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Cities

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## Can cities become self-reliant in food?

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### ARTICLE INFO

#### Article history:

Received 30 November 2010  
 Received in revised form 29 April 2011  
 Accepted 12 June 2011  
 Available online 20 July 2011

#### Keywords:

Globalization  
 Local self-reliance  
 Urban agriculture  
 Urban food production  
 Post-industrial cities

### ABSTRACT

Modern cities almost exclusively rely on the import of resources to meet their daily basic needs. Food and other essential materials and goods are transported from long-distances, often across continents, which results in the emission of harmful greenhouse gasses. As more people now live in cities than rural areas and all future population growth is expected to occur in cities, the potential for local self-reliance in food for a typical post-industrial North American city was determined. Given current policies and bylaws and available area, crop yields, and human intake, three distinct scenarios were developed to determine the potential level of food self-reliance for the City of Cleveland, which has been plagued with home foreclosures and resulting vacant land, lack of access to healthy food, hunger, and obesity particularly in disadvantaged neighborhoods. Scenario I, which utilizes 80% of every vacant lot, can generate between 22% and 48% of Cleveland's demand for fresh produce (vegetables and fruits) depending on the vegetable production practice used (conventional gardening, intensive gardening, or hydroponics), 25% of both poultry and shell eggs, and 100% of honey. Scenario II, which uses 80% of every vacant lot and 9% of every occupied residential lot, can generate between 31% and 68% of the needed fresh produce, 94% of both poultry and shell eggs, and 100% of honey. Finally, scenario III, which adds 62% of every industrial and commercial rooftop in addition to the land area used in scenario II, can meet between 46% and 100% of Cleveland's fresh produce need, and 94% of poultry and shell eggs and 100% of honey. The three scenarios can attain overall levels of self-reliance between 4.2% and 17.7% by weight and 1.8% and 7.3% by expenditure in total food and beverage consumption, compared to the current level of 0.1% self-reliance in total food and beverage by expenditure. The analysis also reveals that the enhanced food self-reliance would result in \$29 M to \$115 M being retained in Cleveland annually depending upon the scenario employed. This study provides support to the hypothesis that significant levels of local self-reliance in food, the most basic need, is possible in post-industrial North American cities. It is concluded that while high levels of local self-reliance would require an active role of city governments and planners, public commitment, financial investment, and labor, the benefits to human health, the local and global environment, and the local economy and community may outweigh the cost.

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### Introduction

Globalization has been one of the most enchanting experiences of human civilization. It has facilitated the exchange of information and ideas, advancing technology and progress to heights never even envisioned by generations past (Friedman, 2005). Globalization has also contributed to the spread of cultures and tolerance and led to the rise of international organizations committed to peace and justice (Appadurai, 1996; Pieterse, 2009; Tomlinson, 1999). Yet, globalization has inflicted externalities on both local communities and the global environment. First, globalization undermines local economic resilience, creating an unnecessary

and unhealthy dependence on foreign goods which communities could produce at home (Shuman, 1998). Likewise, globalization undermines the autonomy of local communities (Shuman, 1998). As multinational corporations increase their economic and political influence, communities lose control over their most basic necessities, such as food and energy. This local power leakage allows the well-being of residents to be placed in the hands of corporate CEOs who may be thousands of miles away and who frequently have no understanding of or respect for the local economic, social, and cultural fabric of the community. Globalization also has a devastating effect on the environment (Morris, 1987; Roseland, 2005; Shuman, 1998). Corporations have no economic incentive to preserve the environment and the culture of global goods transportation results in tremendous greenhouse gas emissions. Another harm of globalization is the promotion of a culture of unsustainable consumerism and excessive consumption (Belk, 1996; Morris, 1987; Roseland, 2005; Shuman, 1998). As a result of globalization, the consumer

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has been separated from the producer and thereby no longer witnesses the detrimental effects of consumerism: depletion of finite resources, pollution of natural environments, and accumulation of waste. Without a firsthand reminder of these harms, this trend of excessive consumption will likely continue unabated, which can have dire consequences for sustainability and the environment. Therefore, globalization negatively affects local economic resilience, autonomy, the environment, and sustainability.

Given the serious detriments associated with globalization, a comprehensive paradigm shift is needed. Local self-reliance (Morris, 1987; Shuman, 1998) refers to the principle that localities should be able to obtain at least their basic necessities, if not more of their goods, from within their own physical footprints. Local self-reliance encourages communities to use their limited resources in the most efficient and sustainable manner, and grants localities both autonomy and economic resilience, counteracting the major negative externalities of globalization. Local self-reliance can be applied at different scales, including household, neighborhood, city, region, and even country. In a global age, it is unrealistic and even inadvisable for a locality to become completely isolated from the rest of the world. Therefore, local self-reliance fully encourages the global exchange of ideas and technology, the promotion of international organizations and justice, and the spread of tolerance and peace. However, local self-reliance entails that localities be as self-reliant as possible with regards to basic necessities like food, energy, water, and materials.

