56–76.
Lawhon, M. and Murphy, J.T. (2012) Socio-technical regimes and sustainability transitions: Insights from political ecology, *Progress in Human Geography*, 36(3), pp. 354–378.
Lee-Smith, D. (2010) Cities feeding people: an update on urban agriculture in equatorial Africa, *Environment and Urbanization*, 22(2), pp. 483–499.
LeJava, J.P. and Goonan, M.J. (2012) Cultivating urban agriculture: addressing land use barriers to gardening and farming in cities, *Real Estate Law Journal*, 41(Fall), pp. 216–245.
Litt, J.S., Soobader, M.-J., Turbin, M.S., Hale, J.W., Buchenau, M. and Marshall, J.A. (2011) The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption, *American Journal of Public Health*, 101(8), pp. 1466–1473.
Lobell, D.B. and Burke, M. (eds) (2009) *Climate Change and Food Security: Adapting Agriculture to a Warmer World*. Dordrecht: Springer.
Lyson, H.C. (2014) Social structural location and vocabularies of participation: fostering a collective identity in urban agriculture activism, *Rural Sociology*, 79(3), pp. 310–335.

MacRae, R., Gallant, E., Patel, S., Michalak, M., Bunch, M. and Schaffner, S. (2010) Could Toronto provide 10% of its fresh vegetable requirements from within its own boundaries? Matching consumption requirements with growing spaces, *Journal of Agriculture, Food Systems, and Community Development*, 1(2), pp. 105–127.

Mapanda, F., Mangwayana, E.N., Nyamangara, J. and Giller, K.E. (2005) The effect of long-term irrigation using wastewater on heavy metal contents of soils under vegetables in Harare, Zimbabwe, *Agriculture, Ecosystems and Environment*, 107(2), pp. 151–165.

Martellozzo, F., Landry, J.S., Plouffe, D., Seufert, V., Rowhani, P. and Ramankutty, N. (2014) Urban agriculture: a global analysis of the space constraint to meet urban vegetable demand, *Environmental Research Letters*, 9(6), art. 064025.

Maxwell, D., Levin, C., Armar-Klemesu, M., Ruel, M., Morris, S. and Ahiadeke, C. (1998) *Urban Livelihoods and Food and Nutrition Security in Greater Accra, Ghana*. Washington, DC: International Food Policy Research Institute.

McClintok, N. (2013). Radical, reformist, and garden-variety neoliberal: coming to terms with urban agriculture's contradictions, *Local Environment*, 19(2), pp. 147–171.

Mincyte, D. and Dobernig, K. (2016) Urban farming in the North American metropolis: rethinking work and distance in alternative food networks, *Environment and Planning A*, 48(9), pp. 1767–1786.

Minkoff-Zern, L.-A. (2014) Knowing 'good food': immigrant knowledge and the racial politics of farmworker food insecurity, *Antipode*, 46(5), pp. 1190–1204.

Mougeot, L. (2000) *Urban Agriculture: Definition, Presence and Potentials and Risks*, Thematic Paper 1. Ottawa: International Development Research Centre.

Mougeot, L.J.A. (ed.) (2006) *Agropolis: The Social, Political, and Environmental Dimensions of Urban Agriculture*. Ottawa: International Development Research Centre.

Muldoon, M.F., Taylor, A.K., Richman, N. and Fisk, J. (2013) *Innovations in Local Food Enterprise: Fresh Ideas for Practitioners, Investors, and Policymakers for a Just and Profitable Food System*. Arlington, VA: Wallace Center at Winrock International.

Newman, K. and Lake, R.W. (2006) Democracy, bureaucracy and difference in US community development politics since 1968, *Progress in Human Geography*, 30(1), pp. 44–61.

Obatolu, V. and Speak, S. (2013) Urban agriculture as a stimulus to urban planning in developing cities for sustainable food and nutrition security, *Annals of Nutrition and Metabolism*, 63(1), p. 1020.

Orsini, F., Kahane, R., Nono-Womdim, R. and Gianquinto, G. (2013) Urban agriculture in the developing world: a review, *Agronomy for Sustainable Development*, 33(4), pp. 695–720.

Perez-Vazquez, A., Anderson, S. and Rogers, A.W. (2005) Assessing benefits from allotments as a component of urban agriculture in England, in: L.J.A. Mougeot (ed.) *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture*. London: Earthscan and the International Development Research Centre, pp. 239–266.

Perkins, H.A. (2010) Green spaces of self-interest within shared urban governance, *Geography Compass*, 4(3), pp. 255–268.

Porter, J.R., Xie, L., Challinor, A.J., Cochrane, K., Howden, S.M., Iqbal, M.M., Lobell, D.B. and Travasso, M.I. (2014) Food security and food production systems, in: Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. and White, L.L. (eds) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press, pp. 485–533.

Pothukuchi, K. and Kaufman, J.L. (1999) Placing the food system on the urban agenda: the role of municipal institutions in food systems planning, *Agriculture and Human Values*, 16(2), pp. 213–224.

