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Saving the Land that Sustains Us

On the cover: This Google Earth image tells a tale of two towns. It depicts the towns of Niagara-on-the Lake on the Canadian side of the Niagara River (left) and Porter, New York (right) from an elevation of about 10 miles (16 km). These two communities share the same soil resources and the same climate. What would explain why the Canadian side is replete with vineyards and produce farms, while the American side is largely abandoned farmland?

(Image from Google Earth Pro, retrieved Oct. 30, 2013; coordinates 43°13'11.81" N 79°03'15.60" W)

Guest Editorial

Columns

Land for Food Papers

(Continued)

The Food Systems Development Project of the Center for Transformative Action (an affiliate of Cornell University), publisher of JAFSCD, is grateful for the support of our sponsors.

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Open Call Papers

Book Review

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GUEST EDITORIAL

JULIA FREEDGOOD, AMERICAN FARMLAND TRUST

Land: The new gold

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In his thoughtful column for this issue, "Running Out of Land for Food," **John Ikerd** says, "the challenge of preserving enough farmland for food production will be a defining challenge for the 21st century." I couldn't agree more. Thus it is both timely and important that JAFSCD is addressing this critical issue.

I was fortunate enough to get to meet Lester Brown, founder of the Worldwatch Institute, in 2012 when he gave a keynote address at an American Farmland Trust (AFT) board meeting. He said something then that has stuck with me since: "Food is the new oil and land is the new gold." As such we must step up efforts to protect the quality and quantity of these most essential and precious resources.

AFT works to save the land that sustains us by protecting farmland, promoting sound farming practices and keeping farmers on the land. Much of our current focus is to protect and conserve enough farmland to ensure food security today and for future generations. As for me, I have spent my career balancing these two interests — saving farmland on one hand and supporting sustainable food and farming systems on the other.

In February 2014, I will have been at AFT for 25 years. For nearly 10 years prior to AFT, I worked on several direct marketing and agricultural development projects, including a stint as the executive director of the Massachusetts Federation of Famers Markets. Over this period, I have seen many positive changes both to protect farmland and to promote a healthy and sustainable food system. But in the absence of a robust national movement to save the land that sustains us, the threats remain real, and in fact have become more

Julia Freedgood is assistant vice president for programs at American Farmland Trust and lead author of *Saving American Farmland: What Works*. She developed the methodology for the Cost of Community Services studies, which have now been conducted in more than 150 U.S. communities to assess the contribution of farmland to local budgets. Freedgood works closely with agricultural constituencies from farmers and ranchers to USDA field personnel, municipal, county and state officials, and planners, academics and land trusts to ensure that agricultural land is available and affordable for farming and ranching, natural resources are managed with sound conservation practices, farmers and ranchers are economically viable, and communities support a secure and resilient food supply. She holds an master's in Urban and Environmental Policy and Planning from Tufts University. She can be contacted at jfreedgood@farmland.org.

complex and challenging. Thus it was both encouraging and sobering to review the papers for this issue — to learn more about my Canadian neighbors and consider the U.S. situation in a broader global context.

In his column Dr. Ikerd also refers to Lester Brown and Worldwatch Institute — particularly their extensive research on rising global demand for food and energy in an age of eroding soils, declining aquifers, and global climate change. I agree that these are serious environmental constraints, especially in the context of saving land for food production. In an effort to protect farmland, we must address the quality of the resource as well as the quantity, and manage that resource to improve soil health, preserve water resources, and address climate change. In addition to addressing environmental issues, however, I would add urbanization and, at least in the U.S., an aging farming population as serious threats to the future of the natural and human resources needed to ensure future food production capacity.

According to the World Health Organization, for the first time in history the majority of the world's population lives in a city (WHO, n.d.). The United Nations (UN) predicts that by 2050, this will have risen to 69 percent of the world's population (UN Economic and Social Affairs Population Division, 2010). Farming can no longer be seen as a strictly rural enterprise. The intertwined dynamics of environmental constraints, population growth, and urbanization will continue to change the context of agricultural land use and food production in the 21st century. Two papers address this dynamic. In "Farm Adaptation at the Rural-Urban Interface," **Shoshanah Inwood and Jill Clark** discuss the resiliency of agriculture in urban counties, often due to policies and market-support programs that protect farmland from development. In "Farms or Freeways? Citizen Engagement and Municipal Governance in Edmonton's Food and Agriculture Strategy Development," **Mary Beckie, Lorelei Hanson,** and **Deborah Schrader** also address this issue, illuminating the conflict between citizens' demands for sustainable urban food systems and traditional land use planning.

Beyond urbanization, in the U.S. changing demographics are presenting new challenges the future of the land base that supports domestic food production. There is a gray tsunami of aging farmers and just a trickle of young people entering agriculture to take their place. As roughly a third of the farming population, farmers over the age of 65 represent the fastest growing sector of U.S. agriculture, while farmers under the age of 35 make up the fastest shrinking (U.S. Department of Agriculture [USDA] Economic Research Service [ERS], 2013). New farmers' inability both to find and afford appropriate farmland to purchase or rent is a major barrier to entry. **Kathy Ruhf's** thoughtful essay on "Access to Farmland: A Systems Change Perspective" addresses it broadly and is an important contribution to the literature.

When AFT was founded in 1980, we were the first national organization specifically dedicated to saving farmland for farming. At the time, a handful of state and local programs were pioneering the use of agricultural conservation easements. Back in those days, we functioned largely as an agricultural land trust and also engaged in federal conservation policy.

While AFT still holds easements on farmland, to effect more significant change not only in Washington but across the U.S., over the years we have shifted our emphasis to education, technical assistance, and research-based policy development at the federal, state, and local levels. Today 28 states and 91 local governments have funded easement acquisitions. Combined with about 70 land trusts that are seriously committed to farmland protection, more than 5 million acres (2 million hectares) of agricultural land can never be developed. Importantly, easement-protected land largely remains in agricultural production (Esseks & Schilling, 2013).

It is worth noting that of the 1,700 land trusts currently operating in the U.S., only 70 have acquired at least 25 easements or protected at least 5,000 acres (2,023 hectares) (Esseks & Schilling, 2013). Most focus

on other conservation purposes, such as protecting wetlands, watersheds, or wildlife habitat. While there is potential to develop these relationships, education and better understanding of each other's requirements and motivations are needed. Fortunately, there are good examples to follow. Of the small number of land trusts that actively are engaged in farmland protection, many provide services to help farmers — including beginning farmers — gain access to land. These include assistance with succession planning, land linking, leasing, and selling protected land to farmers and ranchers, as well as provisions to protect future affordability (Dempsey, 2012).

Finally, a handful of states and hundreds of communities have used planning, zoning, and smart growth to promote compact development and reduce conversion of farmland to the development of things like highways, houses and shopping malls. This also has paid off. Between 2002 and 2007, at the height of the building boom, annual conversion rates dropped 29 percent from the 1992 to 1997, the most intense period of sprawling development which led to unprecedented farmland conversion.[1]

Yet despite these achievements and the construction slow-down from the Great Recession, farmland remains at risk. Recent U.S. government data show permits for future home construction back up to pre-recession levels and housing completions up 21.6 percent in just the past year. Inevitably, much of this new construction is and will continue to take place on farmland, which is ideal for development because it is generally cleared, well drained, flat, and cheaper than suburban or urban land. But farmland also is at risk because most people are unaware of the consequences of its loss and unconcerned with food security.

Other countries are making significant investments in land to ensure future food supplies. As **Elizabeth Starr** points out in her paper, "Rethinking Investment Dynamics," the food-price crisis of 2008 spurred a global land grab in Africa, Asia, Latin America, and the former Soviet Union. While North America remains blessed with some of the world's most precious agricultural resources, policy-makers and the public would be wise to heed these trends, recognize the value of land for food, protect our agricultural resources, and prepare for a global population of nearly 10 billion people by 2050 (UN Department of Economic and Social Affairs Population Division, 2013).

Since 1982, the U.S. has developed more than 41 million acres (16.6 million hectares) of rural land — 1 out of 3 acres ever developed. Driven by superhighways, shopping malls, and suburban sprawl, development increased 57 percent while our population only grew 30 percent (U.S. Census Bureau, 2012; USDA, National Agricultural Statistics Service, 2007), consuming a land area as large as the states of Illinois and New Jersey combined (Dempsey, 2010). More than half of that land — 23 million acres (9.3 million hectares) — was devoted to agriculture, and equally concerning, much of this development took place on crop land and our best-quality soils, including about 14 million acres (5.7 million hectares) of prime farmland. Much of it also took place in urban-influenced areas, which support significant food production: 91 percent of the market value of fruits, 78 percent of vegetables, 67 percent of dairy, and 54 percent of poultry and eggs are produced in urban-influenced counties.[2]

According to ERS, the U.S. already needs another 13 million acres (5.3 million hectares) of fruit and vegetable production to meet recommended dietary requirements (Buzby, Wells, & Vocke, 2006). While most people may not eat their daily requirements, the gap is widening between supply and demand: U.S.

[1] American Farmland Trust's Farmland Information Center 2009 analysis based on 2007 National Resources Inventory data from the *Summary Report: 2007 National Resources Inventory,* by the U.S. Department of Agriculture's Natural Resources Conservation Service, Washington, D.C., and the Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. Retrieved from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1041379.pdf

[2] Based on an analysis by American Farmland Trust's Farmland Information Center using the market value of agricultural products from the 2007 Census of Agriculture and the USDA Economic Research Service's 2003 Urban Influence Codes.

fruit and vegetable imports effectively tripled between 1990–92 and 2004–06 (Huang & Huang, 2007), and the United States has become a net importer of fruits and vegetables for the first time in its history (Johnson, 2012).

This should be cause for concern but not for alarm. While we still must protect our most valuable farmland, it is possible to reclaim land for agriculture and support community-based food production. In their paper "Beyond Protection: Delineating the Economic and Food Production Potential of Underutilized, Small-parcel Farmland in Metropolitan Surrey, British Columbia," **Kent Mullinix and colleagues** find that by bringing underutilized land into small-scale, human-intensive, direct-market production, these lands could easily satisfy Surrey's seasonal consumption of regionally appropriate crop and animal products, while also creating new jobs and economic activity.

As a rule, land is worth more for development than for agriculture, so Ikerd's historical perspective on the limitations of the free market gives us more than food for thought: "The market economy will neither provide food for the hungry of current generations nor preserve enough farmland to provide food for generations of the future." While it is worth considering a return to the commons, Starr's "Rethinking Investment Dynamics" on global land grabbing points to the potentially "devastating consequences on the local communities that live off land not formally belonging to them."

Ultimately, research, education, and policy interventions are needed to help farmers and ranchers adapt to the environmental constraints of soil erosion, declining aquifers, and climate change — as well as to urbanization and the fragmentation of the agricultural landscape. These must be premised on the fundamental needs to maintain well managed agricultural land for food production, and to ensure that it remains available and affordable to the next generation. To achieve this, we must build a larger constituency — not only in North America, but around the world. This issue of JAFSCD is an important step in that direction.

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THE ECONOMIC PAMPHLETEER
JOHN IKERD

Running out of land for food

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The challenge of preserving enough farmland for food production will be a defining challenge for the 21st century. Lester Brown, icon of the Worldwatch Institute, identifies food scarcity as "the weak link" of modern society (Brown, 2012). He points to the growing global demand for food and fuel, eroding soils, declining aquifers, and global climate change as major challenges to the future of human civilization. All of these challenges could be met, but not without a fundamental transformation in current ways of thinking about both land and food. A market economy will neither provide food for the hungry of current generations nor preserve enough farmland to provide food for

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*Why did I name my column "**The Economic Pamphleteer**"? Pamphlets historically were short, thoughtfully written opinion pieces and were at the center of every revolution in western history. Current ways of economic thinking aren't working and aren't going to work in the future. Nowhere are the negative consequences more apparent than in foods, farms, and communities. I know where today's economists are coming from; I have been there. I spent the first half of my 30-year academic career as a very conventional free-market, bottom-line agricultural economist. I eventually became convinced that the economics I had been taught and was teaching wasn't good for farmers, wasn't good for rural communities, and didn't even produce food that was good for people. I have spent the 25 years since learning and teaching the principles of a new economics of sustainability. Hopefully my "pamphlets" will help spark a revolution in economic thinking.*

generations of the future. Any society that allows markets to determine how much and what kind of land is used for food is not sustainable. This could be ***the*** defining challenge of the 21st century.

In his classic book *The Great Transformation,* economist Karl Polanyi details the historical consequence of "commodifying" land and labor in futile efforts of capitalists to create a self-regulating, free-market global economy (Polanyi, 1944/1957). Prior to the "enclosure movement," land was held in common, rather than owned by individuals. Land was freely available to everyone to use to meet their basic needs of survival and sustenance. The process of enclosing, or privatizing, the commons began during the 16th century. However, "the years between 1760 and 1820 are the years of wholesale enclosure in which, in village after village, common rights are lost" (Thompson, 1991, p. 217). The industrial revolution and rise of capitalism occurred during this time.

Speculative farmland prices, relentless farmland consolidation, and global "land-grabbing" are all symptoms of a soulless global economy running out of land for food.

Land had to be privatized and commodified or priced before land use could be determined by market competition rather than community consensus. Only then could the global economy become self-correcting or self-regulating. Labor likewise had to be commodified. The commodification of land essentially forced the commodification of labor, as those without access to land for food were forced to sell their labor to employers in order to survive. However, it seemed that nothing short of the threat of starvation could force people who once had access to land to produce their own food to work for money to buy food. The English Poor Laws were nationalized and expanded in 1834 to cover the entire working class, not just the young, old, and disabled. Various other attempts were made to protect the working class from the social upheaval triggered by removal of land from the commons. Nothing seemed to work.

The right to enough land to grow one's own food was long considered to be a fundamental right under "natural law." In 1690, John Locke proclaimed that land could be ethically removed from the commons only if "...there is enough, and as good, left in common for others" (Locke, 1690, chap. 5, sect. 27). In comparing privatization of land to taking a drink from a flowing stream, he wrote, "And in the case of land and water, where there is enough of both" (Lockean Proviso, n.d., para. 2). Eventually, there was not enough good land left in the commons for those who needed it most.

By 1795, Thomas Paine concluded, "the landed monopoly…has produced the greatest evil. It has dispossessed more than half the inhabitants of every nation of their natural inheritance… and has thereby created a species of poverty and wretchedness that did not exist before" (Paine, 1795, para. 20). Paine was not advocating a return to hunting and gathering. He recognized that agriculture was necessary to support the global population of even his time. He was reaffirming that if land belongs to anyone, it belongs to the people in common, and even if managed privately, it must still be used for the common good.

Paine proposed a universal, lifelong indemnity to compensate the people for their loss of access to the commons. A variety of social welfare and food assistance programs have been tried over the years, culminating in the U.S. with the New Deal and Great Society programs of the 1930s and 1960s, respectively. Nothing has adequately addressed the twin perils of poverty and hunger associated with privatization of land and labor. Experiments with socialism and communism have been frustrated by the same challenges as early social welfare programs. People only seem inclined to work when they have a personal incentive to do so. Since the resurgence of free-market fundamentalism in the 1980s, social welfare and food assistance programs have been under persistent attack. "Poverty and wretchedness" seem destined to continue unabated.

The current global food system is not provid-

ing adequate food for much of the world's population today, and it most certainly is not leaving future generations with enough land to meet their needs for food. It is not sustainable. Speculative farmland prices, relentless farmland consolidation, and global "land-grabbing" are all symptoms of a soulless global economy running out of land for food. Rising global food prices have triggered new waves of hunger and starvation. Many families who can afford enough calories are suffering from a variety of diet-related health problems caused by not getting adequate nutrition. Market economies will not provide enough good food for all, and all previous attempts to ameliorate this inherent deficiency have failed. It's time for a fundamental change in thinking about issues of land and food.

For example, specific parcels of land could be identified and zoned for use in food production, without depriving individuals of their right to benefit from land improvement. This is not socialism. It is no different in concept from current zoning laws. However, enough land would need to be zoned "permanently" for food production to meet the basic food needs of both current and future generations. This means that the area of land zoned for food would need to be sufficient in both quantity and quality to allow for *sustainable* farming in order to avoid further exploitation.

Admittedly, the "development value" of land currently zoned for agriculture would be lost. Such value, however, is purely speculative, and society has no responsibility to ensure the success of land speculation. Owners of land currently zoned for higher-valued uses could be compensated for down-zoning to agriculture by taxing away speculative gains in other land that is up-zoned to higher-valued uses. Profits from up-zoning are essential a grant from society, as owners of such land have done nothing to increase its value. Taxing away such profits would also remove economic pressure to up-zone land from agriculture to other uses.

Farming of land that is zoned for food and farmed sustainably could be treated as a public utility, as proposed by Willard Cochrane, secretary of agriculture during the Kennedy administration (Levins, 2000). Sustainable farmers could become independent contractors. Admittedly, this would not solve the hunger problem because hunger is too closely linked with poverty. But, it would ensure there is enough good land left for food when society eventually addresses the problems of poverty caused by the commodification of labor. The more urgent priority is to preserve enough good farmland to provide good food for all, both now and in the future.

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GLOBAL VIEWS OF LOCAL FOOD SYSTEMS

Reflections on the growing worldwide local food movement

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Should farmers just say no?

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In a world in which agriculture is increasingly dominated by industrial farming and international trade, there is one crop that is still profitable to small farmers. It is hardy, drought-tolerant, and thrives on marginal lands. Multinational corporations have not yet hijacked its seeds, and its cultivation requires limited capital investment. Marketing poses no real problem, and farm gate prices are often an order of magnitude higher than those of the next alternative crop. Its production is still concentrated in countries of the South, where it does not benefit from any market-distorting subsidy. And while it can be consumed locally, it is mainly an export crop, bringing in much needed hard currency. It is also a magnet for Northern tourists coming to sample the produce "a la source." The catch? It is illegal.

From the mountains of the Moroccan Rif to the Afghan Highlands, from the hills of Lesotho to the forests of Jamaica, the cultivation of cannabis is essential to the livelihoods of millions of people who live on marginal lands. In many southern countries it is unofficially tolerated, making it an extralegal rather than an illegal crop. Governments recognize, albeit covertly, that cannabis farming plays a crucial role in halting the massive exodus of farmers from rural areas where poverty is endemic. Take Morocco, for instance, the world's largest producer and exporter of cannabis in the world, where *kif* (the local name for cannabis) is smuggled by boat to Spain across the Mediterranean and from there to the rest of Europe. The Spanish government doesn't like it and the *Guardia* vigilantly polices Spain's coastline. But the alternative to cannabis contraband is often the smuggling of North African migrants using the same route. As one *kif* producer put it, "*Kif* does not kill you, hunger does" (Martelli, 2013, para. 16), while the human toll from the illegal sea crossings keeps

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increasing. Similar stories are echoed in most cannabis-producing regions in the world.

Due to the illegal nature of cannabis production, systematic, rigorous research on the nature and operation of the cannabis value chain and of the power structures that surround it is scant. Indeed, such research is fraught with physical danger, not least because it may shed light on the internal operation of drug cartels and their connection to the powers that be. Yet there exist a number of studies that offer a good perspective on the cannabis production and trade in their local and global dimensions (for example, see Bloomer, 2009; Chouvy & Laniel, 2004; Kepe, 2003). Woven together, they bring to light the variants of the cannabis value chain and reveal their shared characteristics. Over the past year Hélène Servel, a French student studying at the Université Lyon-2 and I have strived to unravel the political ecology of hashish (cannabis resin) in the Bekáa region of Lebanon. Our findings are currently being prepared for publication, but a cursory examination of the data allowed us to identify a number of themes that echo the reports from other cannabis-producing regions of the South.

Contrary to a commonly held idea, most small farmers, especially subsistence farmers, who engage in the production of cannabis are not bandits who like to live in illegality. To them, cannabis farming is a coping mechanism that offers an economically viable alternative to legal crops that have little return on investment. It is also often part of a diversified livelihood portfolio that includes on-farm and off-farm employment (Bloomer, 2009). Even landless farmworkers benefit from cannabis production, as daily wages can be up to 10 times higher than the average farmworker's pay (see Cochet, 1989, for Mexico). That said, cannabis farming may also be thought of as an act of contestation directed at a state that does not offer social support to its marginalized citizens and which those citizens see as being responsible for their destitution. This thesis is well developed in James C. Scott's theory of "everyday form of peasant resistance" (Scott, 1986).

Another common misconception is that all cannabis producers are rich. While the returns from cannabis cultivation are higher than "legal" crops, one must note that the distribution of profits and earnings reflects the strong power differential along the production and marketing chain. As with regular crops, small farmers — who produce most of the raw material — are at the bottom of the pile and obtain the smallest share of revenues. Traders, smugglers, and large producers who control the subsequent stages of the value chain are the largest earners. In spite of that, it is the cannabis farmers who are the target of repression. Poret (2006) analyzed the drug-prohibition policies of the United Nations and shows that they almost exclusively address the supply side, which is made up essentially of small producers. These policies push them to seek refuge under the wings of powerful players who practice a blend of business and banditry. Thus, land, labor, and financial capitals are not sufficient to guarantee success in cannabis production. The other two essential elements are the ability to take risk, as farmers operate with a constant sword of Damocles looming over their heads, and the availability of a strong, protective "social" capital that offers collective protection from the repressive apparatus.

To subsistence farmers, cannabis farming is a coping mechanism that offers an economically viable alternative to legal crops that have little return on investment.

For some researchers (Chouvy & Laniel, 2004) the dynamics of the cannabis value chain are essentially driven by geopolitical considerations. Much has been said about the U.S. use of the "War on Terror" and the "War on Drugs" (Carpenter, 2004; Greenwald, 2010) to justify its self-appointment as the global Drug Enforcement Administration (DEA), operating and funding cannabis eradication programs worldwide (Bureau of International Narcotics and Law Enforcement Affairs, 2013). No amount of scaremongering, however, can shake away the widespread conviction among cannabis growers in Lebanon that the U.S. has a

hidden agenda that goes well beyond the protection of its people from the nefarious effects of narcotics. They point to the flagrant contradiction in the U.S. between the legalization of cannabis production and the emergence of quasi-industrial production units, and the financial support for the eradication of cannabis fields where it contributes to local livelihoods. In that respect, planting cannabis becomes not only a livelihood necessity, but also an act of resistance to what is perceived as an iniquitous and hegemonic power.

Planting cannabis becomes not only a livelihood necessity, but also an act of resistance to what is perceived as an iniquitous and hegemonic power.

These specificities set aside, it appears that cannabis production abides by the same economic principles as any other commodity traded in capitalist markets. Its production requires labor and capital investments, and its pricing obeys the law of supply and demand. It is channeled through an economic value chain that is just as implacable. The only reason its cultivation is still profitable for small farmers in the South is its illegality: it does not have to compete yet with industrially farmed agricultural commodities that have benefited from direct or indirect farm subsidies. But this is rapidly changing. As the U.S. legalizes production and the new pot barons (Newsweek, 2012; Fortune, 2013) find their places in Wall Street offices, many Southern countries such as Uruguay are starting to follow suit in order to carve themselves a share of a promising global market.

