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Research paper

Socio-spatial differentiation in the Sustainable City: A mixed-methods assessment of residential gardens in metropolitan Portland, Oregon, USA

Nathan McClintock*, Dillon Mahmoudi, Michael Simpson[1], Jacinto Pereira Santos[2]

Toulan School of Urban Studies & Planning, Portland State University, PO Box 751, Portland, OR 97207, USA

HIGHLIGHTS

- Home gardens are clustered in gentrifying areas of the city's inner core.
- Low-income respondents meet more of their produce needs from their gardens.
- Highly educated respondents are more likely to garden for environmental reasons.
- Planners should frame urban agriculture efforts considering diverse motivations.

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ABSTRACT

As cities take center stage in developing and brokering strategies for sustainability, examining the uneven distribution of green infrastructure is crucial. Urban agriculture (UA) has gained a prominent role in urban greening and food system diversification strategies alike. Despite that it is the preeminent form of food production in North American cities, residential gardening has received little scholarly attention. Moreover, research on the intra-urban variability of home gardens is sparse. In this paper, we use a mixed-methods approach to assess the scale and scope of residential gardens in Portland, Oregon, a metropolitan region renowned for its innovations in sustainability. Using a combination of mapping, spatial regression, and a mail survey, we compare residential UA and the characteristics and motivations of gardeners in two socioeconomically differentiated areas of Portland and one of its major suburbs. Results demonstrate that engagement in UA is differentiated along both spatial and socioeconomic lines, with more educated respondents engaging for environmental reasons and more lowincome respondents relying on their gardens for food security. We contextualize our findings within broader urban processes, e.g. reinvestment in the urban core and displacement of poverty to the periphery. For policymakers, our results suggest the need for sustainability messaging that is sensitive to a variety of motivations and that resonates with a diverse population. For a city to reach a broader population, it may need to reframe its sustainability goals in new ways, while attending to the structural constraints to food access that cannot be resolved through local food production alone.

1. Introduction

How to feed an increasingly urbanized world in an ecologically sustainable – and socially equitable – manner is a critical question that policymakers have grappled with over the past few decades. As a complementary, decentralized node of food production and distribution, urban agriculture (UA) has gained a prominent role in municipal efforts to diversify urban food systems while greening urban landscapes in North America (Hodgson, Caton Campbell, & Bailkey, 2011; Jansson, 2013). Defined here as the production of food crops and livestock within urbanized areas, UA takes a variety of forms, including: allotment or community gardens; commercial market gardens and urban farms; organizational and institutional gardens run by non-governmental organizations, churches, schools, and community groups; and residential or home gardens. While few claim that UA can meet all

* Corresponding author. Tel.: +1 503 725 4064; fax: +1 503 725 8770.
E-mail address: n.mcclintock@pdx.edu (N. McClintock).
[1] Current address: Department of Geography, University of British Columbia, 1984 West Mall, Vancouver, BC, Canada V6 T 1Z2.
[2] Permanent address: Colegiado de Agronomia, Universidade Federal do Tocantins, Cx. Postal 66, CEP 77402-970 Gurupi, TO, Brazil.

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of the food needs of a city (Grewal & Grewal, 2012; MacRae et al., 2010; McClintock, Cooper, & Khandeshi, 2013), many have argued that UA can nevertheless enhance the resilience of urban food systems vis a vis environmental or economic variability and shocks (Barthel & Isendahl, 2013; Krasny & Tidball, 2009; Okvat & Zautra, 2011).

Urban agriculture serves multiple functions. Studies highlight how gardens provide a suite of ecosystems services, including improving stormwater infiltration, reducing urban heat island effect, sequestering soil carbon, enhancing biodiversity, and reducing greenhouse gases by reducing the distance that food travels between production and consumption (Guitart, Byrne, & Pickering, 2013; Lin, Philpott, & Jha, 2015; McPhearson, Hamstead, & Kremer, 2014; Moglia, 2014; Pearson, Pearson, & Pearson, 2010). The social benefits of UA are also varied, and include: improving nutritional and mental health (Alaimo, Packnett, Miles, & Kruger, 2008; Armstrong, 2000); fostering community interactions and cohesion (Ghose & Pettygrove, 2014; Saldivar-Tanaka & Krasny, 2004); serving as a rallying ground for food justice and food sovereignty activism in low-income communities (Bradley & Galt, 2014; Ramírez, 2015; Sbicca, 2012; White, 2011); and mitigating urban food insecurity (Bradley & Galt, 2014; Gray, Guzman, Glowa, & Drevno, 2014). Finally, scholars and practitioners have also emphasized UA's economic benefits, from offsetting household food costs (Gray et al., 2014; Kortright & Wakefield, 2011) to creating jobs (Smit et al., 1996; van Veenhuizen, 2006) and increasing land values (Voicu & Been, 2008). With these benefits in mind, urban sustainability planners have embraced UA and dozens of cities have made changes to policies and land use controls in hopes of encouraging urban food production (Hodgson et al., 2011; Thibert, 2012).