Self-reliance in terms of daily food needs requires the production of food within urbanized areas. Food production in the cities can take many forms, including home gardens, community gardens, market gardens, school gardens, rooftop gardens, windowsill gardens, aquaculture, and urban farms, among others. The choice of production method will vary due to the circumstances of each community and its preferences, but the benefits can be generalized: Urban agriculture has the potential to increase access to healthy and nutritious food (Blaine, Grewal, Dawes, & Snider, 2010; Duchemin, Wegmuller, & Legault, 2008; Minnich, 1983), reduce human impact on the environment (Doron, 2005; Flores, 2006; Halweil, 2005; Howard, 2006), strengthen local economies (Masi, 2008; Moustier, 2006), and promote a sense of community (Flores, 2006; Malakoff, 1995; Patel, 1991). Blaine et al. (2010) found that engagement in community gardening results in dietary changes leading to increased vegetable intake. Minnich (1983) discovered that under average growing conditions in a 130-day growing season, a 10 by 10 m plot can provide a household's yearly vegetable needs, including much of the household's nutritional requirements for vitamin's A, C, and B complex and iron. Given the escalating hunger and obesity in the USA, increasing accessibility and supply of nutritious food is extremely important. Gardening can also provide physical exercise, from cutting stems to turning compost piles (Brown & Jameton, 2000). Finally, gardening can be a way to relax and release stress, thus improving the psychological health of urban residents (Kaplan, 1973; Malakoff, 1995).

Producing food within the city also improves the environment. It is estimated that food in the United States travels an average of 1500 miles from the farm to our plates (Halweil, 2005). Doron (2005) calculates that if food in the United Kingdom was produced and consumed locally, the level of carbon dioxide emissions would be reduced by 22% – twice the amount the UK has committed to under the Kyoto Protocol. Increased gardening can also increase rates of carbon sequestration, further mitigating the human impact on climate change. Additionally, urban agriculture can reduce the problems associated with stormwater runoff, since rainwater can be redirected to gardens.

Local self-reliance also has many economic benefits. In addition to reducing local economic leakage, the increased green space can

also reduce the urban heat island effect, resulting in lower air conditioning costs (United States Environmental Protection Agency, 2008). It can also create jobs throughout the food sector, including production, processing, and marketing. Additionally, kitchen waste can be reused as fertilizer, resulting in less waste collection costs for the city and reduced expenditures on synthetic fertilizers. Likewise, redirection of stormwater to food production would reduce the cost of stormwater management. Finally, property values would increase as vacant lots are put to attractive yet productive usage and there is an overall reduction in crime in the city (Malakoff, 1995).

Urban gardening, especially collective gardening, can also promote a sense of community. Patel (1991) found that “gardening cut across social, economic, and racial barriers and brought together people of all ages and backgrounds.” Further, Malakoff (1995) notes that neighborhoods with garden projects in Philadelphia and San Francisco observed “marked reductions” in burglaries, thefts, and illicit drug dealing. Finally, local self-reliance promotes a feeling of community empowerment. “Those who control our food control our lives, and when we take that control back into our own hands, we empower ourselves toward autonomy, self-reliance, and true freedom” (Flores, 2006).

Despite the importance of urban agriculture in the ecology of the cities, food systems have remained excluded from the planning discipline until recently. Pothukuchi and Kaufman (1999) were among the first to recognize this omission and noted that the urban food system was less visible than other systems such as transportation, housing, employment, or even the environment. They argued that despite its low visibility, urban food system contributes significantly to community health and wellness and metropolitan economies, connects to other urban systems such as housing, transportation, land use, and economic development, and impacts the urban environment. Pothukuchi and Kaufman (2000) conducted a survey of 22 US city planning agencies that provided further evidence for the limited attention given to the food system. They discussed the practical and conceptual reasons why planners should devote more attention to the food system and described several specific ways planners can strengthen the urban food system. Their efforts provoked the American Planning Association to produce its seminal *Policy Guide on Community and Regional Food Planning* in 2007 (APA, 2007). While the omission remains a matter of historical interest, food planning has now emerged as a legitimate part of planning agenda in the developed and developing countries (Morgan, 2009; Morgan & Sonnino, 2010).

Data from urban areas around the world indicate that a significant portion of a locality's vegetable and animal intake can be met locally. In Sarajevo, 2 years after the blockade began in 1992, self-reliance in urban food production was estimated to have grown from 10% to over 40% for vegetables and small livestock (Sommers, 1994). Lee-Smith (2006) found that urban agriculture provided “as much as 90% of leafy vegetables and 60% of milk sold in Dar es Salaam, Tanzania” as well as 76% of vegetables in Shanghai and 85% of vegetables in Beijing. Even in the United States, households produced enough to meet 40% of the nation's fresh vegetable demand during the ‘victory garden’ movement of World War II (Brown & Jameton, 2000).

Can such high levels of self-reliance be achieved in contemporary North American cities? We conducted a case-study examining the potential of local self-reliance in a typical post-industrial US city, Cleveland, Ohio, in order to serve as a model for the application of the local self-reliance principle. Cleveland was once a major manufacturing center, but with the decline of heavy manufacturing, Cleveland's economy has become more diversified and the service sector has grown considerably. More recently, Cleveland has been facing home foreclosures and resulting vacant lots (Dewar, 2008) and has several ‘food deserts,’ where fast food restaurants

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