One cannot help wonder about the fate of the small farmers as cannabis enters the global commodities regime. Will legalizing production benefit them by removing the sword of Damocles under which they operate and freeing them from the hold of cartels? Some small cannabis farmers are concerned that legalization will invite "safe" capital investments by large corporations and that they will lose the only edge they now possess: their willingness to take risks. For regions such as the Moroccan Rif or the Lebanese Bekáa, and in the absence of any viable alternatives, these changes are bound to cause further depeasantization and to deepen poverty. Small producers sought refuge in illegality as they gave up on governments that have been incapable of offering support to their citizenry, and after having witnessed the repeated failure of crop replacement programs. The legalization process may now breach this last line of defense. These presumptions bring about an important question: Can small farmers exist within a legality that is imposed on them by a power architecture in which they do not participate? For those among us who are interested in political ecology and are concerned about the fate of small farmers, this new agrarian question must become an urgent research priority.

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Farms or freeways? Citizen engagement and municipal governance in Edmonton's food and agriculture strategy development

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Abstract

In the mid- to late 1990s, most provincial governments in Canada downloaded or devolved authority for land use planning to local levels of government. In Alberta, this shifted responsibility for the protection of farmland to municipalities. However, a strong oil and gas economy and rapid growth of Alberta's urban centers in recent decades has resulted in significant loss of prime farmland to urban and industrial development. In Edmonton, Alberta's capital city, citizens' concerns over food security and the protection of farmland within city boundaries shaped the 2010 municipal development plan, which links land use planning with food and agriculture, and also paved the way for an Edmonton agri-food strategy. In this exploratory case study we examine factors shaping Edmonton's food policy development and implementation, and the impact on prime farmland in the city's outer limits. Despite progressive changes in policy due to strong citizen support, municipal council's approval of a food and agriculture strategy lacking hard targets subsequently set the stage for continued urban sprawl and loss of prime farmland. This study illuminates the conflicts between

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citizens' demand for sustainable urban food systems and the development narrative still prevalent in many North American cities. We conclude the paper by discussing the key levers required to ensure the transformational context required to institute holistic food system strategies.

Keywords
citizen engagement, food policy, land use planning, municipal governance, urban agriculture, urban food and agriculture strategy

Introduction and Methods

In May 2010, Edmonton's city council approved a municipal development plan (MDP) that mandated the development of a Citywide Food and Agricultural Strategy (CWFAS) and required that future urban area structure plans be designed in adherence with this strategy (City of Edmonton, 2010a, p. 20). As a result, Edmonton became the first urban municipality in Canada to link land use planning with a comprehensive agriculture and food strategy, which was viewed as a major achievement by citizens advocating for local food system development. Extensive citizen engagement during the MDP process brought issues of food security and farmland preservation to Edmonton's municipal planning table, and generated unprecedented political attention. But as the process quickly unfolded, many became disillusioned by the level of commitment of senior administration and some members of city council to develop and implement a comprehensive, innovative, and robust strategy that would protect and utilize Edmonton's unique agricultural assets, including over 5,000 hectares (12,355 acres) of prime farmland in the urban area.

This research utilizes an exploratory case study approach to examine food policy development in Edmonton from November 2008 to March 2013. All three authors undertook informal interviews and participant observations during a broad range of activities associated with food policy development. Beckie was a member of the CWFAS's advisory committee and in addition to attending 10 months of biweekly meetings in that role was able to observe a diversity of public and stakeholder consultation activities. Hanson and Schrader were academic researchers associated with the Food and Agriculture Citizen Panel convened by a city/university agency, the Centre for Public Involvement, and were also participants in activities and discussions organized by a civil society organization (Greater Edmonton Alliance (GEA)). Hanson is also a member of the city's Environmental Advisory Committee, a municipal advisory body that provided feedback on the process and documents associated with Edmonton's food and urban agriculture policy. Additional documents were reviewed including policy and background documents, meeting minutes, videos, and surveys, as well as handouts and e-mails written by citizens and more publicly accessible documents such as newspaper clippings and blog posts.

The theoretical framework for this interdisciplinary study was developed through a synthesis of readings on food systems, urban agriculture, food policy development, land use planning, citizen engagement, and governance related to sustainability. We drew from case research that examines successes and challenges in implementing cross-sectoral food policies and strategies (Mansfield & Mendes, 2013; Mendes, 2007, 2008; Sonnino, 2009), responded to the call for more comprehensive accounts of the evolution of food policy initiatives (MacRae, 1999; Mendes, 2007; Pothukuchi & Kaufman, 1999, 2000; Wekerle, 2004), and aimed to contribute to scholarship on key levers required to move the food system to a more sustainable place (Meter, 2011). Specifically, we built on the work of Mansfield and Mendes (2013), who explore key structural and procedural factors that influence food policy development capacity (Mendes, 2008), and extended the analysis to account for additional procedural and contextual factors affecting Edmonton's food and agriculture strategy.

We begin with an overview of scholarship that explores citizen engagement with local food system development and sustainability issues in general, challenges of food policy work within the scope of municipal policy and planning, and the complexity of sustainability-related civic governance. The second section describes the development of *fresh: Edmonton's Food and Agriculture Strategy* (City of Edmonton, 2012a) and its related context. We conclude the paper by discussing the key levers

required to ensure a transformational context for holistic food system strategies.

The Changing Nature of Citizen Engagement and Governance in Urban Food System Policy and Planning

Citizen involvement in municipal policy and decision-making has been a growing trend since the late 1960s, resulting in a "move away from expert-driven policy-making models towards processes that facilitate two-way information flow" and collaboration, in order to regain citizens' trust in government and to create "more robust, effective and equitable planning" (Masuda, McGee & Garvin, 2008, p. 360; see also Healey, 2003; Innes, 1995). There is also growing recognition of the complexity and interconnectedness of the sustainability issues communities are grappling with, and the recognition that these cannot be solved by government alone (Calder & Beckie, 2013; Cooper & Vargas, 2004; Forrester, 2009; Innes & Booher, 2004). Agriculture and food systems are "strategic considerations" in determining the sustainability of a municipality (Hiley, Bonneau, Thomas & Rousseau, 2011, p. 27), and as Hassanein explains, "ultimately 'experts' cannot by themselves fairly make the decisions that impact the sustainability of agricultural production and the food system because those decisions involve choosing among values" (2003, p. 78). Tensions and conflict can arise, however, between individuals' values and the "good" of the community, and relations of power can influence the decision-making process regarding complex and polarized issues (Booher & Innes, 2002; Healey, 2012; Mouffe, 2009). For example, governments might endorse engagement and yet provide limited opportunities and/or retain control over the process (McCann, 2001). Alternatively, engagement processes might be dominated by business and community elites or special interest groups (Rydin & Pennington, 2000). Communities encompass multiple and diverse perspectives and "any substantial proposal for change is likely to generate all kinds of tensions and conflicts" (Healey, 2012, p. 20). To achieve inclusivity and collaboration in policy and planning "takes time, effort and resources" (Rydin & Pennington, 2000, p. 161). Dialogue enabling multiple perspectives to be heard can lead to conflict but can also create a space for "new, more productive patterns" to emerge (Pearce & Littlejohn, 1997, p. 79).

Municipal involvement and authority over agriculture and food has been increasing over the past two decades in both the Global North and South, in large part due to unprecedented urbanization pressures (Mansfield & Mendes, 2013; Mougeot, 2006), citizen interest in localized food systems, and demand for supportive food and agriculture policy (Hiley et al., 2011; Morgan, 2013), and the devolution or downloading and offloading of responsibilities from higher levels of government (Hiley et al., 2011). Many municipal governments are beginning to acknowledge the "multifunctional nature" (Morgan & Sonnino, 2010, p. 210) of urban agri-food systems; more than "just 'feed the City'" (Sonnino, 2009, p. 426), they can also provide economic opportunities, skill training, social and cultural opportunities, and ecological functions (Beckie & Bogdan, 2010; Evans & Miewald, 2013; Mougeot, 2006; Thibert, 2012; Weissman, 2013).

The food policy response of local governments has varied and is influenced by a number of factors, including geography and climate, the economy, migration and settlement patterns, and cultural and political context (Schrader & Hanson, 2012). In general, the number of targeted municipal policies (e.g., community gardens, small livestock, farmers' markets, community kitchens, food banks) has increased in North American cities in recent decades, but in many cases policies referring specifically to agricultural production are vague and open to differing interpretations (Desjardins, Lubczynski & Xuereb, 2011; Oswald, 2009). City administrations may enthusiastically endorse urban agriculture if limited to community, rooftop, or backyard gardens, but view larger-scale agriculture enterprises as a regressive use of land when compared to residential development (Thibert, 2012), despite evidence of the higher long-term costs of infrastructure and services relative to agriculture (American Farmland Trust, 2010). Kaufman and Bailkey (2000) identify four types of obstacles to urban agriculture: site-related, government-related, procedure-related and perception-related. Given the long-term investment that agriculture requires,

some scholars argue that the most significant obstacle is securing land tenure (Mubvami & Mushamba, 2006); hence, there is a need for an integrated, systems approach that links land use planning with urban food policy (Desjardins et al., 2011; Hiley et al., 2011; Ikerd, 2011).

A small but growing number of cities have developed comprehensive, cross-sectoral food strategies (Sonnino, 2009), defined by Mansfield and Mendes (2013) as:

> …an official plan or road map that helps City governments integrate a full spectrum of urban food system issues within a single policy framework that includes food production, food processing, food distribution, food access and food waste management. (p. 38)

Developing an urban agri-food strategy that integrates with other government policies (municipal, regional, provincial) and engages local stakeholders is complex and time-consuming work, and some authors question whether local governments have the supportive legislative framework, human and financial resources, and political will necessary to implement and integrate effective sustainability policies and programs of this nature (Barling, Lang, & Caraher, 2002; Hiley et al., 2011; Mansfield & Mendes, 2013; Mendes, 2008). Not only are municipalities stretched thin by continued funding cuts and the downloading of responsibilities from other levels of government, but also until very recently there have been "few policy roadmaps to follow or regulatory tools to support their implementation" (Mendes, 2008, p. 943). There is a degree of organizational learning and capacity-building that must occur across governmental institutions to be able to effectively implement a sustainable agri-food strategy. As Mendes (2008) explains,

> governance in support of sustainability goals requires structural, procedural and cultural changes to the institutions within which decisions are taken and actions carried out. In this regard, sustainability presents inherent challenges in relations to state resources, powers and capacity to act. (p. 944)

Key to the process of building institutional capacity is identifying mechanisms that both enable and limit effective collaborative local governance and policy development. In her analysis of the adoption of a food policy mandate in Vancouver, Mendes (2008) examined five key factors that influenced governance capacity to implement cross-cutting social and environmental urban policy (table 1). These factors are both structural ("organizational arrangements and commitments involving governments") and procedural ("who is involved, when, how and where?") (Mendes, 2008, p. 950). The partnerships and collaborations that emerge from the procedural elements help to address the cross-sectoral and multifaceted nature of urban food systems. We utilize the analytical framework developed by Mendes to examine the factors influencing urban food policy development in the city of Edmonton, Alberta.

Table 1. Factors That Influence Governance Capacity for Food Policy Development

Structural issues	1. Legal status and a mandated role for food policy;
	2. Staffing support;
	3. Integration of food policy into regulatory and legal frameworks;
Procedural issues	4. Joint actor partnerships and networks in planning and policy making; and
	5. Citizen participation mechanisms.

Source: Adapted from Mendes, W. (2008). Implementing social and environmental policies in cities: The case of food policy in Vancouver, Canada. *International Journal of Urban and Regional Research, 32*(4), 942–967.

Description of the Case

Agricultural, Demographic and Legislative Context

Alberta is one of the three Canadian Prairie provinces situated in the Northern Great Plains Region (figure 1). Close to one-third (31.5 percent) of

Figure 1. Alberta's Location in Canada and North America

Source: Government of Alberta. (2011). *Facts on Alberta: Living and doing business in Alberta.* Edmonton, Alberta: Alberta Treasury Board.

the total amount of farmland in Canada[1] and 18.97 percent of its Class 1 agricultural land[2] is situated in Alberta (Statistics Canada, 2009), but changing demographics and strong economic growth in recent decades has resulted in an increasing loss of prime farmland in the province to urban residential, industrial, and commercial development, particularly in the rapidly urbanizing Calgary-to-Edmonton corridor (Vander Ploeg, 2008), where most of the prime farmland in the province is located (Alberta Agriculture and Rural Development [AARD], 2002; Hofmann, Filoso, & Shofield, 2005).

Alberta's growth rate (10.8 percent) is nearly double the national average (5.9 percent), with 83 percent of the population of 3.65 million now living in urban centers (Statistics Canada, 2013b). From 2006 to 2011 the number of farms in the province declined by 12.5 percent and the amount of farmland decreased by 3.1 percent, or 647,497 hectares (1,600,000 acres), much of which consisted of high quality soils near urban centers (Statistics Canada, 2009). Land speculation and fragmentation of farmland due to urban and industrial development are also concerns as this drives up land prices beyond agricultural productivity values, making it financially difficult for farmers wanting to start or expand their operation while enticing others to sell their land, especially as they reach retirement age (AARD, 2002).

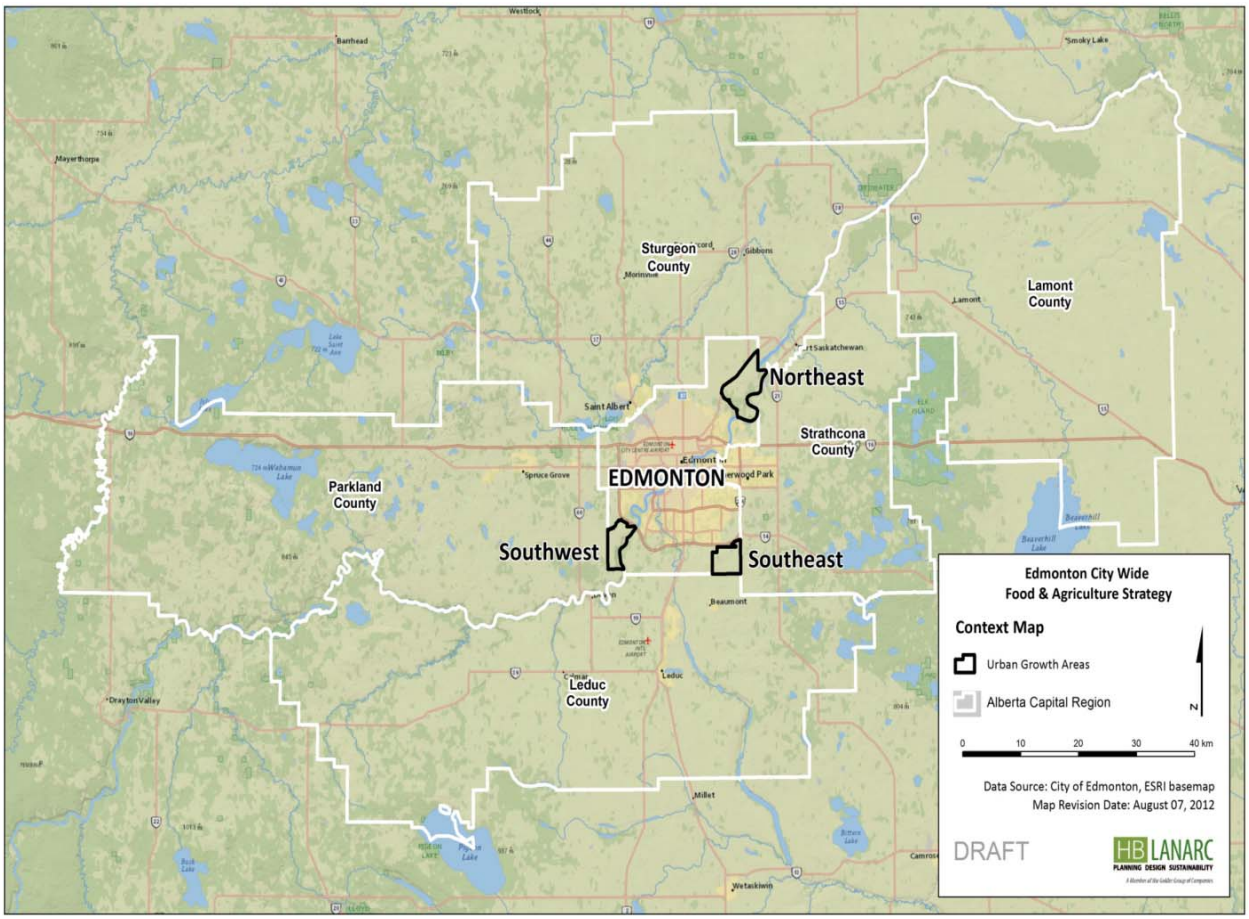
Land use planning is a provincial responsibility according to the Canadian Constitution (Government of Canada, 2013), but in the mid- to late 1990s authority over land use planning in many parts of the country was downloaded from provinces to municipalities and regions (Hiley et al., 2011). In 1994 the new Alberta Municipal Government Act abolished Regional Planning Commissions in the province and transferred responsibility for protecting agricultural land to municipalities (AARD, 2002). To aid this process, Provincial Land Use Policies were developed and municipalities are encouraged but not required to adhere to them (Alberta Urban Municipalities Association [AUMA], 2007). In contrast, British Columbia, Ontario, and Quebec have provincially legislated delineation of agricultural zones and urban growth boundaries (Hiley et al., 2011). In the prairies provinces, where approximately 80 percent of Canada's farmland is located, there is no legislation to

[1] In spite of Canada's relatively large size, only 7.3 percent of the land base (167 million acres) is utilizable for agricultural production, mainly because of soil quality and the nature of the Canadian climate and terrain (Statistics Canada, 2009).
[2] There are seven classes used to rate agricultural land capability in Canada. Class 1 lands have the highest and Class 7 lands the lowest capability to support agricultural land use activities. Class 1 soils have no significant limitations in use for crops. Prime farmland is characterized as Class 1, 2, and 3. For further information see Agricultural Soil Classification, Canada Land Inventory, Agriculture and Agri-Food Canada: http://sis.agr.gc.ca/cansis/nsdb/cli/classdesc.html

protect this crucial resource (Acton & Gregorich, 1995).

Alberta's provincial capital of Edmonton (pop. 812,201) has the second-highest population growth rate (12.1 percent) in Canada, next to Calgary (Statistics Canada, 2013a). Being a gateway to the oil sands and other industrial development in northern Alberta, as well as a major transportation link to the Canadian North, the entire Capital Region (Edmonton and 23 surrounding municipalities) has been characterized by strong growth for nearly two decades (Vander Ploeg, 2008). It is the northernmost census metropolitan area in Canada and occupies the largest land base (11,993 sq. km or 7,452 sq. miles) (Edmonton Capital Region Board, 2013). With a view to future growth, in 1982 Edmonton annexed approximately 8,000 hectares (19,768 acres) bordering the northeast, southeast and southwest parts of the city, and designated these as future Urban Growth Areas (UGAs) (figure 2). Much of this land was zoned agricultural and has mostly remained so over the past 30 years, making Edmonton one of the few urban municipalities in Canada with a large amount of prime agricultural land within its boundaries (HB Lanarc Consultants, 2012a). There have, however, been significant shifts in land tenure in the UGAs. Since the time of annexation the share of land owned by farmers has decreased by 43 percent; land leased and rented from land investment companies is now the predominant form of tenure (HB Lanarc Consultants, 2012a). There has

Figure 2: Location of Edmonton and the Urban Growth Areas (Northeast, Southwest and Southeast) Within the Alberta Capital Region



Source: HB Lanarc Consultants (2012a). *Agricultural inventory & assessment: City of Edmonton City Wide Food and Agriculture Strategy.* Edmonton, Alberta: City of Edmonton.

Table 2. Area, Soil and Climate Summary for Edmonton's Urban Growth Areas

Urban Growth Area	Total Area (Hectares)	Prime Agricultural Soil (Class 1, 2, and 3) (Hectares)	Prime Agricultural Soil (% of total area)	Average Annual Precipitation (mm)	Average Growing Degree Days
Northeast	3,832	3,058	80.4%	469	1,409
Southeast	2,028	1,168	57.8%	470	1,357
Southwest	2,028	1,286	63.8%	500	1,391
Total	7,888	5,512	70.3%		

Note: 1 hectare = 2.47 acres; 500 mm = 19.7"
Source: HB Lanarc Consultants (2012a). *Agricultural inventory & assessment: City of Edmonton City Wide Food and Agriculture Strategy.* Edmonton, Alberta: City of Edmonton.

also been a decline in the number of farms; for example, in the northeast UGA there was a 57 percent decrease in the number of farmers (from 170 to 73) from 2006 to 2011 (HB Lanarc Consultants, 2012a), in comparison to the provincial average of 13 percent during the same time period (Statistics Canada, 2009).

Seventy percent of Edmonton's UGAs is classified as prime agricultural land, consisting of Class 1, 2, and 3 soils (table 2). Approximately 50 percent of the northeast and southwest UGAs is Class 1 soils (HB Lanarc Consultants, 2012a). To put this in perspective, of the 7.3 percent of Canada's land mass suitable for agriculture, only 0.5 percent is Class 1 soils (Statistics Canada, 2009). The Edmonton area has additional qualities that make it well suited to crop production (HB Lanarc Consultants, 2012a). Despite its more northerly location, Edmonton has one of the longest growing seasons in Alberta. Moisture conditions in the Edmonton area are also better for crop production than more southerly parts of the province, where there is often a moisture deficit. This combination of favorable growing conditions is particularly evident in the northeast UGA, which has a combination of high quality soils, unique microclimate, and potential for irrigation due to its proximity to the North Saskatchewan River.

The Way We Grow: Edmonton's Municipal Development Plan

Every 10 years, Alberta municipalities with a population of 3,500 or greater are required to develop statutory municipal development plans (MDP) (Alberta Municipal Affairs [AMA], 2012). Development of Edmonton's current MDP, titled *The Way We Grow,* began in 2006 and included an extensive public engagement process that included a project website, workshops, interviews, web and telephone surveys, and public and stakeholder consultations. The MDP underwent two reviews (in 2008 and 2009), with final approval in May 2010 (City of Edmonton, 2010a).

Most notable among those participating in the MDP process was a broad-based citizens' organization known as the Greater Edmonton Alliance (GEA).[3] Through community meetings and social networking, GEA helped to mobilize over 500 citizens to attend the first MDP hearings in support of food and agriculture being included in the plan. GEA member institutions had identified food security and the preservation of prime farmland within city boundaries as key topics to be included in Edmonton's MDP (Nutter, Hubbard, & Nutter, 2011). In response, Edmonton's city council requested that city administration staff research and report on possible urban food policy options and mechanisms to protect urban farmland (City of Edmonton, 2008).