While there has been a significant expansion of community gardens and commercial agriculture in cities over the past decade (Drake & Lawson, 2014; Rogus & Dimitri, 2015), most urban food production continues to take place at the residential scale. But as Taylor and Lovell (2014) point out, scholarship on residential food production in the Global North is sparse, and the scale of home gardening rarely quantified. Estimates vary considerably within and across countries of the Global North. One study estimated that about 25% urban and suburban households – about 30 million overall – in the US produce some of their own food (National Gardening Association, 2014), while a study in Ohio reported 39 to 41% of urban and suburban residents had a household food garden (Schupp & Sharp, 2012). In a study in Denver, 48% of respondents reported gardening at home and 8% in community gardens (Comstock et al., 2010). In a Canadian study of domestic food production, 40% of Toronto residents and 44% of Vancouver residents reported that someone in their household grew food (City Farmer, 2002), while a 2013 survey conducted by the City of Montreal reported 42% of people produced food at home (Ville de Montréal, 2013). Productivity varies widely. CoDyre, Fraser, and Landman (2015), for example, reported that home gardeners in Ontario grew anywhere between 0.08 and 5.18 kg per m^2. Similarly, in a review of data from seven North American cities, McClintock (2014) reported garden yields ranging from 0.56 to 60.09 metric tons per hectare. Even less clear is *intra*-urban variability of urban food production, that is, the ways that the presence and function of UA differ within a city or neighborhood. A number of studies have explored such socio-spatial variation in relation to trees (Martin, Warren, & Kinzig, 2004), lawns (Giner, Polsky, Pontius, & Runfola, 2013), biodiversity (Kinzig, Warren, Martin, Hope, & Katti, 2005), and community and organizational gardens (Guitart et al., 2013; Kremer & DeLiberty, 2011; Pourias, Aubry, & Duchemin, 2015), but scholars have only recently begun to examine such variation in relation to residential UA (Hunter & Brown, 2012; Smith, Greene, & Silbernagel, 2013; Taylor & Lovell, 2012; Taylor & Lovell, 2015).

Addressing the socio-spatial differentiation of UA is vital, given that the benefits of urban sustainability are rarely evenly distributed: for example, urban green space and tree canopy often correlate with socioeconomic stratification (Pham, Apparicio, Séguin, Landry, & Gagnon, 2012); low-income populations of color tend to have less access to parks and open space (Wolch, Byrne, & Newell, 2014); and more affluent white populations are more likely to live in neighborhoods with mature trees or extensive canopy (Heynen, Perkins, & Roy, 2006). While some have attributed these disparities to the historical legacies of previous eras of development (Boone, Cadenasso, Grove, Schwarz, & Buckley, 2010), critical geographers have shed light on how such stratification is ongoing. Despite dominant sustainability narratives suggesting that green infrastructure benefits everyone, some sustainability efforts have instead alienated historically marginalized groups who feel that the new infrastructure is marketed toward eco-conscious affluent newcomers, rather than meeting the immediate needs of longtime residents (Checker, 2011; Goodling, Green, & McClintock, 2015; Lubitow & Miller, 2013; Pearsall, 2012).

Arising in response to these disparities in distribution and access to green infrastructure, and to the relative absence of explicit equity concerns in sustainability policy (Pearsall & Pierce, 2010), a "just sustainability" paradigm integrates the environmental focus of the dominant sustainability framework with the justice concerns of marginalized populations (Agyeman, 2013). Asking "Sustainable for whom?" researchers and planners embracing a just sustainability framework are concerned not only with equalizing access to the fruits of sustainability innovations, but also with how these same innovations may actually exacerbate existing disparities.

Food access fits squarely within this framework. Researchers have exposed disparities within sustainable food systems efforts in North America, revealing that alternative food sources such as farmers markets and UA are often dominated by – and disproportionately benefit – a predominantly white, educated, and affluent population, often by invoking environmental-, ecological-, and sustainability-oriented discourse (Alkon & Agyeman, 2011). Even in so-called "food deserts" (low-income areas with limited access to grocery stores or supermarkets), gardening efforts intended to improve access to healthy food tend to be dominated by young, educated, and usually white outsiders, alienating people of color by reproducing dominant hierarchies of power (Lyson, 2014; Ramírez, 2015; Slocum, 2007). Such disparities are further exacerbated as UA organizations led by this same demographic disproportionately receive grant funding and other support from public and private sources (Cohen & Reynolds, 2014; Reynolds, 2015).

With this concern for just sustainability in mind, we turn to our study of residential gardens in metropolitan Portland, a paradigmatic "Sustainable City" heralded for its innovative sustainability efforts. The goal of our study is twofold: first, to determine the extent to which residential UA – and its potential contribution to urban food system resilience – occurs in a spatially and socioeconomically uneven manner; and second, to determine whether the motivations of gardeners differ along these same socio-spatial lines and, if so, how. We begin by describing our study site of metropolitan Portland, Oregon, then present our mixed-methods approach to assessing both the scale and scope of residential food production, comparing production in two socioeconomically differentiated areas of Portland – Inner and East Portland – and in one of the city's major suburbs, Vancouver, Washington. Through mapping of gardens, spatial regression to determine explanatory factors, and a mail survey to determine the characteristics and motivations of gardeners, we demonstrate how engagement in UA is differentiated along spatial and socioeconomic lines. We conclude with a discussion of these results, limitations and strengths of the study, and implications for urban food systems planning.