Poulsen, M.N., Hulland, K.R., Gulas, C.A., Pham, H., Dalglish, S.L., Wilkinson, R.K. and Winch, P.J. (2014) Growing an urban oasis: a qualitative study of the perceived benefits of community gardening in Baltimore, Maryland, *Culture, Agriculture, Food and Environment*, 36(2), pp. 69–82.

Pudup, M.B. (2008) It takes a garden: cultivating citizen-subjects in organized garden projects, *Geoforum*, 39(3), pp. 1228–1240.

Roberts, D.J. and Mahtani, M. (2010) Neoliberalizing race, racing neoliberalism: placing 'race' in neoliberal discourses, *Antipode*, 42(2), pp. 248–257.

Roehr, D. and Kunigk, I. (2009) Metro Vancouver: designing for urban food production, *Berkeley Planning Journal*, 22(1), pp. 61–70.

Rosol, M. (2012) Community volunteering as neoliberal strategy? Green space production in Berlin, *Antipode*, 44(1), pp. 239–257.

Satterthwaite, D., McGranahan, G. and Tacoli, C. (2010) Urbanization and its implications for food and farming, *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 365(1554), pp. 2809–2820.

Seyfang, G. (2006) Ecological citizenship and sustainable consumption: examining local organic food networks, *Journal of Rural Studies*, 22(4), pp. 383–395.
Slocum, R. (2006) Anti-racist practice and the work of community food organizations, *Antipode*, 38(2), pp. 327–349.
Slocum, R. (2011) Race in the study of food, *Progress in Human Geography*, 35(3), pp. 303–327.
Smit, J., Nasr, J. and Ratta, A. (2001) *Urban Agriculture: Food, Jobs and Sustainable Cities*. New York: United Nations Development Programme.
Staeheli, L.A. and Mitchell, D. (2008) *The People's Property? Power, Politics, and the Public*. London: Routledge.
Staeheli, L.A., Mitchell, D. and Gibson, K. (2002) Conflicting rights to the city in New York's community gardens, *GeoJournal*, 58(2–3), pp. 197–205.
Tanentzap, A.J., Lamb, A., Walker, S. and Farmer, A. (2015) Resolving conflicts between agriculture and the natural environment, *PLoS Biol*, 13(9), art. e1002242.
Taylor, J.R. and Lovell, S.T. (2014) Urban home food gardens in the Global North: research traditions and future directions, *Agriculture and Human Values*, 31(2), pp. 285–305.
Tolossa, D. (2010) Some realities of the urban poor and their food security situations: a case study of Berta Gibi and Gemechu Safar in the city of Addis Ababa, Ethiopia, *Environment and Urbanization*, 22(1), pp. 179–198.
UN (United Nations) (2009) *High Level Task Force on the Global Food Crisis*. Published online <http://un-foodsecurity.org/node/135>.
Veen, E.J., Derkzen, P. and Visser, A.J. (2014) Shopping versus growing: food acquisition habits of Dutch urban gardeners, *Food and Foodways*, 22(4), pp. 268–299.
Viljoen, A. and Wiskerke, J.S.C. (eds) (2012) *Sustainable Food Planning: Evolving Theory and Practice*. Wageningen: Wageningen Academic Publishers.
Warshawsky, D.N. (2010) New power relations served here: the growth of food banking in Chicago, *Geoforum*, 41(5), pp. 763–775.
Warshawsky, D.N. (2011) Food Bank Johannesburg, state, and civil society organizations in post-apartheid Johannesburg, *Journal of Southern African Studies*, 37(4), pp. 809–829.
Warshawsky, D.N. (2014) Civil society and urban food insecurity: analyzing the roles of local food organizations in Johannesburg, *Urban Geography*, 35(1), pp. 109–132.
Wei, B. and Yang, L. (2010) A review of heavy metal contaminations in urban soils, urban road dusts and agricultural soils from China, *Microchemical Journal*, 94(2), pp. 99–107.
Weis, A.J. (2007) *The Global Food Economy: The Battle for the Future of Farming*. London: Zed Books.
Welsh, J. and MacRae, R. (1998) Food citizenship and community food security: lessons from Toronto, Canada, *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 19(4), pp. 237–255.
White, M.M. (2011) Sisters of the soil: urban gardening as resistance in Detroit, *Race/Ethnicity: Multidisciplinary Global Contexts*, 5(1), pp. 13–28.
WHO (World Health Organization) (2015) *Obesity and Overweight*, Fact Sheet No. 311. Published online <http://www.who.int/mediacentre/factsheets/fs311/en/>.
Zick, C.D., Smith, K.R., Kowaleski-Jones, L., Uno, C. and Merrill, B.J. (2013) Harvesting more than vegetables: the potential weight control benefits of community gardening, *American Journal of Public Health*, 103(6), pp. 1110–1115.
Zoellner, J., Zanko, A., Price, B., Bonner, J. and Hill, J.L. (2012) Exploring community gardens in a health disparate population: findings from a mixed methods pilot study, *Progress in Community Health Partnerships: Research, Education, and Action*, 6(2), pp. 153–165.