GEA continued to educate and mobilize support for these issues among citizens, including

[3] The Greater Edmonton Alliance (http://www.greateredmontonalliance.com) is a nonprofit, multi-issue network of civil society institutions such as faith-based organizations, business associations, unions, and community groups that work together to have an impact on community issues that matter to its member organizations.

having more than 700 families pledge to shift 40 percent of their current food dollars to locally produced food (Nutter et al., 2011). In 2009, over 500 citizens again appeared at City Hall for the public hearing on the second draft of the MDP. GEA presented a policy paper, *The Way We Eat,* to city council and in it proposed amendments to the MDP related to agricultural land use and the development of a local food system (GEA, 2010). Councilors requested that these amendments be tabled for the next draft. That fall, GEA and a potato farmer situated in the northeast UGA hosted the "Great Potato Giveaway," an event that provided 45,000 kilograms (99,200 pounds) of potatoes free to the public as a means of inspiring people to come and experience a market garden, and also to raise awareness of the need to protect prime farmland in the area. Approximately 15,000 people participated in the one-day event, causing a massive traffic jam on the highway in northeast Edmonton (Drake & Sands, 2009; Nutter et al., 2011). The event was viewed as highly successful in achieving its goals, as commented by Michael Walters, a GEA organizer:

> We've [GEA] demonstrated the significant demand for local food, which was our intent. This land has more value than just being a holding pattern for urban growth. While the cities will continue to grow, we need to integrate agricultural land within that development. (Canadian Press, 2009)

As a result of extensive public input and support over two and a half years, in May 2010 more than 500 citizens witnessed city council's approval of the new MDP, which contained two amendments: Section 3.1: Land Use, and Section 5: Food and Agriculture. The former requires that future area structure plans be completed in alignment with the city's Growth Coordination Strategy, the Integrated Infrastructure Strategy, and a to-be-developed food and agriculture strategy (City of Edmonton, 2010a, p. 20). Hence, the UGAs' area structure plans could not be developed and approved before a local food and agriculture strategy was developed. Section 5 is a new addition to the MDP and provides a vision statement for the development of a comprehensive Citywide Food and Agriculture Strategy (CWFAS):

> Edmonton has a resilient food and agriculture system that contributes to the local economy and the overall cultural, financial, social and environmental sustainability of the City. (City of Edmonton, 2010, p. 8)

Development of Edmonton's Food and Urban Agriculture Strategy

Edmonton City Council publicly launched Edmonton's food and urban agriculture initiative in May 2010, and that autumn the mayor appointed 15 individuals to serve on an advisory committee charged with developing a food and agriculture strategy. The CWFAS Advisory Committee consisted of a diverse set of stakeholders representing developers, land investment companies, international agricultural businesses, local nongovernmental organizations (NGOs), restaurants, postsecondary institutions, and local farmers (City of Edmonton, 2012b).[4] Working with staff from Edmonton's Urban Planning and Environment Branch and HB Lanarc Consultants,[5] the committee was tasked with guiding the development and completion of a strategy by spring 2012. The committee considered background documents developed by HB Lanarc Consultants,[6] citizen feedback, and reviewed other municipal food strategies. The diversity of stakeholders on the committee gave rise to considerable and often polarized debate about various aspects of the strategy, with agricultural land preservation in the

[4] Absent from the advisory committee was representation from marginalized groups (immigrant, First Nations, low income), public health, K-12 education, and emergency food providers (food banks).

[5] HB Lanarc Consultants (http://www.hblanarc.ca) is a Vancouver-based planning and design firm that works with local and regional governments and developers on sustainable community and regional planning, and over the past decade has specialized in sustainable food-system strategies.

[6] Background documents developed by the consultants, such as the *Agriculture Inventory and Assessment* report, generated up-to-date information that was valuable to the strategy development and will also be useful background information for implementation processes.

Table 3. Citizen Engagement Processes Associated with the Development of Edmonton's Food and Urban Agriculture Strategy

Type of Engagement	Frequency and Duration	Purpose and Output	No. of Participants*
Advisory Committee	Monthly, then biweekly, meetings held Oct. 2011–Sept. 2012	• Create a draft citywide food and agriculture strategy for Edmonton. • A 94-page draft strategy written by a professional writer in consultation with the advisory committee.	15
Nine Key Stakeholder Groups	Two 3-hour meetings were facilitated April–June 2012	• Provide feedback on draft strategy components. • Two summary reports produced by HB Lanarc Consultants.	120
Citizens Panel	Six 4-hour facilitated discussions held April–June 2012	• Engage diverse citizens in discussions around food and agriculture policy issues. • The citizen panel produced a report with the help of city staff and a professional writer.	66
Public Conference	Two-day conference with invited local and national speakers held in May 2012	• Education and feedback on key food issues. • Selected speaker videos were posted online.	265
Public Opinion Survey	Online and mailed surveys administered in June 2012	• Gather input for strategy. • A report was written by the University of Alberta, Evaluation & Research Services.	2,276
Landowner Survey	Surveys mailed to landowners in the UGAs in June 2012	• Understand current land use in UGAs and landowners' future intentions for land. • Summary report produced by HB Lanarc Consultants.	282
Open Houses	Two open houses held for invited stakeholders and two held for the general public, Oct. 1–4, 2012	• Feedback on draft version of strategy. • Report produced by University of Alberta, Evaluation & Research Services.	120
Online Survey	Oct. 1–4, 2012	• Feedback on draft version of strategy. • Report produced by University of Alberta, Evaluation & Research Services	205

* *Note:* A number of people participated in multiple engagement activities.
Sources: Centre for Public Involvement, 2012; HB Lanarc Consultants, 2012b, 2012c, 2012d; University of Alberta, Evaluation & Research Services, 2012a, 2012b.

UGAs being the most contentious. Although all members agreed that some of the prime farmland in the UGAs should be preserved, no consensus was reached as to how much land to preserve, where, and by what means.

A professional writer was hired to compose a draft of the strategy, with guidance from city staff. After many revisions submitted by committee members, a final draft of the strategy was presented to the committee and received mixed reviews; three members felt it was entirely unacceptable as it failed to align with the vision statement and did not set hard targets or goals, and four others felt it needed further revisions. With majority approval, the 94-page draft strategy was released to the wider community for review in October 2012, with a two-week period for submission of feedback through an online survey and four community open houses.

The city undertook a wide range of public consultation activities during the strategy development process (table 3). Prior to the final draft being approved, an online public opinion survey, a landowner survey, stakeholder meetings, a conference, and a citizen panel were convened. The city staff and consultants shared public feedback with the CWFAS Advisory Committee, but under very tight timelines for review and consideration.

The citizen engagement processes revealed strong support for preserving prime farmland for agricultural production, particularly in the northeast UGA, and expanding urban agriculture in the city. The public opinion survey, completed by over 2,000 citizens, identified the availability of land to grow food for sale as a critical resource by 72 percent of respondents (University of Alberta, Evaluation & Research Services, 2012a). Furthermore, 74 percent of participants identified locally grown or produced foods as an important factor influencing their food-buying decisions, and 54 percent stated that local ingredients were a key factor when deciding where to eat out. The highest rated recommendation of the randomly selected members of the citizens' panel was to "Create and/or amend zoning, bylaws, fees, and taxes to prohibit developments on good fertile agricultural land, particularly the northeast farmland" (Centre for Public Involvement, 2012, p. 2). The second highest recommendation was to "Maximize spaces and places within the City of Edmonton for urban growing and food production" (p. 2). Public feedback on the strategy revealed that more than 50 percent of the respondents ranked "Integrate land for agriculture" and "Expand urban agriculture" as their first, second or third priority (University of Alberta, Evaluation & Research Services, 2012b).

On October 26, 2012, Edmonton's city administration presented the CWFAS to city council's executive committee for approval. A special nonstatutory public hearing was convened. Due to strong public interest, the hearings were extended over two days, during which 63 registered speakers were allowed to make five-minute presentations: 10 spoke for themselves, 53 represented a range of organizations including GEA, other NGOs, neighborhood organizations, the Edmonton Area Land Trust, landowners, real estate investors, and land developers (City of Edmonton, 2012a). The presentations represented primarily two positions: those opposed to having the strategy approved and those in favor. Those opposed to the strategy largely aligned with GEA, which had advocated for the protection of some portion of contiguous agriculturally zoned land in the area structure plans,[7] felt that the wording of the CWFAS was not strong enough to ensure this could occur, and asked for more time to revise it. Those in favor of the strategy were composed largely of land investment company representatives, developers, and acreage landowners who spoke of the need for residential development and services to meet projected urban growth. Following the hearings, four out of five councillors voted in favor of accepting the draft strategy; the councillor opposed to the existing draft requested more data analysis, concrete recommendations, and targets. In response the executive committee asked that administration prepare an implementation plan and budget for the draft strategy.

Edmonton's food and urban agricultural strategy, titled *fresh,* received final approval November 2012, just thirteen months after the CWFAS Advisory Committee was first appointed. The strategy includes five goals that establish the foundation for an integrated food system, and nine strategic directions that provide a basis for action (table 4). Council also approved ongoing funding of CA$150,000 per year to support one full-time staff person and the establishment and support of a food council to guide the implementation of the strategy.

With the approval of *fresh*, the northeast UGA area structure plan could now be prepared[8] and presented to city council, which occurred in February 2013. Public hearings on the plan were held over two days. Forty-seven individuals spoke, many of whom had previously spoken at the strategy hearing (City of Edmonton, 2013a). Developers, land investors, and acreage owners in the northeast (including some farmers who had sold their land and were now renting it back) supported the plan, citing the need for housing and services for an adjacent 4,857 hectare (12,002 acre) energy and technology park that will be developed over the next 40 years (City of Edmonton, 2010b).

[7] GEA specifically requested 600 hectares (1,483 acres) of contiguous farmland bordering the North Saskatchewan River be protected in the northeast UGA.

[8] Unlike other most other urban municipalities in Canada, area structure plans in Edmonton are generated by developers, in consultation with local landowners and the city planning department.

Table 4. Goals and Strategic Directions of fresh: Edmonton's Food and Urban Agricultural Strategy

Goals	Strategic Directions
1. A stronger, more vibrant local economy. 2. A healthier, more food-secure community. 3. Healthier ecosystems. 4. Less energy, emissions, and waste. 5. More vibrant, attractive, and unique places.	1. Establish the Edmonton Food Council. 2. Provide food skill education and information. 3. Expand urban agriculture. 4. Develop local food infrastructure and capacity. 5. Grow local food supply and demand. 6. Enliven the public realm through diversity of food activities. 7. Treat food waste as a resource. 8. Support urban farmers and ecological approaches to farming. 9. Integrate land use for agriculture.

Source: City of Edmonton. (2012b). *fresh: Edmonton's food & urban agriculture strategy.* Retrieved from http://www.edmonton.ca/City_government/documents/FRESH_October_2012.pdf

Those opposed to the northeast area structure plan consisted mainly of citizens and GEA members, including the Northeast Edmonton Agricultural Producers (NEAP) who still own land and farm in the area; these presenters spoke about the need to preserve a larger and contiguous area of prime farmland in the northeast.

The northeast area structure plan, approved in June 2013 by Edmonton's city council in a vote of 10 to three, designates 200 hectares (494 acres) of privately owned but noncontiguous farmland, with a provincial highway shown as bisecting much of this. The plan also identifies the development of five neighborhoods (with a density of 31 units per hectare and an average housing price of CA$525,000), each of which requires more detailed neighborhood structure plans that will go to city council for review and approval (City of Edmonton, 2013c).

Discussion

This study indicates that Edmonton's Citywide Food and Agricultural Strategy development process addressed all the structural and procedural factors Mansfield and Mendes (2013) identify as key to municipalities effectively implementing a coordinated and integrated agri-food strategy. In response to strong citizen involvement with this issue, city council approved the integration of agriculture and food into the MDP, and thus created a statutory mandate for an agri-food strategy and also ensured future land use planning would have to consider and align with it. The city also dedicated a number of staff and significant financial resources[9] to the strategy development process. Thus, the city met the three structural conditions Mansfield and Mendes identify as essential to providing an enabling institutional context for development of a progressive food policy. The city also addressed key procedural factors during the strategy development: first, by placing an array of community representatives on the CWFAS Advisory Committee, and second by providing a diverse range of opportunities for public and stakeholder consultation. These efforts to create inclusivity generated input from multiple perspectives for identifying goals and strategic directions that would "address the multi-jurisdictional and multi-sectoral nature of food systems" (Mansfield & Mendes, 2013, p. 48).

Further analysis of this case, however, reveals additional procedural and contextual factors at play that are not accounted for in the framework presented by Mansfield and Mendes, but significantly influenced the content of the strategy and its implementation. To begin with, the development process was conducted over a relatively short period of time. Unlike other cities, such as Toronto or Vancouver, which developed food policies over a number of years, Edmonton's strategy process was allocated one year, despite repeated requests from a number of advisory committee members

[9] The total internal and external cost for the development of the CWFAS was CA$780,000. The full report can be found in section 6.4, City of Edmonton Executive Council meeting minutes, at http://sirepub.edmonton.ca/sirepub/mtgviewer.aspx?meetid=770&doctype=MINUTES

for more time to deliberate. Similarly, a number of presenters at the public hearing spoke of the need to grant more time to the process in order to create a robust strategy with targets and deadlines. The strategy includes "Expand urban agriculture" and "Integrate land for agriculture" as strategic directions, but protection of urban agricultural land is presented as part of a set of recommendations to consider, with no clear mandate or targets. Additionally, a cost-benefit analytical framework for different land-use scenarios is included in the strategy (City of Edmonton, 2012b), but several members of the advisory committee were dissatisfied with the final cost-benefit product and felt it was incomplete and needed to be tested before being released. Administration was intent on completing the strategy by the October 2012 deadline established by council, which they explained was necessary to secure budget funding for the implementation of the strategy. But another urgent motive was the concurrent development of the northeast area structure plan, which could not go forward for approval without the strategy in place.

Similar to many urban municipalities, community actors and agencies in Edmonton have played a key role in initiating food and agriculture activities and triggering related policy development. GEA was able to build upon community interest by educating and mobilizing a larger segment of the population in support of the development of urban agri-food policy. In response to strong citizen interest with this issue, the city incorporated extensive engagement opportunities through both representation on the advisory committee and a range of other citizen engagement activities. However, several studies have shown that inclusivity and dialogue do not guarantee democratic outcomes (e.g., Masuda et al., 2008, Rydin & Pennington, 2000). Many citizens, GEA representatives and members of the advisory committee expressed feelings of frustration and cynicism about the engagement and collaborative efforts, as the strategy and the northeast area structure plan maintained the status quo. Two of the front-line planners involved said they felt demoralized and exhausted by the intense work schedule and unrealistic expectations placed on them. "We were swimming in data," said one of the planners in reference to the input that was gathered during the citizen engagement activities, but as a member of the advisory committee commented, there was not the time or the methods developed to effectively synthesize or incorporate the data into the decision-making process. In the end, many participants questioned the efficacy of public dialogue in changing policy outcomes in this complex and politically charged issue.

As a number of scholars of collaborative decision-making point out, conflict is both inevitable and productive in sorting through complex public policy issues (Booher & Innes, 2002; Healey, 2012; Mendes, 2008). "Rather than taking conflict as a symptom of urban degeneracy, it instead can be understood as an asset of productive tensions that birth new possibility" (Mendes, 2008, p. 962). As the hearings for both the CWFAS and the northeast area structure plan revealed, the key disagreement focused on preserving a significant amount of contiguous prime farmland in the northeast UGA. At the hearing on the northeast UGA, GEA representatives commented that the condensed timeframe for the strategy greatly constrained the committee's discussions of different planning scenarios and economic development models, and thus prevented them from moving through disagreements to arrive at common ground. Some members of the advisory committee said they felt pulled into polarized positions, for or against the strategy, which undermined the opportunity for a thoughtful, richly innovative approach to creating an integrated urban landscape that could embrace the possible synergies and benefits of incorporating and preserving contiguous prime farmland within city boundaries. In this sense, the transformational learning and buy-in that are key to successful and innovative collaborative governance models were significantly constrained (Booher &Innes, 2002; Bruff & Wood, 2000).

The recent decisions that were made regarding Edmonton's municipal food and agriculture strategy and its implementation are embedded in historic events and a larger socio-political context. First, Edmonton's annexation of surrounding farmland in the 1980s for future urban growth triggered a number of changes, starting with a spike in land prices in Edmonton's UGAs shortly afterward due

to land speculation (HB Lanarc Consultants, 2012a). High land prices combined with high interest rates during the 1980s influenced many farmers to sell their land to land investors and rent it back. Despite the agricultural potential of this land, it is not surprising that commitment to continue farming in an area designated for urban growth has declined, as evidenced by the dramatic reduction in the number of farms in the northeast from 2006 to 2011. As one scholar of urban and peri-urban agriculture has noted, "Given that agriculture generally requires long-term investment, land-use insecurity is especially problematic when trying to promote urban agriculture" (Thibert, 2012).

Second, new industrial and residential developments have been encroaching on the remaining urban farmland and in many ways predetermined the outcome related to Edmonton's northeast UGA. Perhaps of most significance is the adjacent energy and technology park, a cluster of secondary and tertiary chemical refining and manufacturing industries being built to support the oil and gas sector, which was approved in 2010 (City of Edmonton, 2013d). One of the key objectives for this park is to refine the byproducts produced by the oils sands and create additional refinery capacity (KlineGroup, 2008). The need for housing and services to support this technology park was cited as a critical factor supporting the approval of the northeast area structure plan.

Third, in Alberta there is no supportive legislative framework and coordination among different levels of government for preserving prime farmland, such as takes place in British Columbia, Quebec, and Ontario. When faced with growth and development pressures, many municipalities in Alberta have not followed provincial land use planning guidelines, explored policy options, or utilized tools, such as agricultural zoning, conservation easements, transfer of development credits, and urban growth boundaries, that could help address land use conflicts (Alberta Urban Municipalities Association [AUMA], 2007). In rural municipalities bordering major urban centers, there is a concern that "the agricultural voice is being overshadowed in municipal council chambers" (AARD, 2002, p. 4). According to Hiley et al. (2011), leadership and direction from the provincial level is a necessary condition for local government to effectively deal with this issue. Instead, the downloading of land use planning from provinces to municipalities, which has taken place in Alberta and throughout most of Canada, has not come with designated legislative authority or sufficient human and financial resources, and there has been a chronic lack of training opportunities for land use planning at the municipal level (Hiley et al., 2011). Unless these changes take place, tensions between citizens' demands for sustainable agri-food systems and loss of prime farmland due to urbanization will remain a controversial issue for municipalities.

Conclusion

Edmonton is in the early stages of implementing its agri-food strategy, and time will reveal how it will continue to unfold once the food council is underway (established summer 2013) and the new mayor and council (elected October 2013) begin to play a role in shaping this issue. What is clear, however, is that the level of citizen awareness and engagement with food and agriculture issues has increased significantly and that momentum will likely continue. Citizen involvement in food system planning is crucial, as "effective and acceptable local solutions require local decisions, which in turn require the extensive knowledge and participation of the people most affected by those decisions" (Roseland, 2005, p. 222).

As municipalities across North America respond to growing citizen demand for sustainable agri-food systems, it is instructional to chart the evolution of urban policy development processes such as Edmonton's, identifying the factors that support capacity-building and enable cities to play a responsible and progressive role as food policy actors in an increasingly urbanized world. In the case study at hand, in many respects the procedural and structural mechanisms that enable cross-cutting social and environmental policy were used. Yet as the hearings for the northeast area structure plan illustrated, despite strong public support for the protection of urban farmland, most members of city council were compelled to equate the value of this land according to short-term economic gains associated with urban residential develop-

ment, despite the higher long-term costs of infrastructure and other services relative to agriculture, and the overall benefits of prime farmland preservation. Unable to adapt their view of development to include a more robust and integrated urban food system, Edmonton City Council approved a food and agricultural strategy that largely fits into the status quo of urban growth. Without a sufficient legislative framework and the designated authority to act therein, however, it is challenging for municipalities to address citizens' increasing demand to be bold and innovative in dealing with urban agriculture within the land use planning process. Hence this case study illustrates that instituting complex sustainability initiatives that have no clear jurisdictional home, such as is found in comprehensive municipal agri-food strategies, involves organizational learning and new governance arrangements if true urban transformation is to be achieved.

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Beyond protection: Delineating the economic and food production potential of underutilized, small-parcel farmland in metropolitan Surrey, British Columbia

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Abstract

Surrey, British Columbia, is Canada's twelfth largest and fastest-growing city. Within its boundary, 8,692 hectares (21,478 acres) (25 percent of the municipality's land base) are protected by the province's Agricultural Land Reserve (ALR). Local government intuits the long-term importance of ALR lands. In this region speculative land development for urbanization is routinely considered the greatest threat to agriculture land loss. However, our analyses reveal that use of ALR land in Surrey for non-agricultural purposes was the greatest contributor to "effective agricultural land loss" and thus poses a formidable threat to ALR diminution. Given that most of these underutilized parcels are less than 5 hectares (12.4 acres) in size, the Surrey government is interested in the potential of small-lot, community-focused agriculture to curtail their loss from agriculture while simultaneously contributing to community economic vitality. We conducted an inventory of 669 properties, covering 3,035 hectares (7,500 acres) or approximately 33 percent of the total Surrey ALR, which had been identified as underutilized for agriculture by the Ministry of Agriculture in its 2004 City of Surrey Agricultural Land Use Inventory. Our work revealed that at least 556 parcels amounting to 2,446 hectares (6,044 acres) (27 percent of Surrey's ALR) remained underutilized, and that within these parcels 1,351 hectares (3,338 acres) (15 percent) could still conceivably be farmed. We calculated that if brought into small-scale, human-intensive, direct-market production, these lands could satisfy 100 percent of Surrey's seasonal consumption of 29 regionally appropriate crop and animal

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products, create over 1,500 jobs, and have the potential to nearly double the current economic magnitude of Surrey's agriculture sector.

Keywords
Agricultural Land Reserve, agricultural land speculation, direct-market agriculture, human-intensive agriculture, metropolitan agricultural land, small-lot agriculture, underutilized agricultural land, urban encroachment

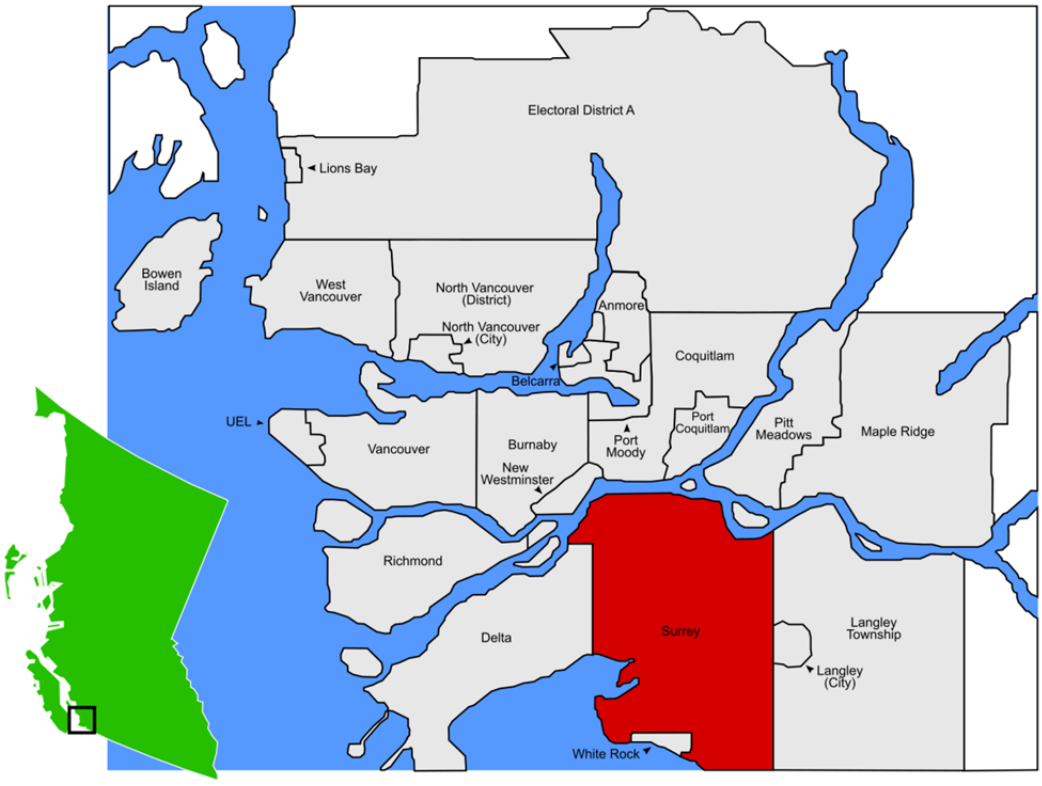
Acronyms Used
ALC: Agricultural Land Commission
ALR: Agricultural Land Reserve
ARA: agriculture-related activity
BC: British Columbia (Canada)
FTE: Full-time equivalent
FTEFL: Full-time equivalent–field labor
FTEOO: Full-time equivalent–owner/operator
GVRD: Greater Vancouver Regional District

Introduction

Surrey, British Columbia, Canada, has a long and significant agricultural history. In the late 1800s the city grew up amid pioneer family farms which had been established in the fertile lowlands of the Nicomekl and Serpentine rivers (figure 1).

These early farms produced a wide variety of agricultural products and played a key role in what was then a relatively regional agri-food system reliant on rail and shipping to transport goods to markets in southwest and eastern British Columbia (B.C.) and Vancouver Island. By 1940, a new bridge and highway connected Surrey to neighboring southwest British Columbia municipalities, initiating a period of rapid suburban development enabled by the conversion of much of Surrey's farmland into residential neighborhoods. This trend was also occurring in surrounding areas; during this period as much as 6,000 hectares (14,826 acres) of prime agricultural land, predominantly in southwest British Columbia, were lost annually to (primarily) urban and suburban uses (British Columbia Provincial Agricultural Land Commission, 2002a). Urban development of farmland continued unabated until 1973, when the provincial government introduced the Agricultural Land Commission (ALC) Act (B.C. Provincial Agricultural Land Commission 2002b) with the objective of protecting threatened farmland in perpetuity. The act resulted in the creation of the Agricultural Land Reserve (ALR), a "provincial zone in which agriculture is recognized as a priority

Figure 1. Metro Vancouver, B.C., with City of Surrey Highlighted



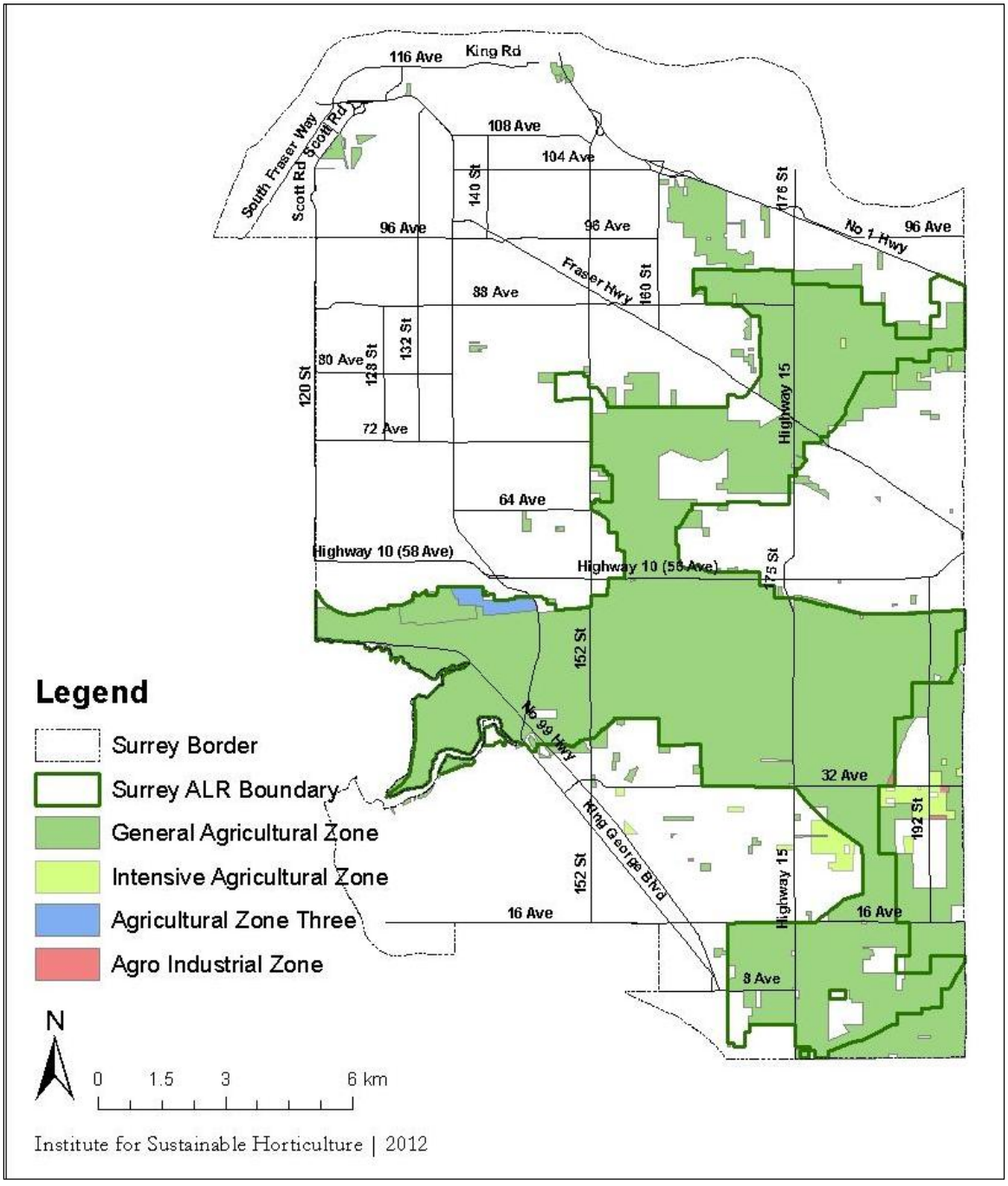
use, farming is encouraged, and non-agricultural uses are controlled" (B.C. Provincial Agricultural Land Commission, 2002a, para. 1;). Prior to the act, extensive subdivision of agriculture lands into small parcels (e.g., 2 hectares or 5 acres) occurred. It may be that subdivision of agricultural lands, as well as encroachment, motivated the legislation. This has encouraged profligate establishment of rural residences and various non-farm ALR land use, especially in peri-urban regions such as metro-Vancouver. It has also been observed that the ALR has functioned as a de facto urban growth boundary in B.C., and in metropolitan areas (especially) the ALR has not curtailed speculative land holding (Condon, Mullinix, Fallick, & Harcourt, 2010). In the City of Surrey, approximately 8,787 hectares (21,713 acres) were designated as part of the ALR. These lands, part of the Pacific Maritime Eco-zone that extends along Canada's Pacific Coast, typically have over 200 frost-free days (the most in Canada) due to the influences of the ocean (Agriculture and Agri-Food Canada, 2013a; Environment Canada, 2012). Surrey receives on average 1050mm (41.3") of precipitation annually and has an average summer temperature of 22° C (72° F). Gleysolic and Organic-Fibrisol soils dominate Surrey's agricultural lands, where organic materials accumulate around the surface area of the clay within the soil. With proper drainage these soils are considered prime agricultural land due to their high nutrient content (Agriculture and Agri-Food Canada, 2013b).

Eventually Surrey, Vancouver, 20 other nearby municipalities, several Indian Reserves, and one Electoral Area formed the Greater Vancouver Regional District. This regional district is now called Metro Vancouver, and is western Canada's major metropolis. Between 2006 and 2011 Metro Vancouver absorbed about 69 percent of British Columbia's population growth and now has a population of 2.44 million. This was the second highest population growth rate among metropolitan areas in Canada. Within Metro Vancouver, the City of Surrey exhibited the highest growth rate during the most recent census period, and is now home to 19 percent of the province's population (468,251). This has placed enormous development pressure on agricultural lands and resulted in a situation in which the real estate value of ALR land is far in excess of that justified by any form of production agriculture (Condon et al., 2010). In economic terms, the opportunity cost of ALR land being used for agricultural purposes is too high.

The nature of a jurisdiction's agriculture sector can profoundly influence its economic, social, and civic character (Goldschmidt, 1978; Nassauer, 1997). Surrey's extensive agricultural lands, which run geographically north-south through the heart of this suburban but very rapidly urbanizing municipality, are a unique feature and prompt many to describe Surrey as having a dual "urban and rural" character (figure 2). Surrey's 9,000 hectares (22,239 acres) of ALR lands currently make up approximately 25 percent of the city's total jurisdictional area and account for about 15 percent of all the agricultural land in Metro Vancouver (B.C. Ministry of Agriculture and Lands, Sustainable Agriculture Management Branch, 2009). Agriculture remains an important component of Surrey's municipal landscape; however, farm numbers in the municipality are steadily declining. The number of census-reporting farms has declined by approximately 30 percent over the past 20 years (Metro Vancouver, 2007). Surrey's current agriculture sector produces a wide variety of crops and products (table 1), generates over CA$153 million in gross annual farm receipts, employs approximately 4,470 people, and pays over CA$37 million in wages (City of Surrey Economic Development Office, n.d.).

In 2006, average gross receipts on Surrey farms were CA$314,971, which is higher than the average for both Metro Vancouver farms (CA$278,306) and B.C. farms (CA$133,641) (B.C. Ministry of Agriculture and Lands, Sustainable Agriculture Management Branch, 2009). The higher average gross farm receipts are due largely to farms producing commodities under the province's Supply Management program, which regulates production through a quota system and sets wholesale prices (Hamilton, 2011). Eggs, poultry, and dairy are the Supply Managed commodities. Otherwise 46 percent of Surrey agriculture operations (226 farms) report gross receipts of less than CA$10,000, reflecting a high incidence of minimally lucrative farm operations (Boyd, 1998; B.C.

Figure 2. ALR Boundary and Municipal Agriculture Zones in Surrey, B.C.



Ministry of Agriculture and Lands, Sustainable Agriculture Management Branch, 2009; Morton, 2008).

The City of Surrey, like other jurisdictions in southwest B.C. and elsewhere, is demonstrably committed to preserving its farmlands and supporting the agri-food sector, including local production and supply (Cantrell, Colasanti, Goddeeris, Lucas, & McCauley, 2013; City of Surrey, 2008a; District of Maple Ridge, 2009; Esseks, Oberholtzer, Clancy, Lapping, & Zurbrugg, 2008; Kent Agricultural Advisory Com-

Table 1. Agricultural Land Use Activities on ALR Land in Surrey, BC (2006)

Agricultural Land Use Activity	Number of Parcels	Total Area (ha | acre)	Percent of Surrey ALR in this Use
Forage and Pasture	226	1,934 | 4,779	22%
Berries	140	1,068 | 2,639	12%
Field Vegetables	113	845 | 2,088	10%
Horse Farms, Stables, and Riding Facilities	46	305 | 754	4%
Beef Cattle	45	462 | 1,142	5%
Nurseries and Tree Farms	35	233 | 576	3%
Specialty Crops	23	154 | 381	2%
Dairy Farms	18	456 | 1,127	5%
Poultry Farms	16	92 | 227	1%
Specialty Livestock	16	60 | 148	1%
Greenhouse Operations	15	140 | 346	2%
Agritourism and/or Crop Preparation or Processing	9	83 | 205	1%
Sheep and/or Goat Farms	8	33 | 82	0%
Total	**710**	**5865 | 14,493**	**67%**

British Columbia [B.C.] Ministry of Agriculture and Lands. (2005). City of Surrey agricultural land use inventory 2004. Victoria, B.C.: Author. Retrieved from http://www.surrey.ca/

mittee, 2004). The Surrey Economic Development Strategy states that "Surrey's agricultural land deserves continued protection as part of creating a more sustainable region that can meet a share of its food needs locally. This requires a long-term vision and commitment in view of increased pressure to convert agricultural land to other uses" (City of Surrey, 2008b, p. 26). To this end the municipality enacted a unique policy in 2004 that requires placing two units of land of comparable quality into the ALR for every one removed (Policy for Considering Applications for Exclusion of Land from the Agricultural Land Reserve, Policy 0-51) (City of Surrey, 2004). This policy has greatly curtailed ALR land withdrawal within Surrey. Despite the municipality's commitment to farming and food systems, however, virtually all ALR land is valued well above that commensurate with any agricultural use, often at prices exceeding CA$250,000 per hectare (Condon et al., 2010). ALR lands at the urban–ALR interface are reported to be valued at CA$2 million or more per hectare. Much ALR land is owned in speculation. Other ALR lands are purchased for "rural residences" and estates, including "hobby" farms and farms used for tax abatement purposes (Boyd, 1998; Stobbe, Cotteleer, & van Kooten, 2009). In Surrey, evidence suggests that virtually no agricultural land is bought or sold for agriculture (Mullinix, Fallick, & Dorward, 2012).

Recognizing that a significant quantity of Surrey ALR lands are extensively subdivided and held in speculation, and that such disposition often leads to non-agricultural use and land degradation, the municipality sought to curtail ALR land misuse. It sought to do so by identifying and understanding the nature of its ALR lands that were underutilized for agriculture and assessing their potential to be used for agriculture and thus to contribute to the local food system and economy. Understanding the nature and potential of these ALR lands is seen as a first step to create strategies and programs to utilize these lands for agricultural purposes and to curtail resource diminution. As such it was the objective of our study to:

1. Identify historic trends and patterns of Surrey ALR land loss;
2. Ascertain the quantity and qualities of the city's underutilized ALR lands;
3. Estimate the local food production potential of these lands if used for small-scale agriculture;
4. Estimate the income-generation potential of these lands if used for small-scale agriculture; and
5. Estimate the job-creation potential of small-scale agricultural operations on these lands.

Materials and Methods

Assessment of ALR Land Loss
To identify historic patterns and trends of ALR land loss in Surrey between 1973 (ALR inception) and 2010, we reviewed and evaluated exclusion application documents held at the Agricultural Land Commission (ALC — the independent administrative tribunal responsible for administering the ALR in support of agriculture and adjudication of exclusion and nonfarm use applications). We also compared Surrey historical zoning maps to contemporary maps.

Assessment of Currently Underutilized ALR Lands
At the time of this study (2010–11) the most recent City of Surrey land use data came from an agricultural land use inventory completed by the Ministry of Agriculture and Lands in 2004 (British Columbia Ministry of Agriculture and Lands, 2005). That inventory indicated that 669 ALR parcels composing 7,500 hectares (18,533 acres) (33% of Surrey's ALR) were underutilized for agriculture. Eighty-three parcels we could not locate were excluded from analysis. To assess how much of the land deemed underutilized in 2004 remained underutilized in 2011, we conducted an inventory of the identified parcels. Using a combination of roadside visual inspection and aerial photography interpretation, the following key data were collected for each:

- The parcel's primary land use;
- A description of any permanent structures present on the parcel (e.g., homes, outbuildings, driveways, etc.), and estimation of the portion of the property they occupied as a percentage of the whole parcel;
- The portion of the parcel available for agriculture-related activities (ARAs), recorded as a percentage of the whole;
- The general type of ARAs the parcel had potential to support as standardized into two categories:

    1. Soil-based agriculture, or
    2. Structure-based agriculture (including greenhouse/hoop house, raised bed, aquaculture, apiculture, or livestock barn), and/or food-system services (those services required to support small-scale local agriculture, including preproduction and production services, post-harvest services, and distribution and supply services).

    This determination was based upon an assessment of the parcels' land cover, arable soil availability, proximity to major intersections, and current use(s). In general, land with an available soil resource was considered to have potential for any type of ARA, and land that was paved or had an otherwise degraded soil base was considered to have potential for structure-based agriculture or food-system services.
- The type of remediation necessary to make the parcel available for the selected ARAs was standardized into the following categories: change of use (from nonproduction to production), land clearing (tree and brush removal followed by tillage), structure reclamation or development (for structure-based agriculture), field preparation (mowing followed by tillage), or minimal to none (essentially ready for farming).

Calculation of Economic and Job Creation Potential
To estimate the potential of Surrey's underutilized ALR lands to contribute to the local economy via income generation and job creation if brought into small-scale, human-intensive, direct-market agriculture, we evaluated 12 scenarios. Scenarios were composed of three land apportionments: 0.4 hectare (1 acre) of underutilized ALR land; City of Surrey–owned underutilized ALR land (113 hectares or 279 acres), and all underutilized ALR land within Surrey (1352 hectares or 3,341 acres), and four production schemes:

- **Scheme 1: Highly diversified crops and products**
  Production of 29 fruit and vegetable crops, honey, and two small-animal products: apple, asparagus, beet, bell pepper, broccoli, Brussels sprout, cabbage, carrot,

cauliflower, Chinese cabbage, cucumbers, eggs, garlic, honey, hazelnut, kale, lamb, lettuce, pak choy, pear, green bean, potato, pumpkin, radish, snow pea, spinach, sweet corn, table grape, turnip, tomato, yellow onion, and zucchini.

- **Scheme 2: Labor-intensive crops**
  Production of 10 highly labor-intensive crops: spinach, carrot, snow pea, turnip, tomato, apple, beet, garlic, radish, bell pepper.
- **Scheme 3: Highly profitable crops**
  Production of ten highly profitable crops: spinach, pak choy, snow pea, Chinese cabbage, beet, pumpkin, cabbage, radish, turnip, carrot.
- **Scheme 4: Extensively consumed crops and products**
  Production of 10 extensively consumed products: potato, eggs, apple, lettuce, onion, tomato, carrot, cabbage, table grape, cucumber.

Crop-specific production cost, labor cost, and yield data were obtained from published enterprise budgets. Every effort was made to obtain and use the most up-to-date enterprise budgets pertaining to southwest British Columbia (Beale, Dill, & Johnson, 2008; B.C. Ministry of Agriculture and Lands, 2005, 2006, 2008a, 2008b, B.C. Ministry of Agriculture and Lands, Sustainable Agriculture Management Branch, 2009; B.C. Ministry of Agriculture, Fisheries and Food, 1993, 2001a, 2001b, 2002; Grimsrud, 1998; Gunner, 1993, 1994; Seavert, Andrews, Bubl, McReynolds, & Freeborn, 2007). In instances where such budgets were not available (the case for five crops), we selected enterprise budgets from other locales, including Oregon, Maryland, and the B.C. Okanagan Valley. Fixed costs in the enterprise budgets we used were based on larger operations and were not easily proportioned to our smallest land allocation scenario. For that reason, for the 0.4 hectare (1 acre) farm scenario analysis we increased fixed costs from those used for all other scenarios in recognition that very small farms can expect to incur higher per-acre fixed costs than larger operations. When U.S. enterprise budgets were used, we converted monetary values based on the annual exchange rate per the Bank of Canada (2013). A fixed cost per acre of CA$1,000 was included for land rent. This value is considered high in light of our conversations with small-scale farmers in the region, and published approximations of lease rates for comparable agriculture uses (Koopmans, 2010).

Recognizing the inherent variability in farming yields and wanting to have higher levels of confidence in our calculations, we decreased enterprise budget yield values by 15 percent and increased costs of production values by 10 percent, after inflation adjustment.

Field labor requirements were reported in a variety of formats in the enterprise budgets, so it was necessary to convert to a standard labor hour unit. If the enterprise budget indicated the total number of hours needed to produce the crop, these values were used. If field labor costs were reported as piece rate, we derived total labor hours by assuming a CA$12/hour base wage rate and dividing labor costs by the hourly wage. Labor hours for each scenario were converted to full-time equivalent–field labor (FTEFL) units based on 40 hours per week for 48 work weeks per year. Because small-scale, human-intensive farming operations require management to develop the business and oversee production, processing, direct marketing, and other tasks, and because the enterprise budgets used to estimate farm labor requirements did not generally include these functions, we included a "full time equivalent–owner/operator" (FTEOO) category in the estimate of job creation and eliminated management as a cost. Further, we assumed owner/operators would derive remuneration from net farm income. Based on the demands of small-scale, human-intensive, direct-market production agriculture, we assumed one FTEOO was required per five acres in production.

Job creation potential was expressed as Full Time Equivalent Total (FTE Total) and calculated as follows:

$$FTE\ Total = FTEFL + FTEOO$$

For this study we used a static price structure. We did not attempt to calculate the changes in

price that may result from an increase in supply, and we assumed that additional produce brought to market would be bought by consumers willing to pay for locally grown produce at the prices used. We also assumed that farmers could sell 100 percent of their products via direct market channels at prices similar to those currently obtained at farmers' markets or retail. We did not account for possible shrinkage between field and sales. In 2009 we surveyed pricing structures at regional farmers' markets and in 2011 did the same at Surrey grocery stores. These data were used to estimate a direct market price, expressed in Canadian dollars (CA$) per pound or per dozen, for each of the 29 crops and three animal products used in our analysis; 2009 data were adjusted to 2011 dollars using the Consumer Price Index.

Prices used in our analysis were chosen preferentially in the following order:

1. "Farmers' market" prices were used when available; 44 percent of the prices we used are from local farmers' markets.
2. Where farmers' market prices were not available, we used "local" product prices at retail stores.
3. Where local product prices were not available, we used "local, organic" product prices at retail stores.
4. Where local, organic, product prices were not available, we used "organic" retail prices.

In instances where more than one preferred pricing data point was available (e.g., three sources for local, organic cabbage), an average was calculated. Prices used (table 2) were considered representative of that which small-scale farmers could expect when direct marketing high quality, local produce.

Table 2. Crop Prices Used in Calculation of Economic Potential of Underutilized Agricultural Land Reserve Lands in Surrey, B.C.

	Crop	Price[a]	Price Type
Vegetables	Asparagus	$4.98	Organic
	Beet	$2.88	Farmers' Market
	Bell Pepper	$3.98	Local, Organic
	Broccoli	$2.36	Farmers' Market
	Brussel Sprout	$1.98	Local, Organic
	Cabbage	$1.68	Farmers' Market
	Carrot	$2.33	Farmers' Market
	Cauliflower	$3.67	Farmers' Market
	Chinese Cabbage	$1.68	[b]
	Cucumber	$2.36	Farmers' Market
	Garlic	$9.43	Farmers' Market
	Green Bean	$3.99	Local, Organic
	Kale	$4.00	Organic
	Lettuce	$1.31	Local, Organic
	Pak Choy	$3.98	Farmers' Market
	Potato	$1.93	Farmers' Market
	Pumpkin	$1.70	Farmers' Market
	Radish	$2.48	Local, Organic
	Snow Pea	$7.98	Organic
	Spinach	$7.98	Organic
	Sweet Corn	$1.04	Unknown
	Tomato	$1.70	Farmers' Market
	Turnip	$1.24	Average
	Yellow Onion	$1.09	Average
	Zucchini	$1.70	Farmers' Market
Animal Products	Egg Production	$6.14	Average
	Honey	$7.27	Local
	Lamb[c]	$8.00	Local
Fruit and Nuts	Apple	$1.98	Farmers' Market
	Hazelnut	$14.02	Average
	Pear	$2.35	Farmers' Market
	Table Grape	$3.13	Farmers' Market

Average indicates that an average price was derived based on collected data.
[a] Price of eggs is per dozen. All other prices indicated are prices per pound.
[b] Prices for cabbage were used as a proxy for Chinese Cabbage.
[c] The Farmers Market price indicated for lamb is for the cut dressed weight and was gathered in an interview with a local lamb producer who sells through direct marketing channels.

Calculation of Food Production and Consumption Satisfaction Potential

Annual per-capita consumption rates were derived

from Statistics Canada and USDA food disappearance data (B.C. Ministry of Agriculture and Lands, 2006; Conner, Becot, Hoffer, Kahler, Sawyer, & Berlin, 2013; Desjardins, MacRae, & Schumilas, 2010; Grewal & Grewal, 2011; Statistics Canada, 2010; U.S. Department of Agriculture, Economic Research Service, 2011). To estimate potential of underutilized lands to produce foods sufficient to satisfy Surrey's food consumption over 6 months of the year the following formulas were used:

$$\text{Total 6 Month Food Consumption in Surrey} = [\text{Annual Per Capita Consumption} \div 2] \times 465{,}150$$

and;

$$\text{Acres Needed to Satisfy 100\% of Surrey's 6 Month Food Consumption} = \frac{[\text{Annual Per Capita Food Consumption} \div 2]}{\text{Yield/Acre}}$$

and;

$$\text{Potential of Land to Satisfy Surrey's 6 Month Consumption of Selected Food} = \frac{\text{Acres of Land Available}}{\text{Acres Needed to Satisfy 100\% of Surrey's 6 Month Consumption of Selected Foods}}$$

Results and Discussion

Assessment of ALR Land Loss

We reviewed all available records of ALR land exclusion and change-of-use applications, approved and denied. In 2006, the ALC launched an online archive of Commission decisions on ALR applications, which contains files associated with applications made for Surrey properties from 2006 through 2010. These included 14 applications for nonfarm use; nine applications for transportation, utility, and recreational use; six applications for subdivision; one application to deposit fill; and one joint application for exclusion and inclusion that would result in a net gain to the ALR area. Records for these applications generally included copies of ALC staff reports with information about the nature of the application and the subject property, minutes from the ALC meeting held to discuss and decide on the application, and a copy of the final decision letter sent to the applicant. Other supporting documentation, including the applicant's submission and rationale for making the request, was in most cases not available in these online records.

For records of applications that predate 2006, only hard-copy archive files were available. Despite our interest in applications of all types, ALC staff were only able to retrieve those archive files associated with exclusion applications from 1973 to 2005. Applications for nonfarm use, to deposit fill or remove soil, and for transportation, utility, and recreational trail use were not available. Due to this limitation, it was only possible to complete an historical analysis of exclusion applications; other application types were not analyzed. Twenty-eight applications for exclusion were reviewed in hard-copy format at the ALC.

A total of 29 exclusion applications were made in Surrey over the 37-year study period, 10 of which were approved and nine of which were approved in part or with conditions. As a result, 95 hectares (235 acres) were lost from the ALR, or about 1% of Surrey's total ALR land base. In comparison, Metro Vancouver lost 9% of its ALR in approximately the same timeframe (Provincial Agricultural Land Commission, 2011).

Although the Surrey rate of approval (66%) seems relatively high, it was noted that all applications for exclusion occurred before December 2003, the date on which Surrey's Policy O-51 (two acres for one policy) came into effect. Since, there are no records of exclusion applications being made for ALR land in Surrey. It would appear that this policy has effectively put a moratorium on the exclusion of land, although its effect on the rate of application for nonfarm use, subdivision, soil deposition, transportation, or boundary adjustments could not be measured due to a lack of data about these types of applications before the bylaw came into effect.

A significant challenge to the intended research stemmed from the fact that historical records related to ALR applications were either incomplete or, in the case of subdivision or nonfarm use records, unavailable. From both online records and

hard-copy archives, we made every attempt to collect comprehensive information related to the application, the parcel affected, the City of Surrey's recommendations, and the ALC's decision-making process. In many instances, however, records were incomplete and we were thus unable to retrieve information related to all of these factors. These data gaps made objective analysis difficult and the identification of consistent trends impossible. Without complete information it proved impossible to comprehensively and conclusively identify the determinants of ALR land loss and change.

We were, however, able to locate and map properties for which exclusion applications were made between 1973 and 2010. In so doing we noted a seemingly significant "edge effect" in that all exclusion applications (both successful and unsuccessful) were found to have occurred on ALR properties proximal to the ALR- urban interface. Although this suggests that the edge is most at risk to exclusion, there has not been a single successful exclusion application made since the passing of Policy O-51 in 2004. Anecdotal information from local real estate agents revealed that current land values are higher at the edge, which indicates that these properties may be subject to speculative valuation or seen as suitable sites for nonfarm use, though not necessarily via exclusion (Mullinix et al., 2012; Penner, 2008).

Assessment of Currently Underutilized ALR Lands

While exclusion of ALR lands seems to pose only a minor threat to the integrity of the municipality's agricultural land base, our analysis revealed a more troubling dynamic occurring *inside* the ALR: the high incidence of its use for non-agricultural purposes. Our analysis revealed that at least 556 parcels remained underutilized for agriculture in 2011, amounting to 2,446 hectares or 27 percent of Surrey's ALR. These parcels underutilized for agriculture are typically small in size, with 50 percent being 2.4 hectares (5.9 acres) or smaller and 78 percent 5 hectares (12 acres) or smaller. While the majority of underutilized parcels (90%) are privately owned, a small number are owned by public institutions including the City of Surrey, the Surrey School Board, the provincial government, and the BC Hydro and Power Authority (BC Hydro). Most of these parcels are currently public parks with varying levels of development. None of the underutilized parcels is federally owned.

Some parcels within the underutilized ALR land are largely undeveloped and thus potentially usable for production agriculture in their entirety. Not all parcels, however, are necessarily available or suitable for agriculture-related activities. Buildings, residences, or other structures are typically found on ALR parcels used for commercial, industrial, institutional, and residential purposes. These structures, though technically impermanent, effectively render portions of each property not amenable to agriculture or food-system services in the near future. We considered the portion of underutilized land occupied by structures, calculated to be 334 hectares (825 acres), to be permanently alienated from agriculture, and so subtracted that amount from our estimate of total underutilized land area. Based on a lack of information regarding the feasibility and cost of their reclamation, 531 hectares (1,312 acres) of Surrey ALR land currently occupied by golf courses was also deemed permanently alienated to agriculture and subtracted from the total inventory of underutilized ALR. Likewise, 144 hectares (356 acres) of land in other non-agricultural uses (including water management areas, wildlife management areas, and transportation and communication corridors) were considered unlikely to be utilized for agriculture because they support important ecosystem or infrastructure services that are essential for Surrey's urban and agricultural communities; their area was subtracted from the total underutilized area**.** Thus we were able to conservatively estimate that 1,351 hectares (3,338 acres) of Surrey's currently underutilized ALR land could be used for small-scale, human-intensive agriculture. Five hundred hectares (1,236 acres) of this land would require reclamation such as change of use, logging, and brush clearing.

Calculation of Income Generation and Job Creation Potential

Our first scenario, 0.4 hectare (one acre), is representative of a single, very small-scale farm. Many beginning, direct market, peri-urban farmers enter the industry farming at this or a similar scale (Mullinix et al., 2012). Our analysis indicates that

farms of this scale can employ between 1 and 1.29 people full time, and generate up to CA$36,989 annually in return to the owner/operator. The average income in Surrey in 2006 was CA$32,733 (City of Surrey, 2008c). Crop choice greatly affects farm profitability at this scale of production, as revenue potential for the "10 most valuable crops or animal products" scenario is more than double that of the "29 crops and 3 animal products" scenario (table 3). Because we increased, and likely overestimated, fixed costs for the 0.4 hectare scenarios, we may have underestimated potential net revenue, but in so doing offer a more conservative estimation. The figures generated in this analysis corroborate anecdotal financial information gathered in interviews with small-scale farmers in the Surrey area, and other reports (Mullinix et al., 2012; Stobbe et al., 2010).

Our second suite of land and production scenarios was calculated for the utilization of all underutilized ALR lands owned by the City of Surrey (113 hectares or 279 acres). If these lands were brought into small-scale agricultural production, they would have the potential to contribute over CA$15 million in gross revenue to Surrey's economy and create between 100 and 136 full-time jobs (table 4).

We recognize that many ideas for the use of this land already exist; this analysis provides an assessment of what would be possible in the near future if the City of Surrey were to take a progressive and active role in supporting new and small-scale farmers in the municipality, and make municipally owned land available to them for agriculture. In the future, cities like Surrey may be compelled to procure agriculture lands for such a purpose (Condon et al, 2010).

Our final scenario of land allocation and production analyzes the potential of all underutilized ALR parcels in the City of Surrey (1,351 hectares or 3,338 acres) if brought into agricultural production under the same four cropping alternatives (table 5). This includes land that is both privately owned and owned by the City of Surrey. If all 1,351 hectares (3,338 acres) of land currently underutilized for agriculture were brought into production, they would have the potential to contribute over CA$186 million in gross receipts to Surrey's agriculture sector. This would more than double the current economic magnitude of the industry. The enterprises on this land could employ between 1,188 and 1,623 full-time employees.

Calculation of Food Production and Consumption Satisfaction Potential

Our analysis reveals that Surrey's underutilized land has the capacity to make significant contributions to the community's food supply. Taking into

Table 3. Economic and Job Creation Potential of 0.4 ha (1 acre) of Underutilized ALR Land in Surrey, B.C., Under Four Production Schemes

		Potential Revenue Generated (all CA$)		Potential Jobs Created	
		Gross Revenue	Return to Owner/Operator	FTEFL*	FTEOO*
Production Scheme	29 Crops, Products, and Honey [a]	$34,779	$19,182	0.16	1
	10 Most Labor-Intensive Crops [b]	$43,817	$23,578	0.29	1
	10 Most Profitable Crops [c]	$54,813	$36,968	0.23	1
	10 Most Highly Consumed Crops and Products [d]	$31,165	$14,443	0.18	1

[a] Apples, asparagus, beet, bell pepper, broccoli, Brussels Sprout, cabbage, carrot, cauliflower, Chinese cabbage, cucumber, garlic, green bean, lettuce, hazelnut, kale, pak choy, pear, potato, pumpkin, radish, snow pea, spinach, sweet corn, table grape, turnip, tomato, yellow onion, zucchini, and honey. All crops grown on one-twenty-ninth acre.
[b] Tomato, snow pea, turnip, apple, beet, garlic, carrot, radish, bell pepper, potato. All grown on one-tenth acre.
[c] Spinach, pak choy, snow pea, Chinese cabbage, beet, pumpkin, cabbage, radish, turnip, carrot. All grown on one-tenth acre.
[d] Potato, apple, lettuce, yellow onion, tomato, carrot, cabbage, table grape, cucumber, bell pepper. All grown on one-tenth acre.
* FTEFL (full-time equivalent–field labor) and FTEOO (full-time equivalent–owner/operator)

Table 4. Economic and Job Creation Potential of 113 ha (279 acres) of Municipally Owned Underutilized ALR Land in Surrey, B.C., Under Four Production Schemes

		Potential Revenue Generated (all CA$)		Potential Jobs Created	
		Gross Revenue	Return to Owner/Operator	FTEFL*	FTEOO*
Production Scheme	29 Crops, 2 Animal Products, and Honey [a]	$9,454,419	$6,110,457	44	56
	10 Most Labor Intensive Crops and Animal Products [b]	$12,268,898	$7,715,140	80	56
	10 Most Profitable Crops and Animal Products [c]	$15,347,607	$11,464,525	66	56
	10 Most Highly Consumed Crops and Animal Products [d]	$8,511,718	$4,871,498	48	56

[a] Apples, asparagus, beet, bell pepper, broccoli, Brussels Sprout, cabbage, carrot, cauliflower, Chinese cabbage, cucumber, garlic, green bean, lettuce, hazelnut, kale, pak choy, pear, potato, pumpkin, radish, snow pea, spinach, sweet corn, table grape, turnip, tomato, yellow onion, zucchini, and honey. All crops grown on one-twenty-ninth acre.
[b] Tomato, snow pea, turnip, apple, beet, garlic, carrot, radish, bell pepper, potato. All grown on one-tenth acre.
[c] Spinach, pak choy, snow pea, Chinese cabbage, beet, pumpkin, cabbage, radish, turnip, carrot. All grown on one-tenth acre.
[d] Potato, apple, lettuce, yellow onion, tomato, carrot, cabbage, table grape, cucumber, bell pepper. All grown on one-tenth acre.
* FTEFL (full-time equivalent–field labor) and FTEOO (full-time equivalent–owner/operator)

Table 5. Economic and Job Creation Potential of 1351 ha (279 acres) of Underutilized ALR land in Surrey, B.C., Under Four Production Schemes

		Potential Revenue Generated (all in CA$)		Potential Jobs Created	
		Gross Revenue	Return to Owner/Operator	FTEFL *	FTEOO*
Production Scheme	29 Crops, 2 Animal Products, and Honey [a]	$113,440,053	$72,922,342	520	668
	10 Most Labor-Intensive Crops and Animal Products [b]	$146,350,426	$92,003,041	955	668
	10 Most Profitable Crops and Animal Products [c]	$183,075,030	$136,714,466	783	668
	10 Most Highly Consumed Crops and Animal Products [d]	$101,532,639	$58,092,610	571	668

[a] Apples, asparagus, beet, bell pepper, broccoli, Brussels Sprout, cabbage, carrot, cauliflower, Chinese cabbage, cucumber, garlic, green bean, lettuce, hazelnut, kale, pak choy, pear, potato, pumpkin, radish, snow pea, spinach, sweet corn, table grape, turnip, tomato, yellow onion, zucchini, and honey. All crops grown on one-twenty-ninth acre.
[b] Tomato, snow pea, turnip, apple, beet, garlic, carrot, radish, bell pepper, potato. All grown on one-tenth acre.
[c] Spinach, pak choy, snow pea, Chinese cabbage, beet, pumpkin, cabbage, radish, turnip, carrot. All grown on one-tenth acre.
[d] Potato, apple, lettuce, yellow onion, tomato, carrot, cabbage, table grape, cucumber, bell pepper. All grown on one-tenth acre..
* FTEFL (full-time equivalent–field labor) and FTEOO (full-time equivalent–owner/operator)

Table 6. Land Needed to Satisfy Consumption Rates for Population of Surrey, B.C.

Crop	Consumption Per Person (lb./year)	Consumption of Total Surrey Population (lb./year)	Hectares | Acres to Produce 6 Month Supply for Surrey Population
Asparagus	1.5	717,835	38 | 94
Beet	1.4	656,307	8 | 20
Bell Pepper	9.7	4,501,853	115 | 284
Broccoli	6.4	2,963,634	90 | 222
Brussels Sprout	0.3	143,567	3 | 7
Cabbage	11.5	5,332,491	40 | 99
Carrot	15.9	7,373,194	74 | 183
Cauliflower	5.7	2,635,481	78 | 193
Chinese Cabbage	1.9	871,657	5 | 12
Cucumber	10.5	4,881,280	79 | 195
Garlic	1.0	451,211	31 | 77
Green Bean	2.1	984,460	94 | 232
Honey	1.4	666,561	n/a
Kale	0.3	139,545	83 | 205
Lamb	2.6	1,199,810	13 | 32
Lettuce	22.0	10,234,280	135 | 334
Pak Choy	1.1	511,665	8 | 20
Pear	4.8	2,245,799	80 | 198
Pumpkin	3.7	1,721,055	14 | 35
Radish	1.4	646,052	8 | 20
Snow Pea	0.7	317,898	7 | 17
Spinach	1.4	666,561	12 | 30
Sweet Corn	7.1	3,291,788	68 | 68
Tomato	16.4	7,619,309	79 | 195
Turnip	2.7	1,240,830	8 | 20
Yellow Onion	21.6	10,059,949	73 | 180
Zucchini	4.0	1,860,600	45 | 111
Hectares | Acres required to produce 100% of Surrey's consumption of listed crops for 6 months/year			**1,288 | 3,183**
Percent of Surreys' 6-month/year consumption of listed crops that could be produced on underutilized ALR			**105%**

Surrey's limited infrastructural capacity for processing and storage of crops, we based our calculations on food supply for six months of the year, which is the approximate growing season of most of these crops in Surrey's temperate coastal climate. Our analysis showed that Surrey's underutilized ALR lands could satisfy 100 percent of the municipality's consumption of 27 crops and animal products for six months of the year, if the land were used exclusively for the production of those products (table 6).

Conclusion

When we initiated this study, we thought that an assessment of the loss of Surrey's agricultural land from the ALR would yield useful information for planners and policy-makers involved in agriculture and land use planning, and who are seeking to protect the agricultural land base and enhance local agriculture in the municipality (American Planning Association, 2007; Morgan, 2009; Pothukuchi & Kaufman, 2000). The first Chairperson of the Agricultural Land Commission stated that the ALR was designed to protect B.C.'s agricultural land because, "in the face of increasing land use pressures, local governments were unable or unwilling to hold the line against

rezoning agricultural lands to purportedly 'higher and better uses'" (Runka, 2006, p. 1)). We assumed that Surrey's ALR lands were under significant threat of exclusion from the ALR through a variety of pressures including rapid urbanization, speculation from developers and non-agricultural interests, and expropriation for transportation and infrastructure requirements. Surprisingly, however, historical records revealed that very few Surrey parcels have, in fact, been lost to the ALR as a result of exclusion applications since 1973.

Protecting farmland, however, does not automatically or necessarily equate to utilization of those resources for agriculture (Pynn, 2008) or result in an economically robust agriculture sector that contributes to a region's economic health and vitality (Hamilton, 2011) and produces food for the local populace. If governments and citizens choose to invest in innovative agriculture on protected land, then the resulting local-regional food systems can increase business innovation and entrepreneurship, result in sector-specific economic growth, foster regional economic development, and support employment (Illinois Local and Organic Food and Farm Task Force, 2009; Meter & Rosales, 2001; O'Hara, 2011; Swenson, 2011). Direct marketing channels, such as farmers' markets and farm-gate sales, are identified as especially significant contributors, as these systems allow most, if not all, of sales revenue to be retained locally (Farmers Markets Canada, 2009; Pirog & McCann, 2009; Stobbe et al., 2009). Our study details the revenue, job creation, and food production potential of Surrey's underutilized lands if devoted to this type of agriculture.

We do not mean to suggest that all of the available underutilized ALR lands necessarily *should* be brought into agricultural production or that to the extent they were brought into production that precisely the income generation, job creation, or food provision levels presented herein would necessarily result. Rather, our assessment, based on the best data available, is meant to elucidate that the food production and economic potential of Surrey's underutilized ALR land is not trivial. In light of this, the value of Surrey's underutilized ALR parcels, many of them very small, should not be dismissed or overlooked by the City of Surrey or its residents. They hold immense, immediate value from food-production and economic-contribution perspectives.

Agriculturalists are astute entrepreneurs, traditionally attuned to responding to economic and regulatory signals. There is a growing recognition by agriculturalists and the broader society, reinforced by many market signals, of the emerging potential in the re-localization of food systems (Brinkley, 2012; Desjardins et al., 2010; Palan, 2005; Peters, Wilkins & Flick, 2006; Pothukuchi & Kaufman, 1999). However, the hegemony of the contemporary agri-food production and marketing system (Heffernan, 2005) and our economic environment in general has thus far precluded the substantial emergence of this sector. If its potential is to be fully realized, it will have to be supported and facilitated by governments, especially local governments, through policy, regulation, and programming (Ikerd, 2011; Pothukuchi, 2009; Pothukuchi & Kaufman, 1999; Sonnino, 2009). In Surrey specifically, the transition of these lands into full agricultural utilization is not without significant policy and strategic challenges, all of which relate to two underlying problems: nonfarmer ownership of ALR land, and limited resources and support for small-scale, human-intensive, alternate market farming. As the owner of approximately 113 hectares (279 acres) of underutilized ALR land, the City of Surrey has the opportunity to immediately address some of these challenges and set an example by assuring that their own land is utilized for agriculture. This could be achieved through protective covenants on the land, agriculture land-lease programs, and/or a farmland trust (Wittman, 2009). On nearby Vancouver Island, the District of Saanich rezoned a publicly owned parcel for agriculture in 2006. The district now leases that land to a registered charity that stewards it for farming by several successful small farm businesses (Haliburton Community Organic Farm, n.d.; The Land Conservancy of B.C., 2013).

For the City of Surrey, we also delineated many policy options for encouraging and supporting the use of privately owned agricultural lands for agriculture. Extensive discussion of those recommendations is not the subject of this report. However one potential, albeit likely highly controversial,

mechanism for municipalities to minimize effective loss of zoned and/or protected agriculture lands would be the creation and enforcement of strong regulations against, and penalties for, their non-agricultural use. Surrey's zoning bylaw currently permits the use of ALR parcels for a wide variety of non-agricultural purposes, including a number that could be prohibited under the provisions of the provincial ALC Act, such as commercial and hobby kennels and pet-breeding operations, hunting and wilderness survival training, and golf courses. To curtail speculative holding of agricultural land, municipalities could "tax" away the economic incentive for their development, by imposing development-cost levies and community amenity contribution assessments (Condon et al., 2010). Bringing forth an economic sector of this nature and magnitude will also require an extensive compliment of trained and committed agriculturists (Heinberg, 2006; Mullinix, Fallick, & Rallings, 2011). Surrey and other municipalities could facilitate or support appropriate education and extension programming.

Though the ALR is unique to British Columbia, agricultural land use planning and restrictive agricultural land use regulation is common in North America. Equally common are issues of nonfarmer ownership and nonfarm use of agricultural land, the development of and urban encroachment upon agricultural land, and scant recognition of the economic, job creation, and food production potential of small-scale alternate market agricultural enterprises in peri-urban locales. As such this study presents a method of assessing non-agricultural use and "effective land loss" of designated peri-urban agricultural land as well as their potential to contribute more substantively to regional economies and food systems that other jurisdictions can adapt and use. In doing so we have strengthened the case for food system regionalization.

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Access to farmland: A systems change perspective

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Abstract
While the topic of farmers' access to farmland is not a new issue, contemporary conditions have made it an even greater challenge than in the past. In this reflective essay I suggest that the farmland access challenge in the U.S. means thinking outside the box of ingrained cultural values, past historical arrangements, and current conditions. Using my organization, Land For Good, I argue that persistent challenges to farmland access will be addressed best through dialogue and innovation around how farms and farmland can optimally be accessed, held, and passed on. Land For Good, a New England–based not-for-profit organization, posits a systems change framework for farmland access, tenure, and transfer. This essay explores solutions in a broad context and addresses how farm seekers, landowners, service providers, communities, and policymakers all play key roles.

Keywords
access to land, farm leasing, farm linking, farm seekers, farm succession, farm transfer, farmland access, farmland owners, farmland tenure

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The Farmland Access Challenge
While the topic of farmers' access to farmland is not a new issue, contemporary conditions have made it an even greater challenge than in the past. Access to affordable agricultural land has posed problems for farmers throughout our nation's history (Parsons et al., 2010). "How farm land is acquired, held in ownership, operated, or rented has always been a matter of national interest, for just and fair conditions of tenure are recognized as essential to our national welfare" (Clark, 1944, p. 145). This quote from 1944 bears as much relevance to the farmland access challenge today as it did nearly 70 years ago. This "matter of national interest" is not just within the agricultural community; farmland access and tenure have economic, cultural, aesthetic, and quality-of-life impacts on entire communities.

The purpose of this essay is to use the experiences of Land For Good (LFG), a New England nonprofit specializing in farm access, tenure, and succession, to highlight and discuss current challenges and opportunities surrounding these issues. In my experience, current demographic, economic, and cultural trends have further compounded the persistent challenges facing farmers when it comes to gaining access to and secure tenure on farmland in the U.S. In this paper, I draw from my experi-

ence to make the case for a broad, systems approach to addressing farmland access. I address the various stakeholder sectors that play a necessary part in addressing the obstacles: beginning and other farm seekers, farming and nonfarming landowners, service providers, communities, and policy-makers. I share LFG's perspective, experiences, and challenges and argue for new thinking and dialogue.

Twenty-six years ago, I joined the staff of the New England Small Farm Institute (NESFI). At the time NESFI was negotiating a lease for 400 acres (162 hectares) of public land which it proposed in turn to sublease to start-up farmers. It took nearly the 17 years I was at NESFI to finalize that lease. During that time, I started one of the first farm link programs in the country, helped found the National Farm Transition Network,[1] and co-authored two guidebooks on farmland access and tenure (Higby, Ruhf, & Woloschuk, 2004; Ruhf, 1999). With partners, NESFI delivered workshops on farm succession throughout New England. During that time I also served for six years on the U.S. Department of Agriculture (USDA) Advisory Committee on Beginning Farmers and Ranchers, where access to land, capital, and training were enduring themes.

These experiences gave me a good grounding in the issues and practicalities around land access and tenure locally as well as nationally. When I joined Land For Good[2] nine years ago (now serving as executive director), it was with the intent to build an organization devoted to better understanding, educating about, and improving how farmers acquire, hold, and pass on farms. In the near-decade since then, I've seen farmland access become a much higher profile topic for local food advocacy and conservation groups as well as for the USDA. I've also deepened my appreciation for the complexity of the topic.

Between 1982 and 2007, more than 23 million acres of farmland were lost to development (American Farmland Trust, n.d.) despite efforts to staunch the loss of agricultural land to other uses. By one estimate, 70 percent of the remaining farmland will change hands over the next two decades (Kohl & White, 2001). Our aging farmer demographic reflects not only a slowed rate of exit by older farmers, but a decline in the rate of farm entry, with less than 2 percent of farmland owners under the age of 35 (USDA, NASS, 1999). One consequence is that farm ownership is increasingly concentrated among older farmers. We observe how established farmers compete for additional available acres with two consequences: a growing trend toward part-owner-operator (own some land and rent some land) and less opportunity for new farmers to acquire land through purchase or rent. Along with availability, the cost of land is a huge obstacle. In just eight years (2000–2008), U.S. farmland values more than doubled (USDA, NASS, 2009), making "the entrance bar to farming…higher and higher" (Bell, p. 52).

From my perspective, cultural values — specifically those favoring ownership of land — undergird these challenges. The culture of property ownership is deeply engrained in our society. The Jeffersonian agrarian ideal of independent farmers owning their own land retains its potency. Despite high land prices, the reality that approximately one-third of principle operators rent some or all of the land they farm, and findings that farmers starting out without landownership debt (i.e., those on rented land) are more likely to succeed (Dodson, 1996), land ownership still prevails as a goal for many farmers.

The word "tenure" derives from the Latin word *tenir*, meaning *to hold*. Our present day land-holding challenge is to foster what in 1909 Liberty Hyde Bailey called the "equitable partition of land [which is] the necessary basis of all self-sustaining agriculture" (Bailey, 1909, p. 70). Bailey's "equitable partition of land" may take the form of ownership of land or the form of recognized rights to use land and related natural and built resources for farming. Tenancy has long been recommended as a first step for beginning farmers (Bell, 2004). At the same time, tenancy in the U.S. has been controversial. This controversy stems in part from regional histories, particularly in the South with the abysmal story of sharecropping. As pointed out in 1936, however, "The evil is not in renting land; it is in the traditions and usages which have grown up about

[1] http://www.farmtransition.org
[2] http://www.landforgood.org

the share tenant group in the old South" (Embree, 1936, p. 149). To me, cultural attitudes about farmland tenure are integral to this discussion. How farmers, landowners, and lenders feel about tenancy shape current reality as well as what might be possible.

From my perspective addressing farmland access means not simply putting more farmers on land using established mechanisms, although this is a worthy and necessary objective. Improving farmland access now and into the future means thinking of land access beyond ingrained cultural values, past historical arrangements, and current conditions. I believe that persistent challenges to farmland access will be addressed best through dialogue and innovation around how farms and farmland can optimally be accessed, held, and passed on.

The underlying assumption that guides LFG is that society will benefit from enabling types of farmland tenure that are more appropriate and more beneficial for more farmers while also meeting the needs of landowners and the land itself. That is our goal in addressing the farmland access challenge.

LFG's basic framework is to make farms and farmland:

- Available (enough land in a suitable location that is accessible and findable);
- Affordable (for purchase or rent; not the same as cheaper land);
- Appropriate (for farming and related uses, security, housing, infrastructure); and
- Equitable (division of rights and responsibilities between the landowner and the operator, equity).

Appropriate approaches to farmland tenure may take multiple forms, depending on farmer goals and values, local conditions, cultural context, economics, stage and type of farming, and more. These approaches will reflect a range of core values that in my opinion currently are not well enough lifted up into the discussion. Values are part of the land access challenge, as much as price, policy, and preference. Do we want to strive for the Jeffersonian ideal of "widely dispersed ownership of land by family farmers" (Higby et al., 2004) in the face of increasing concentration of farmland ownership, public policies that reinforce land ownership, and the reality that about 40 percent of U.S. farmland is rented?

What are the values embedded in business models that emphasize control of an asset over ownership, and do they apply to agriculture? What are the values that undergird the landowner/land user dynamic? In our framework, farmland access and tenure are shaped by broader value systems as well. For us, these include:

- Environmental stewardship values at the farm, community, regional, and global levels;
- Cultural values associated with place, tradition, relationships, and agrarian legacy;
- Social values regarding equity, opportunity, and diversity; and
- Economic values regarding ownership and control of business assets.

A Systems Response

My 26 years in farm and food systems work have shaped me as a systems thinker. To me, given the rapid pace of change and the complexity of the issue, analyzing and transforming farmland access and tenure require systems thinking. In my systems approach I look at the problem from multiple angles, contexts and levels — and try to understand the connections among them. I consider the various stakeholders and forces (economic, demographic, cultural, policy, etc.) that influence and are influenced by how farmers acquire, hold, and transfer farm properties. And I try to understand these systems of farmland access, tenure, and transfer in a larger context; that is, how they function within and interact with other important systems from a specific farm enterprise system, to regional or national agri-food systems, and broad socio-economic or cultural systems. At LFG we seek to consider how farmland access shapes — and is shaped by — these other systems.

Given the high cultural value placed on property ownership in the U.S., applying systems thinking to land access and its larger contexts is not simply an academic exercise. At LFG our under-

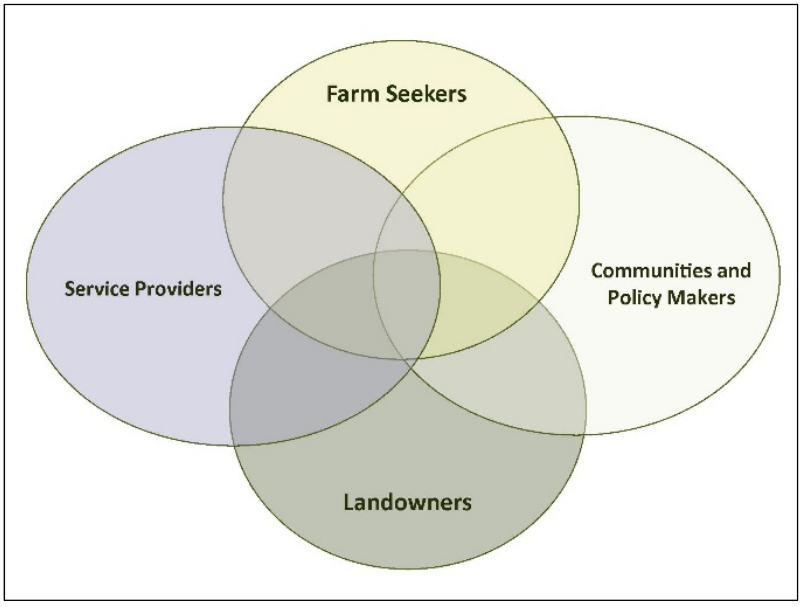
standing of and assumptions about these dynamic systems are fundamental to how we define the problem, as well as how we design our strategies and monitor our progress. LFG is a not-for-profit organization that works in the six-state New England region (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont). We specialize in farmland access, tenure, and transfer. Employing a systems approach, LFG believes that how land is acquired cannot be separated from how it is held over time and how it is transferred. In this framework, the key stakeholders include farm seekers, established farmers, landowners, service providers, communities, and policymakers (figure 1). Each of these stakeholder groups has an integral part to play in improving access to — and appropriately secure tenure on — productive farmland over generations. This is not a revolutionary framework in itself. Our contribution is to emphasize the interplay among these stakeholders at the program and policy levels.

Who Are Farm Seekers?

Farm seekers are new and beginning farmers who want to access land for the first time or scale up their operations, as well as establish farmers who want to expand or relocate their farms. Access to land is a particular obstacle for new and beginning farmers. A survey of new farmers by the National Young Farmers Coalition identified access to land as a top challenge (Shute, 2011). The 2013 annual survey by the American Farm Bureau Federation substantiated this finding: "Securing adequate land…was the top challenge identified in the latest survey of participants in the American Farm Bureau Federation's Young Farmers & Ranchers program" (American Farm Bureau Federation, 2013, para. 1). The traditional pattern of young farmers starting out through intrafamily succession accounted for less than half of farmland acquisitions in the 1980s (Rogers & Wunderlich, 1993), and one study found that less than a quarter of farm acquisitions were through inheritance (Duffy & Smith, 2009). The most common method of acquiring land for beginning as well as established farmers is from a non-relative (USDA, 2013).

Beginning farmers in the 21st century are a heterogeneous group. Using the USDA definition, a beginning farmer is an individual or entity who has never operated a farm or ranch, or who has operated a farm or ranch for not more than 10 consecutive years. Further distinctions are useful. Using the typology developed by the Growing New Farmers Project (New England Small Farm Institute, 2004), people who plan to farm but are not yet farming ("prospective" farmers) have different ideas and needs about land than start-up farmers (those in their first three years of farming), and than those who are reconfiguring their operation, expanding, and/or relocating in years four through 10 of farming. Within the beginning farmer demographic, socially disadvantaged, minority, women, immigrant, refugee, and veteran farmers have unique challenges in accessing land to farm (Parsons et al., 2010). Established farmers are not exempt from land access and tenure challenges such as competition for land, escalating rental rates, financing issues, conservation investments and other improvements, and navigating landlords and farm programs.

Figure 1. Components of the Land Access "System"



Who Are Landowners?

For this discussion, a landowner is any person(s) or any entity who owns land with agricultural uses or potential. As stressed above, access to land is as much about who owns the land as who hopes to access and use it. And, as with farm seekers, the landowning demographic is heterogeneous. From a systems perspective, we have to understand and work with all types of owners to improve access to farmland.

We (and others) divide farmland owners into two major categories: those who farm and those who don't. In our experience, farming landowners typically are established farmers who own at least some of the land they farm. They may rent out some of the land they own to other farmers. For this discussion, the most significant cohort within the farming landowner category is older operators. "If older farmers can't easily exit, their land can't become available to entering farmers" (Parsons et al., 2010, p. 10). Much discussion exists (for example, Parsons et al., 2010) about the aging farmer demographic, and in particular around the pressing challenges related to farm exit. Farmers are living longer and postponing retirement; some say they will "never retire" (Baker, Duffy, & Lamberti, 2000). In one study, 82 percent of farmers did not have an exit strategy nor did they know how to develop one (Spafford, 2006).

We studied factors that influence farmers' reluctance to engage in timely succession planning. In market research commissioned by Land For Good, the most often reported reasons include not enough time to plan, and being "not ready yet" (Aschkenase, Babbitt, & Wilbur, 2010). Beneath this often are emotions such as anxiety, fear, and sadness, as well as family dynamics and perceptions of daunting legal and financial complexities. Current and future farm viability, income during retirement, and treatment of farming and nonfarming heirs are crucial considerations. Increasingly, one of the biggest obstacles is not having an identified successor. In one Iowa study, less than one-third of retiring farmers had identified a successor (Baker et al., 2000).

The other main category of farmland owners in our typology is nonfarming landowners, which we further break into private and public entities. In the private category are retired farmers; widows of farmers (such as 19 percent of Iowa farmland owners, for example (Duffy and Smith, 2009)) and other heirs of farmers; other private landowners (e.g., estate properties, second homes); organizations and institutions (e.g., religious, educational, conservation, intentional communities); and, increasingly, investors, including individuals and investment funds. Public landowners include municipal, county, state, and federal lands, examples of whose holdings include protected open space and parkland.

Historically referred to as absentee landlords, we see a trend of private landowners living further away from their properties (Parsons et al., 2010). On the other hand, we see a new demographic emerging: resident nonfarming landowners who live on or next to their farmed (or farmable) property. In the U.S., 88 percent of farm landlords are not farmers (USDA, NASS, 1999). The land they own represents 42 percent of the nation's farmland (Hoppe, 2006). Nationally, as farm landlords are more separated from their land by geography and generation, they become less involved and engaged with their rented properties and with the communities where the land is located (Parsons et al., 2010). I have observed that until very recently nonfarming landowners were seriously neglected as part of the land access picture.

The Role of Service Providers

From my perspective, engaging seekers and landowners is not enough. If our goal is to improve land access and tenure for the nation's farmers, we have to engage service providers, communities, and policy-makers as part of the system we seek to change. We need more involved and skilled service providers to guide and assist farm seekers as well as landowners. We need involved and supportive civic leaders, neighbors, and community groups. And we need public policies that remove obstacles to land access, foster secure land tenure, support timely and rewarding transitions, and promote a stewardship ethic among farmland owners, whether or not they farm.

From our work at LFG and with colleagues in our region and nationally, we confirm that a wide range of service providers is needed to address

farmland access, tenure, and transfer. Ideally, we would have fully developed networks of programs, services, and advisors to support farm seekers, farmers, and landowners through all stages. Such networks would consist of various agricultural specialists *and also* attorneys, land use planners, mediators, affordable housing experts, lenders, real estate agents, and more. From my vantage point, adequate networks do not exist in any region of the country.

In the past decade there has been a significant growth in programs for beginning farmers. This is good and important. Most readers know of beginning farmer training programs, incubators, networks, and business planning courses, for example. Within USDA, the Beginning Farmer and Rancher Development Program (BFRDP) has spurred and supported dozens of projects and services targeted to new farmers. Most beginning farmer education programs focus on production and business training. On the land side, farm link programs (which link farm seekers with retiring farmers as well as nonfarming landowners) are springing up.

Farm link programs have been around since the mid-1990s. I've been involved with and observed them for 20 years. From my perspective, their accomplishments and strengths are notable but uneven in attempts to connect farm seekers with landowners for purchase or rental transactions. Successful "matches" are few, and, in my opinion, the focus on "matches" as the expected outcome overshadows the various other critical functions that such programs do or could perform. LFG's Land Access Project (LAP), which ran from 2010 to 2013 and was funded by BFRDP, analyzed farm link programs in New England and elsewhere. One outcome of this analysis was to distinguish these functions that are often conflated or confused. Linking programs differ in whether and how they execute the functions. LAP differentiated three distinct functions:

1. **Listing:** creating and maintaining a list of farm properties;
2. **Linking:** sorting or screening for potential seeker-owner compatibility and exchanging contact information; and
3. **Matching:** facilitating specific, customized transactions.

One conclusion of our investigation was that these functions are necessary but not sufficient alone to foster successful tenure arrangements. Farmland seekers and owners need easy, efficient methods to find one another. We need to do much better in this regard. But they also need preparation — as well as sustained support — to engage successfully in a tenure or transfer transaction. LFG stresses "readiness" by both seekers and landowners. Improving readiness involves services related to but different from linking, requiring different skills, expertise, and resources.

To improve readiness, seeker and landowner education is essential. One of LFG's core premises is that too many seekers (especially beginning farmers) are inadequately informed about land tenure options, farm financing, and lease agreements, for example. As a result, they embark down the "linking" path with a high risk of failure.

On the other side of the land "match" equation, nonfarming landowners need information and often a lot of support to realistically and successfully engage with a farming tenant or transferee. In our experience, this is as true with public and organizational landowners and managers as it is with private landowners. Some landowners we encounter are naïve and unrealistic; others can be overly involved and undermining. Service providers can help with educational materials, along with individualized and often labor-intensive technical assistance. For example, at LFG, field agents may spend 50 or more hours over several months working with landowners to assess properties, set goals, and guide farmer recruitment. At a minimum, providers need enough information on this topic to guide their audiences toward the proper resources and subject matter experts and advisors. To this end, LFG and American Farmland Trust have embarked on a USDA-funded program[3] to train 80 Extension educators and other providers in basics about land access and transfer.

One of the challenges I see for the service-provider community is around capacity and focus.

[3] http://www.farmland.org/farmlandadvisors

With the above-mentioned project we are building knowledge and skills for a wide range of providers so they can better assist seekers, farm families, and landowners on these issues. The goal is to make them more able to provide solid, basic information, share resources, and direct their clients to more expertise. They are not — nor should they be expected to be — subject-matter experts. We also need more specialists with expertise in such areas as leasing and agricultural conservation easements.

We deal with this challenge within our own organization. Our field agents have varying degrees of subject-matter expertise, but we promote ourselves to our clients as "coaches," coordinators or facilitators of their own discovery and planning processes, rather than experts. We are still refining this role and how to set expectations and boundaries. From the experience I bring to LFG, I believe that informed, personalized, sustained support for seekers, exiting farm families, and landowners is absolutely essential. While it is necessary, it is not sufficient; hence the necessity for a coordinated service network.

Regarding land stewardship, popular thinking holds that tenant farmers do not care for the land as much as owner-operators (Parsons et al., 2010). It is understandable from a business perspective that farmers with annual agreements might be inclined to manage (or mine) the land for short-term gain with little regard for stewarding the land over the long term. The research reveals a more nuanced reality (Parsons et al., 2010, pp. 49–50). For example, cultural factors often play a large role in how farmers manage land, whether they own the land or farm it as tenants. Farmer and landowner attitudes and relationships are as important as the land tenure arrangement. To me, this opens another opportunity and need for service providers to help support and inform both sides toward shared stewardship objectives. As mentioned above, landowners have not been adequately served. LFG has produced several guides and tools for landowners, but our main struggle continues to be in finding and engaging them. We've had some success with workshops at the local level. We've had less success attracting them to farm link websites.

Transitioning farm families have their own unique set of needs that in my view are not addressed well enough by existing service-provider networks. Farm succession planning requires a number of specialists. Advisors with specialties in applicable laws and regulations, taxes, financial planning, farm viability, long-term health care, land use, farmland preservation, entity formation, farm management, retirement planning, communications, *and* estate planning have a role to play. In my experience, a constellation of experts is not enough. They need to work as a coordinated team for the benefit of the client family.

Succession planning requires sustained effort, support, and coordination (Ruhf, 2013). After attending a day-long workshop on farm estate and succession planning, most farmers reported to us they did not know what to do next. They say they believe in succession planning, and report that paying for it is not an obstacle (Aschkenase, Babbitt, & Wilbur, 2011); rather it is the task complexity and "soft issues" that are perceived as daunting. These soft issues revolve around values, goals, communications, interpersonal relations, and the emotions that underpin them.

LFG's response to this obstacle is to play the coordination and coaching role. We are still working out how best to do this. We are learning how to "keep the ball rolling" when families are resistant or overwhelmed. We are smoothing out how we bring in and coordinate advisors.

We depend on these advisors to be sufficiently skilled and conversant about their area of expertise as well as knowledgeable about the bigger picture to make connections and explore different perspectives and methods outside their realm. For example, an estate planning attorney or retirement planner who lacks sufficient understanding about the role that an agricultural easement can play is less likely to include easements as a planning tool. LFG conducted a day-long peer- and cross-training for attorneys, land use planners, accountants, conservation agents, and others for exactly this purpose. To help exiting families find the support they need, the Farm Transfer Network of New England's website[4] lists succession planning advisors by

[4] http://www.farmtransfernewengland.net

specialty and state. Yet in our experience, this is not good enough. We are exploring the effectiveness of small support groups, incentives, and lower or no fees to see whether this will enable us to assist more farmers with succession planning.

The Role of Communities and Policy-makers

Both farmers and landowners function in a community context. From our systems perspective, the community consists of the immediate physical and social-economic surroundings of the farm and farmer, as well as the larger environment and social, economic, and political systems that interact with farmland owners and users. Civic leaders, conservationists, planners, consumers, "foodies," historic preservationists, economic developers, educators, neighbors, real estate agents, and agency decision-makers, and increasingly local food and farming advocacy groups and philanthropies, are part of the system that influences — and can influence — how farmland is acquired, held, and transferred. To us at LFG, these are fruitful and also at times challenging sectors to engage. Ironically, it is hard to grab the attention of these sectors given all the "noise" and traffic around food system issues these days. Further, policy solutions — and the role of public policy — are not obvious.

How towns regard farming will influence whether and how they offer public land for agriculture, invite new farmers in, and help older farmers in transition. One Massachusetts town contracted with LFG to revitalize a significant agricultural neighborhood. We identified additional available farmland, brought in conservation partners, and worked directly with exiting farm families identified in the assessment phase. The New Entry Sustainable Farming Project (Massachusetts) uses GIS to identify potential farmland and then reaches out to specific landowners. At the regional level, the Metropolitan Area Planning Council (Massachusetts) collaborated with LFG and others to promote farming (including land availability, succession, and municipal farmland leasing) in a project spanning 13 eastern Massachusetts towns.

The recent surge in interest in local and regional food systems is an opportunity to engage a broad range of stakeholders, including an extensive network of farming advocacy groups, in farmland access issues. American Farmland Trust's "It's Not Farmland without Farmers" catch phrase captures the connection between food security and keeping farmers on productive land. That connection needs to be strengthened. LFG needs to do a better job in conveying our sense of urgency about and relevance of land access, and in making the connections among, for example, land access and food security, and beginning farmers and community resilience. I think the potential is great. Messages about farming opportunity, legacy, and stewardship can resonate with citizens and new partners who are already energized around farmland conservation, food security, local food and economic systems, community character and quality of life, and environmental stewardship at all scales.

Federal programs can help to foster a systems approach to land access. For example, the Beginning Farmer and Rancher Development Program, a USDA competitive grant program, lists farm succession planning among the topics eligible for funding. The Conservation Reserve Program incentivizes beginning farmers onto CRP land. In March 2013 I attended a two-day "Transitions in Agriculture" meeting hosted by USDA. At the meeting Secretary of Agriculture Vilsack pointed out "how difficult it is to enter farming if [farmers] don't inherit farms" (T. Vilsack, remarks at meeting, March 20, 2013). The discussion among USDA and Extension professionals, land-grant researchers, lenders, and NGO representatives focused on issues related to both farm entry and exit. Participants posed questions: is the owner-operator tenure model tenable? Is the paradigm shifting? Should it?

The questions raised by others at this meeting were a validation of my own exploration. Policy-makers, land-access advocates, communities, and service providers must engage in new dialogue about farmland tenure in the U.S. As pointed out in a comprehensive 2010 research report, there is no overarching U.S. policy framework for farmland tenure (Parsons et al., 2010). How should we reconcile the historic and contemporary cultural bias toward owning land with recent trends away from it? How should we consider the realities of farm ownership against practices of outsourcing

assets that are typical in other business sectors? *De facto* federal policy has encouraged beginning farmers to purchase farms by offering seductive subsidized loan programs. At the same time, farm advisors and research suggest that for many beginning farmers, renting makes more business sense. Interestingly, this parallels recent trends in home ownership, and for some of the same reasons.

Advocates for nontraditional approaches such as long-term and ground leases need to converse with advocates who hold justifiable fears of perpetual tenancy. Thorny issues such as equity-building by tenants, farmland investors, affordable farm housing, and stewardship on rented land must be tackled. The surge in domestic farmland investment should be seen as both alarming and a potential opportunity to foster more values-based alternatives to global land grabbing. Models for lease-to-own, multiple operators on larger properties, shared equity, cooperative tenure, and landlord roles in shared risk need to be explored. Increasing interest on the part of philanthropies needs to be harnessed. Regional and cultural differences add rich dimensions to the discussion.

We don't have solid answers on these perplexing themes or clear policy solutions. Public policy agendas to address land access, tenure, and transfer are informed by research as well as by on-the-ground experiences of practitioners. Groups such as the International Farm Transition Network and various beginning farmer networks contribute. The research report from the national Farmland Access, Succession, Transfer and Stewardship Project (Parsons et al., 2010) offers dozens of recommendations for policy, programming, and research. LFG's Land Access Project produced a report with innovative policy recommendations (Wagner & Ruhf, 2013) and another that looked at various farmland investment models with suggestions for values-based approaches (Ruhf & Wagner, 2013).

Conclusion

If we seek a more resilient, diverse, and sustainable food and farm system, improved farmland access and tenure must be part of the solution. Within the conversation about land access, my experience tells me that candor about the values implicit in access and tenure models is essential, along with openness to new methods as well as traditional ones to achieve our goals. LFG is continually learning and evolving to meet ongoing and emerging challenges in land access. We are pleased to be a part of the conversation.

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Farm adaptation at the rural-urban interface

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Abstract
Despite population growth and development at the rural-urban interface (RUI), agriculture continues to persist there. This resilience is partially a reflection of land use policies and market support programs designed to protect farm and ranch land that is vulnerable to nonfarm development. Studies examining the RUI primarily focus on the diversity of production and markets and do not discuss the diversity of operators. As the farmland protection and food systems movements continue to refine policy objectives and decide how to allocate scarce resources, it is critical to have up-to-date statistics on the health and vitality of agriculture at the RUI. Using the 2007 Census of Agriculture statistics, we examine (1) the spatial distribution by county of high-value production and marketing practices assumed to play a role in the persistence and vitality of agriculture at the RUI; and (2) the demographic characteristics of farmers in these counties. We find that only some types of high-value production and marketing systems are more prevalent in metropolitan regions, including horses, nursery-greenhouse, and direct sales, while organic production, recreation sales, CSA farms, and value-added farms are more likely to be concentrated in nonmetropolitan counties. We also find that farmers at the RUI are extremely diverse and that a substantial number of beginning and women farmers are found in nonmetropolitan counties, along with a small but notable number of African American, Hispanic and Native American farmers.

Keywords
Census of Agriculture, farm adaptation, farmer diversity, metro counties, rural-urban interface

Introduction

The rural-urban interface (RUI) is the relatively rural space on the edge of urbanized areas (Audirac, 1999); farms and ranches in these geographic areas are highly vulnerable to nonfarm development, yet they continue to thrive and significantly contribute to the U.S. agricultural economy. While RUI counties only represent 20 percent of all U.S. counties, they account for roughly 40 percent of total U.S. agricultural

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production (Jackson-Smith & Sharp, 2008),[1] and produce the majority of the nation's fruits, vegetables, and nursery and greenhouse crops (American Farmland Trust [AFT], 2013; Jackson-Smith & Sharp, 2008). Since the 1970s the RUI has often been the focus of local, state and national debates over disappearing farmland, a shrinking farm population, land use policy, and local and regional food systems.

Starting in the 1970s, the U.S. Department of Agriculture's Economic Research Service (ERS) published a series of reports and research studies documenting the complexity of agriculture at the RUI and the significant contributions metro farmers make to U.S. agricultural production. These research papers and reports examined farm size and type and ownership patterns, and aimed to understand the ways in which metro farmers have been able to persist and adapt to nonfarm development pressures (Heimlich & Brooks, 1989; Heimlich & Anderson, 2001). Recognizing the importance and vulnerability of RUI agriculture, farm advocacy organizations, researchers, and policy-makers used these reports to develop a variety of land-based and market-based strategies designed to support farmers at the RUI (AFT, 1997; Bryant & Johnston, 1992). Today, farmland preservation and efforts to promote local and regional food systems as a viable economic livelihood for farmers (e.g., through on-farm value-added strategies, promoting higher intensity production, etc.) have become mainstream; these efforts are no longer limited to community- or state-level campaigns but are now a part of federal farm policy (AFT, 2013; Clancy & Ruff, 2010; Lyson, 2004; Oberholtzer , Clancy, & Esseks, 2012).

As the farmland protection and food systems movements continue to refine policy objectives and decide how to allocate scarce resources, it is critical that they have the latest statistics on the health and vitality of RUI agriculture. While there have been recent reports examining more macro-level statistics that assess the overall production levels of RUI agriculture (Esseks, Oberholtzer, Clancy, Lapping, & Zurbrugg, 2009; Oberholtzer et al., 2012; Jackson-Smith & Sharp , 2008), there has been little documentation of the specific production and marketing adaptations scholars identified as important for RUI policy and economic investment. For example, Hart (1998) and Heimlich and Anderson (2001) identified and argued that higher-value crops that can be intensively produced on smaller acreages, such as fruit and vegetables, are more likely to persist at the RUI and contribute to the viability and resiliency of agriculture at the RUI (Hart, 1998; Heimlich & Anderson, 2001). However, these statistics have not been updated or examined to understand changes in RUI agricultural production patterns.

In this paper we build on previous descriptive research to examine the degree to which these high-value production and marketing strategies assumed to thrive at the RUI (horse sales, nursery and greenhouse sales, recreation sales, organic sales, direct sales, community supported agriculture farms [CSAs], and value-added farms) are in fact doing so. Given the increasing recognition of the diversity of American farmers and ranchers (U.S. Department of Agriculture, National Agricultural Statistics Service [USDA, NASS], 2008), we take the analysis one step further to ask who are the farmers in these counties? Beyond types of production at the RUI, little has been documented on the social differences within the farm population itself, yet this can have bearings on policies designed to stabilize the production landscape (Inwood, Clark, & Bean, 2013). There has been a rich tradition in rural studies examining the link between ethnicity, race, gender, and farm structure. At the community level the number of women in agriculture support groups is increasing, and at the national level the 2008 farm bill required 10 percent of funds be set aside for beginning and/or socially disadvantaged farmers and ranchers, and/or small and medium-sized farms and ranches (Hardesty, 2010). However, RUI scholars have largely neglected the relationship of farmer

[1] Sharp and Jackson-Smith (2008) represent RUI counties as "counties with Urban Influence Codes (UIC) 1 through 4 (or 1,267 counties total), as well the a small number of counties in UIC categories 5–7 that experienced population growth above the national average of 13.15 percent between 1990-2000 (255 counties fall into this category). UIC codes are developed by the USDA-ERS and can be accessed online at http://www.ers.usda.gov/Briefing/Rurality/urbaninf/" (p. 10).

ethnicity, gender, and experience to farm structure and farm persistence.

Therefore, this paper answers two basic questions: (1) What is the spatial distribution of production and marketing practices assumed to play a role in the persistence and vitality of agriculture at the RUI? and (2) who are the farmers in these counties? We first review the literature examining agriculture at the RUI and farmer diversity, and then present the results of a descriptive analysis of high-value production and marketing systems using 2007 U.S. Census of Agriculture data.

Literature Review

Located beyond suburbia, the RUI is a mix of both rural and urban land uses and is socially and economically connected to an urban core (Audirac, 1999; Clark, McChesney, Munroe, & Irwin, 2009). The RUI is a complex landscape and is affected by a variety of processes, including both global agri-food systems pressures and stresses from local nonfarm urban-related development. At the local level, direct influences from land competition and rising nonfarm population, and indirect influences such as rising land rents, taxes, and increased regulation create increased constraints on farming (Bryant & Johnston, 1992; Fulton, Pendall, Nguyen, & Harrison, 2001; Heimlich & Anderson, 2001). Yet agricultural production at the RUI is substantial; RUI counties account for 78 percent of vegetable production and 91 percent of fruit production in the U.S. (AFT, 2013; Jackson-Smith & Sharp, 2008).

An important theme implicit in many RUI models is the expectation that urban-oriented food and fiber production adaptation strategies (nursery and greenhouse, direct sales, horses, farmers' markets, CSAs, U-pick operations, agri-tourism, organic agriculture, etc.) are likely to emerge and succeed due to their proximity to urban markets (Bowler, 1999; Fennell & Weaver, 1997; Heimlich & Anderson, 2001; Lyson 2004). Heimlich and Brooks (1989) found a relationship between farm type and persistence at the RUI and identify three types of RUI farms, including (a) alternative enterprises (small in size with high-value outputs); (b) recreational enterprises (very small scale, operated by hobby farmers); and (c) traditional enterprises (large operations engaged in conventional commodity production). Research focusing on these various types of enterprises suggests that smaller-scale farms with higher-value outputs are the most likely to persist in metropolitan counties (Heimlich & Anderson, 2001; Hoppe & Korb, 2001). Alternative enterprise types can include consumer-oriented, entrepreneurial activities with an emphasis on direct marketing and value-adding. While there in fact has been a rise in the number of farms oriented toward local and alternative markets (Barbieri & Mahoney, 2009; Inwood & Sharp, 2012; Sparks, 2012), there has been little recent analysis to understand the spatial distribution of different types of specific urban oriented production and marketing systems across the RUI, particularly in agriculturally vibrant areas.

Farmer Diversity at the RUI

The structure of the farm business is not just a result of market and economic forces, but is shaped through the goals, values, and motivations of the farm family. These goals, values, and motivations are influenced by the demographic characteristics of the farm family (Colman & Elbert, 1984; Gasson, 1973; Gasson & Errington, 1993; Lobley & Potter, 2004; Salamon, 1992; Shucksmith & Herrmann, 2002). The associations among gender, ethnicity, culture, length of time farming, farm structure, and development have been well documented in the literature (Imbruce, 2007; Sachs, 1996; Salamon, 1992; Wells & Gradwell, 2001.

Accounting for these differences is increasingly important considering the USDA, NASS report on the growing ethnic, racial, and gender diversity among U.S. farm and ranch operators, and the national investments being made in distinct subpopulations of farmers through the USDA Beginning Farmer and Rancher Grant Program, the National Immigrant Farming Initiative, and the Women's Agricultural Network. USDA, NASS (2007a) reported that from 2002 to 2007 the number of primary operator of all races and ethnic backgrounds increased by four percent, while the number of nonwhite operators grew at a faster rate. Operators reporting Hispanic origin increased 10

percent from 2002 to 2007 (USDA, NASS, 2007a). The role of gender and sex and RUI farm development is particularly interesting. There was a 30 percent increase in female principle operators from 2002 to 2007 (NASS 2007a); however, a spatial analysis reveals that 31 percent of all metro area farms (using the 2008 U.S. Census metropolitan statistical area [MSA] definition) have female operators, compared to the national average of 14 percent of all farm operators. This increasing diversity of Hispanic, Asian, Native American, African American, beginning and women farmers reinforces the need to understand how social differences between farmers can influence farm structure at the RUI.

Ethnicity and Race

The association between ethnicity, culture, farm structure, and development was well documented by Salamon (1992), who identified a typology of Midwestern farmer types based on farm household ethnicities and their distinct agricultural or land ethics. Wells (1996) also has shown the linkage between ethnicity and farming subsystems in California strawberry production, finding that Japanese, Mexican and Anglo growers brought different sets of resources to their farms' development, and that the different social networks associated with each ethnic group created and reinforced farm management styles over time. Recent research on immigrant farmers from Southeast Asia in the Miami Metro region found that the unique motivations, social networks, and style of farming (intensive and diverse) has enabled these small family farms to thrive by taking advantage of niche markets and national distribution networks despite high land rents (Imbruce, 2007). The increase in the number of Hispanic, Asian, Native American and African American farmers (USDA, NASS, 2007a) reinforces the need to understand how cultural nuances influence larger production patterns on the RUI landscape.

Gender and Sex

There has been considerable interest in understanding the gendered dimension of farm adaptation and production strategies particularly as it relates to alternative agriculture (Chiappe & Flora, 1998; Feldman & Welsh, 1995; Sachs, 1996; Wells and Gradwell, 2001). Surveys of the wider female farm population have found women emphasize not only the environmental and economic benefits of sustainable agriculture, but are also more likely to emphasize the link between agriculture and community sustainability and well-being (Chiappe & Flora, 1998; Feldman & Welsh, 1995; Trauger, 2004; Trauger, Sachs, Barbercheck, Kiernan, Brasier, & Findeis, 2008). Some of these gendered values have been correlated with specific farm structures, including the prevalence of, and preference for, cooperative farm markets, direct marketing, value-adding, and craft development among women operators as opposed to large-scale commodity agriculture activities. These trends are reinforced by McNally (2001), who found that when women participated in the active management of the farm operation, the probability of observing on-farm retailing and recreation enterprises increased by 12 percent.

The research examining gender, race, and ethnicity in relationship to farm structure reveal that each farmer subgroup has a unique history and cultural legacy that influence their goals, motivations, and values, which in turn influence the way they structure their farm and envision their farms' future. These studies demonstrate that the structure of a farm business (wholesale, direct marketing, organic, etc.) is not just the result of economic forces, but also reflects specific values and goals of the farm family. As farm, food, and land policies incorporate the social differences of farmers, it is useful to understand how different subpopulations of farmers are spatially distributed across the RUI and non-RUI landscape.

Methods

To document urban-oriented production at the RUI, we first identified RUI counties. Counties in the U.S. were categorized as Metro and Nonmetro using the current U.S. Census definition. Metro counties are used as a proxy for the RUI, as metro counties are composed of central urban cores and include counties that contain rural lands, but have social and economic ties (measured by commuting patterns) to the urban core (Berube & Forman, 2002; Wolman, Galster, Hanson, Ratcliffe, Furdell,

& Sarzynski, 2005). To capture meaningful production at the RUI, counties were then classified as agriculturally important (AI) or non-agriculturally important (NAI), using an approach akin to the parameters described by Jackson-Smith and Jensen (2009). AI counties are in the top three quartiles of U.S. agricultural sales in 2007 and exhibit a healthy agricultural sector. Agricultural sales for NAI counties ranged from US$0 to US$19,379,000 in 2007. AI county sales in 2007 ranged from US$19,386,000 to US$3,730,546,000. As an indicator, AI uses the market value of agricultural product sold and the intensity of production measured via sales per acre of total farmland and cropland. Compared to the ERS farm-dependent county classification, the AI indicator is better able to pick up more intensive uses of farmland and agricultural output regardless of whether a county is large or small, or urban or rural, or if the regional economy is highly specialized or diversified (Jackson-Smith & Jensen, 2009).

We then classified counties as Metro-AI, Metro-NAI, Nonmetro-AI, or Nonmetro-NAI to achieve a more refined analysis for examining spatial distributions of specific production practices. We recognize classifying counties as AI or NAI introduces bias into the analysis, as a larger number of sales will automatically come from AI counties. While this bias does exist, the results are not necessarily predetermined. In fact, this classification brings forward subtle nuances that would have been overlooked if the analysis only focused on Metro versus Nonmetro.

The number of farms and sales values for horses, nursery and greenhouse, recreational services, organic agriculture, direct marketing, CSAs, and value-added production were obtained for each county (n=3080) in the U.S. from the 2007 U.S. Census of Agriculture. Descriptive statistics (totals and percentages) were run to examine the distribution of these variables between the different county types. Due to the relatively small number of farms engaging in some of these activities, sales data was suppressed for some counties. In this paper suppressed sales are treated as missing. Initial analysis revealed the significance of California in organic production and direct sales. To better understand the spatial distribution of organic agriculture and direct sales, California was treated separately in the analysis in some cases. Finally, to understand if there is a spatial dimension to the increasing diversity of American farmers, we examined farmer demographics including race, sex, and beginning farmers. Finally, mapping the variables with GIS illustrates the regional patterns of the statistical findings.

Table 1. Frequency and Percent of Metro and Agriculturally Important (AI) Counties, 2007

Counties	Frequency	Percent
Metro	1,071	34.8%
Nonmetro	2,009	65.2%
Total	3,080	100%
AI	2,263	73.5%
Non-AI	817	26.5%
Total	3,080	100%

Results

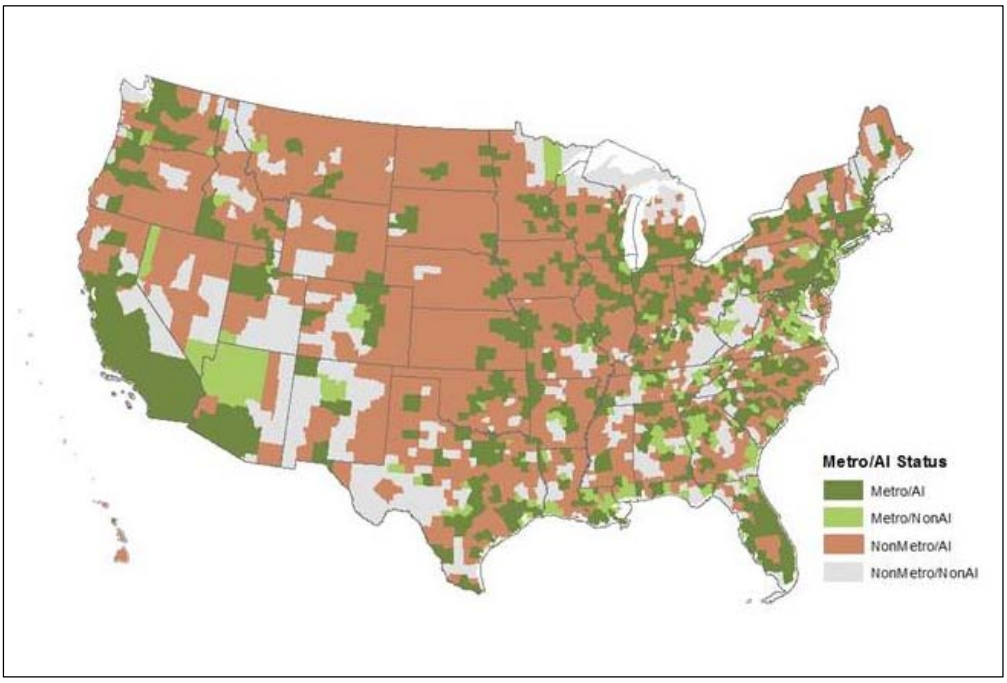
The majority of U.S. counties are Nonmetro counties (65.2 percent) and are non-agriculturally important (73.5 percent) (table 1). Comparatively, Metro counties account for 34.8 percent of all counties, while agriculturally important (AI) counties represent only 26.5 percent of all counties. Table 2 presents the distribution of counties, farm and sales by Metro-AI status and demonstrates the significance of Metro-AI agriculture compared to Nonmetro-AI, Metro-NAI, and Nonmetro-NAI. Figure 1 illustrates the spatial distribution of these counties. Nonmetro-AI counties make up the

Table 2. Percent of Counties, Farms and Sales by Metro and Agriculturally Importance (AI) or Non-agriculturally Important (NAI) Status, 2007

	Metro-AI	Nonmetro-AI	Metro-NAI	Nonmetro-NAI	Total
Counties	25.0%	48.5%	9.8%	16.7%	100%
Farms	35.8%	50.8%	5.1%	8.3%	100%
Sales	38.1%	59.7%	0.8%	1.4%	100%

largest share of counties (48.5 percent), sales (59.7 percent) and farms (50.8 percent). While Metro-AI counties only represent 25 percent of all counties, they account for 38.1 percent of all U.S. sales and 35.8 percent of U.S. farms; these significant contributions to the U.S. agricultural economy reinforce the need to understand the nuances of RUI agriculture.

Figure 1. Spatial Distribution of the Metro/Nonmetro and AI/Non-AI Counties, 2007



Horse Sales, Nursery and Greenhouse, and Recreation Sales

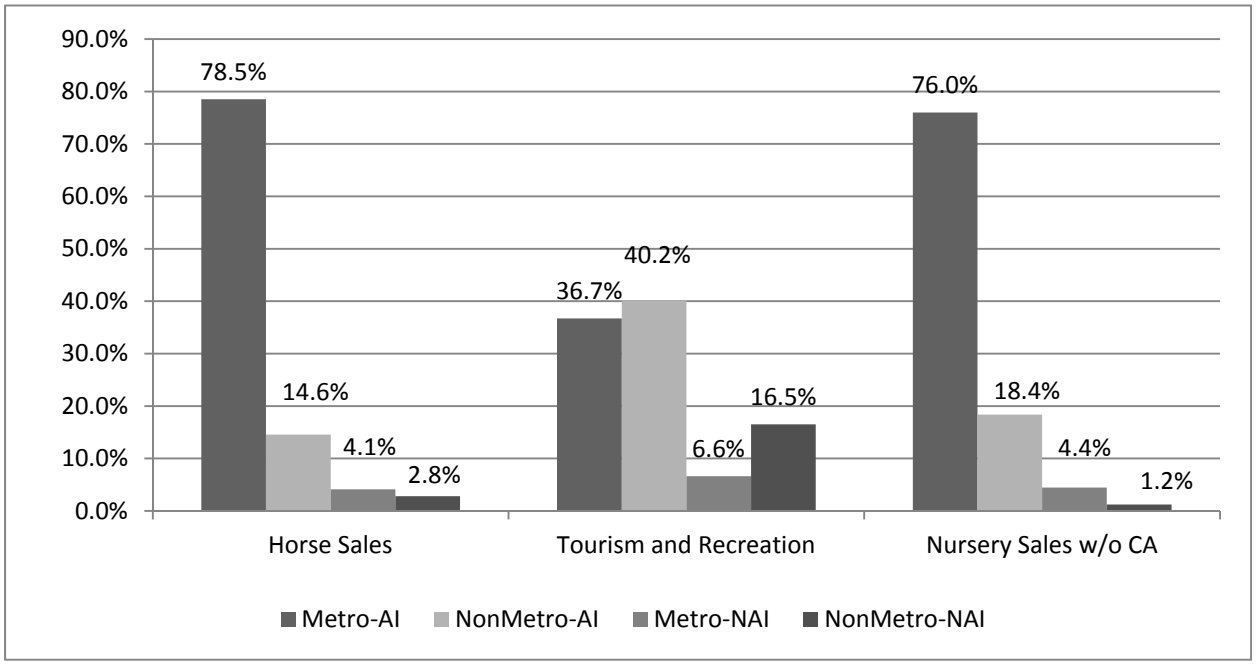
Horses, nursery and greenhouse products, and farm and ranch–based recreation are specific products and services that have been assumed and promoted to do well in areas proximate to urban populations. Horses are not considered a food or fiber commodity, and the degree to which horses should be formally counted in the agricultural sector has been debated. Nationally the horse industry directly contributes US$39 billion into the U.S. economy through feed crops, bedding, breeding, sales, racing, recreation, tourism, and shows (American Horse Council, 2005; Whiting, McCall, & Molnar , 2005). This analysis found that horse sales are concentrated in metropolitan counties and AI counties (table 3). Metro counties account for 82.6 percent of horse sales, compared to only 17.4 percent of sales occurring in Nonmetro counties (figure 2). The vast majority of these sales, 78.5 percent, occur in Metro-AI counties, compared to 14.6 percent in Nonmetro-AI counties. Regionally, the top 10 counties for horse sales are clustered in Kentucky — a state synonymous with horses — and counties such as Marion, Florida, where the

Table 3. Top 10 Horse Counties by Sales, 2007

County Type*	County	Farms	Sales (US$)
Metro-AI	Fayette, Kentucky	249	$409,617,000
Metro-AI	Woodford, Kentucky	190	$212,610,000
Metro-AI	Marion, Florida	847	$128,244,000
Metro-AI	Bourbon, Kentucky	177	$120,779,000
Metro-AI	Jessamine, Kentucky	81	$96,208,000
Metro-AI	Scott , Kentucky	136	$45,553,000
Metro-AI	Monmouth, New Jersey	154	$17,257,000
Metro-AI	Chester, Pennsylvania	206	$12,953,000
Metro-AI	Fauquier, Virginia	146	$10,641,000
Metro-AI	San Diego, California	258	$9,609,000

* AI = Agriculturally Important county

Figure 2. Horse, Nursery and Greenhouse, Tourism, and Recreation Sales by County Type, 2007



town of Ocala is one of the major thoroughbred industry centers (table 3). The emergence of regional horse industries at the RUI demonstrates how an agricultural sector can be tightly tied to the larger regional economy.

Nursery and greenhouse operations are defined as production sites that are protected under glass or other types of material, and sell terrestrial and aquatic plants, trees, shrubs, bulbs, tubers, seeds, fruits, berries, herbs, trees, starts, sod, etc. As relatively small acreage operations with high value outputs, nursery and greenhouse operations appear to be ideally suited for the RUI. These operations serve the high demand for landscaping shrubs, trees, ornamental flowers, and vegetable starts coming from proximate suburban and urban markets. The 2007 Census of Agriculture counted 54,889 nursery and greenhouse operations accounting for US$16.6 billion in agricultural sales (USDA, NASS, 2007b). California alone accounts for 25 percent of nursery and greenhouse sales.

To understand California's impact, the analysis was run both with and without California. In each case nursery and greenhouse sales are predominantly concentrated in Metro and AI counties. Without

Table 4. Top 10 Nursery and Greenhouse Counties by Sales Without California, 2007

County Type*	County	Nursery and Greenhouse Farms	Nursery and Greenhouse Sales (US$)
Metro-AI	Miami-Dade, Florida	838	$493,710,000
Metro-AI	Chester, Pennsylvania	186	$402,195,000
Metro-AI	Marion, Oregon	365	$243,693,000
Metro-AI	Orange, Florida	261	$237,605,000
Metro-AI	Clackamas, Oregon	638	$227,114,000
Metro-AI	Washington, Oregon	293	$199,317,000
Metro-AI	Palm Beach, Florida	425	$185,151,000
Metro-AI	Suffolk, New York	254	$182,901,000
Metro-AI	Maricopa, Arizona	112	$168,405,000
Metro-AI	Lake, Florida	246	$141,702,000

* AI = Agriculturally Important county

California, over three-quarters (76 percent) of nursery and greenhouse sales occur in Metro counties; the value increases to 84.7 percent when California is included, compared to only 18.4 percent in Nonmetro counties (figure 2). Just over 94 percent of nursery and greenhouse sales are concentrated in AI counties. With and without California, all of the top 10 counties for nursery and greenhouse sales are Metro-AI. With California, five of the top 10 are California counties. The predominance of California, Florida, and Oregon counties reflects the important role climate plays in production location (table 4). The more moderate and longer growing season in these regional production centers have led to extensive national and regional distribution networks that supply local nursery and greenhouse operations across the country.

Table 5. Top 10 Recreation Counties by Sales, 2007

County Type*	County	Farms	Sales (US$)
Metro-NAI	Maui, Hawaii	30	$8,464,000
Metro-NAI	Colfax, New Mexico	29	$6,929,000
Nonmetro-NAI	Honolulu, Hawaii	24	$6,647,000
Nonmetro-NAI	Webb, Texas	57	$5,896,000
Metro-NAI	Yates, New York	17	$5,727,000
Metro-NAI	Fremont, Wyoming	41	$5,616,000
Metro-NAI	Moffat, Colorado	62	$4,494,000
Metro-NAI	Routt, Colorado	29	$3,770,000
Metro-NAI	Zavala, Texas	45	$3,156,000
Nonmetro-AI	Kendall, Texas	73	$3,117,000

* NAI = Non-agriculturally Important county; AI = Agriculturally Important county

The Census of Agriculture definition of recreational services is extremely expansive, as it includes income from services such as hunting, fishing, farm or wine tours, hay rides, u-pick operations, and more (USDA, NASS, 2007b). There was a 17 percent decrease in the number of farms offering recreational services between 2002 and 2007, but the income generated from these activities increased 236 percent between these same years, with farms reporting an average of US$24,276 in recreational sales (USDA, NASS, 2007b). Within the local food system and farm-to-school movements there has been a great deal of attention directed toward agritainment (on-farm tours, education, and recreation).

In this analysis, income from recreational services is concentrated in Nonmetro and AI counties. Over half of recreational sales (56.7 percent) are from Nonmetro counties (figure 2). Overall 76.9 percent of recreational sales are from AI counties.. This analysis demonstrates that the majority of sales from recreational services are

Figure 3. Spatial Distribution of Recreational Farms, 2007

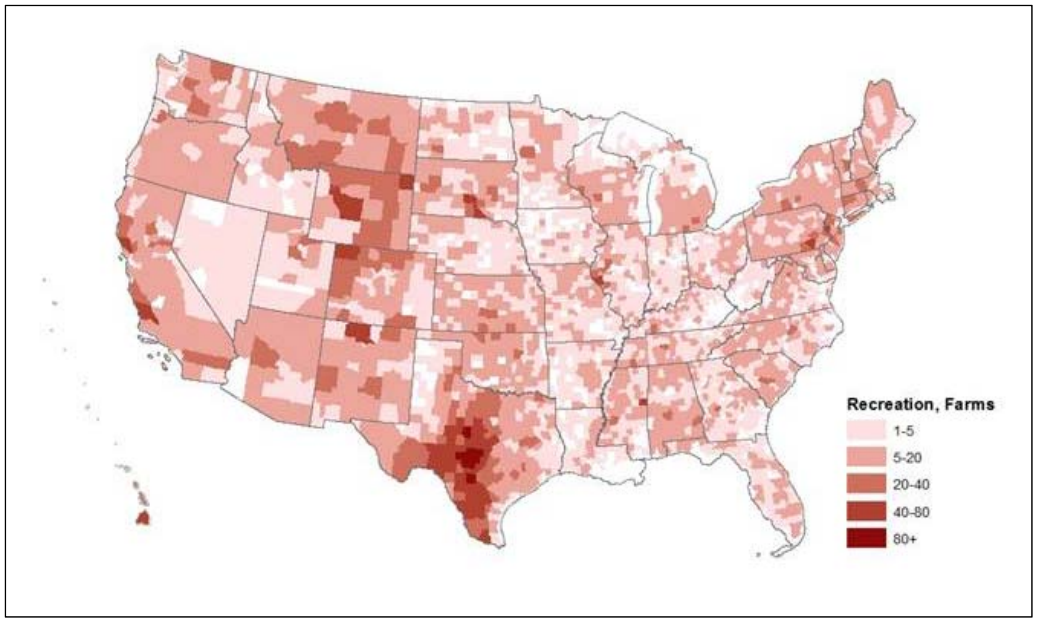


Table 6. Organic and Direct Sales by County Type With and Without California, 2007

	Metro-AI	Nonmetro-AI	Metro-NAI	Nonmetro-NAI	Total
Organic Sales	67.2%	30.6%	0.4%	1.8%	100%
Organic Sales Without California	47.1%	48.9%	0.8%	3.2%	100%
Direct Sales	60.9%	28.5%	5.7%	4.9%	100%
Direct Sales without California	55.3%	32.4%	6.6%	5.6%	100%

* NAI = Non-agriculturally Important county; AI = Agriculturally Important county

coming from more remote counties. This reflects the more traditional forms of outdoor recreation farms and ranches can offer, including hunting, fishing, birding, and horseback riding. The top 10 counties for recreational sales are an eclectic mix and mirror high-amenity landscapes such as those found in Hawaii, New Mexico, and the Finger Lakes region of New York state. The predominance of counties located in Texas, Wyoming, and Colorado reflect the historical recreation opportunities farms and ranches offer in the West (table 5 and figure 3).

Organic and Direct Sales

In the U.S. the upward trend of organic sales and direct marketing has continued to increase. The USDA 2008 Organic Production Survey (an addendum to the Census of Agriculture) counted 14,540 organic farms and ranches in the U.S. representing 4.1 million acres or 1.7 million hectares of land (USDA, NASS, 2008). Organic farmers (certified and exempt organic farms) reported US$3.16 billion in total sales, with US$1.94 billion in crop sales and US$1.22 billion in livestock, poultry, and their products (USDA, NASS, 2008). The economic contribution of organic agriculture is significant to U.S. farm households as organic farms reported higher average annual sales (US$217,675) compared to the overall national average (US$134,807) (USDA, NASS, 2008).

In regard to direct sales, 136,9817 farms reported selling agricultural products directly for human consumption in 2007, representing a 17.2 percent increase from 2002 (USDA, NASS, 2008). Nationally, farmers reported US$1.21 billion dollars in direct sales, accounting for 0.4 percent of total U.S. sales (USDA, NASS, 2008). The vast majority of farms reporting direct sales (93.3 percent) were small family farms (whose total sales are less than US$250,000) (USDA, NASS, 2008). Taken together, California, New York, and Pennsylvania account for over a quarter (26.1 percent) of all direct sales (USDA, NASS, 2008). Given the disproportionate influence of California, with just under half (45.5 percent) of all certified organic production and 14.2 percent of direct sales in the U.S. coming from the state, we included and excluded California in the tallies to see if there were any major differences.

Table 7. Top 10 Counties with Organic Sales Excluding California, 2007

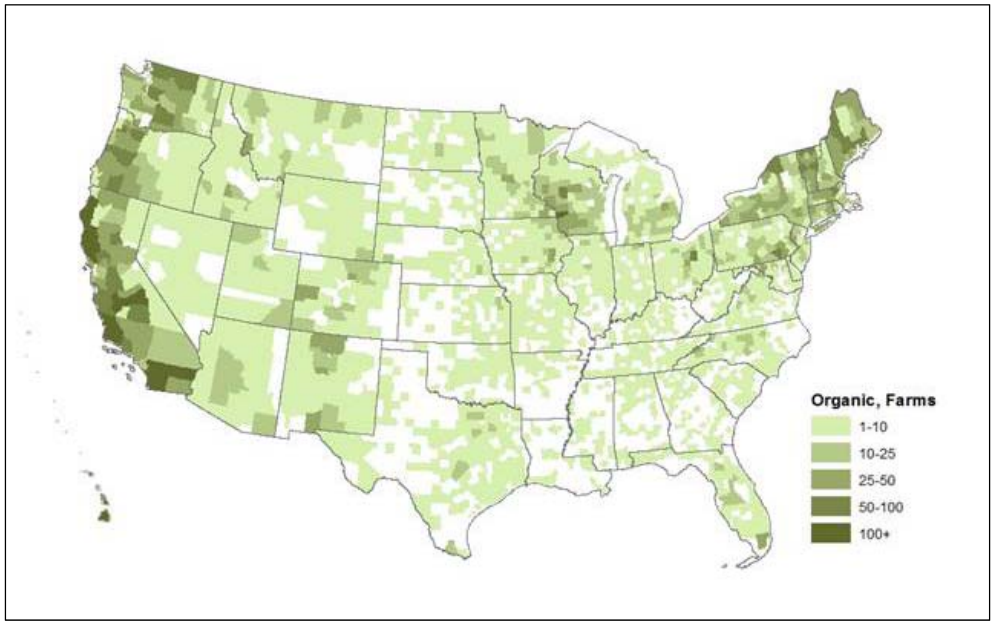
Type	County	Farms	Sales (US$)
Metro-AI	Maricopa, AZ	24	$24,193,000
Metro-AI	Benton, WA	36	$24,004,000
Nonmetro-AI	Grant, WA	37	$23,062,000
Metro-AI	Chelan, WA	46	$19,670,000
Nonmetro-AI	Klamath, OR	42	$18,696,000
Metro-AI	Chester, PA	38	$18,306,000
Metro-AI	Yuma, AZ	10	$15,208,000
Metro-AI	Yamhill, Oregon	72	$13,909,000
Metro-AI	Yakima, Washington	95	$13,237,000
Metro-AI	Lancaster, Pennsylvania	98	$11,687,000

* AI = Agriculturally Important county

Organic Sales

When California is included in the analysis, the majority of organic sales are a Metro and

Figure 4. Spatial Distribution of Organic Farms, 2007



AI phenomena, with the vast majority of sales (67.2 percent) concentrated in Metro-AI counties (table 6). When California is excluded from the analysis, organic production is still predominantly concentrated in AI counties (96 percent); however, it is no longer primarily located in metropolitan counties. Without California, organic production is fairly evenly split between Metro (47.1 percent) and Nonmetro (48.9 percent) counties. The fact that Nonmetro and AI counties stand out as sites of substantial organic production (controlling for the role of California) supports the industrialization-of-organics argument where existing commodity systems are shifting into organic production (Guthman, 2004). Regionally, the top 10 counties by sales and farms are dominated by California. Excluding California, the top counties reflect a greater geographical diversity that corresponds to the particular organic commodity, such as organic grain production in eastern Washington and dairy and vegetable production in Arizona (table 7). In addition to the presence of organic commodity production, the high number of organic farms in the Northeast (figure 4) may be reflecting a variety of factors, including the large demand for organic products in the region, the significant role organic price premiums have in supporting dairy farms in the Northeast (Parsons, 2011), and the strength of the Northeast Organic Food and Farming Association, which over the years has become one of the major stakeholder and technical-assistance nonprofit organizations in the region.

Direct Sales

Both including and excluding California, direct sales occur more frequently in Metro and AI counties. Including California, only one-third (33.5 percent) of direct sales are from Nonmetro counties, while 66.5 percent are concentrated in metro regions; these numbers change only modestly when excluding California. Direct sales are also primarily being generated in AI counties (89.4 percent including California and 87.8 percent excluding California). It is interesting to note that, excluding California, NAI counties account for 12.2 percent of direct sales; when including California, the amount drops negligibly. California counties represented five of the top 10 farms with direct sales. When California is removed from the analysis, direct sales tend to be most common in Metro-AI East coast counties with the exception of Addison, Vermont (Nonmetro-AI), a highly productive agricultural region in Vermont, a state with a highly developed community-based food and agriculture system (see table 8 and figure 5). Nationally, the Northeast has been a leader in developing farmland protection policy and innovative buy local marketing campaigns. These results demonstrate the nuance of how a state like

California, with such an intensive production system, can mask other regional patterns and obscure how land use policies and marketing programs can support farmers in especially tight land markets, like those found in the Northeast.

Table 8. Top 10 Counties with Direct Sales, Excluding California, 2007

AI Status	County	Farms	Sales (US$)
Metro-AI	Jackson, Oregon	344	$13,920,000
Metro-AI	Worcester, Massachusetts	338	$10,871,000
Metro-AI	Hartford, Connecticut	196	$9,333,000
Metro-AI	Lancaster, Pennsylvania	753	$9,220,000
Metro-AI	Suffolk, New York	111	$9,053,000
Metro-AI	Berrien, Michigan	226	$8,492,000
Metro-AI	Middlesex, Massachusetts	191	$6,510,000
Nonmetro-AI	Addison, Vermont	145	$5,434,000
Metro-AI	Orange, New York	94	$5,424,000
Metro-AI	Lane, Oregon	620	$5,103,000

* AI = Agriculturally Important county

CSA and Value-Added Farms

The number of community supported agriculture (CSA) operations has continued to increase. The 2007 Census of Agriculture counted 12,549 farms selling their products through CSAs (USDA, NASS, 2007b). The census only records number of CSA farms; it does not record sales data. In this analysis the majority of CSA farms were in Nonmetro counties and in AI counties. There were slightly more CSA farms in Nonmetro-AI counties (43.8%) compared to Metro-AI (41.6%) (table 9). Less than 15 percent of all CSA farms were located in Non-AI counties with slightly more in Nonmetro-NAI (8.4%) compared to Metro-NAI (6.2%). While the overall pattern reveals there are more CSA farms in Nonmetro counties, the top 10 counties with CSA farms are predominantly found in Metro counties, particularly in California and in the Northeast, the exception being Hawaii County (table 10).

The USDA defines value-added products as including items such as beef jerky, fruit jams, and floral arrangements (USDA, NASS, 2007b). Value-adding has been promoted as an important way farms can capture additional dollars. Parallel to data collected on CSAs, the census of agriculture only reports the number of farms selling value-added products and no sales data. In 2007 there were 78,419 farms selling value-added products (NASS, 2007b). Parallel to the patterns observed

Figure 5. Spatial Distribution of Direct Marketing Farms, 2007

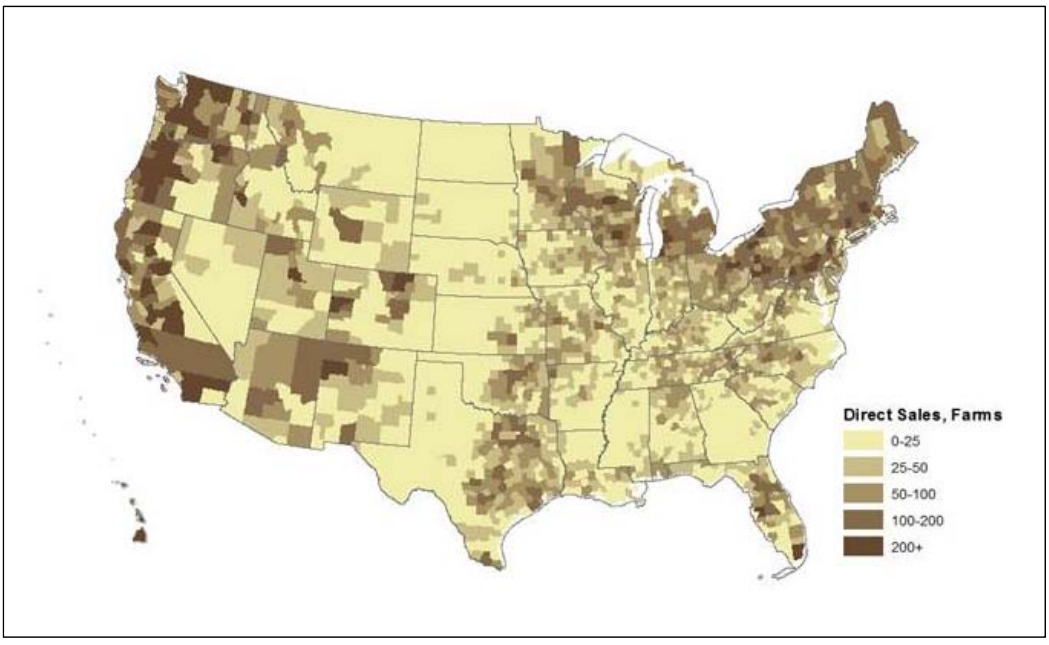


Table 9. CSA and Value-Added Farms by County Type, 2007

	Metro-AI	Nonmetro-AI	Metro-NAI	Nonmetro-NAI	Total
CSA Farms	41.6%	43.8%	6.2%	8.4%	100%
Value-Added Farms	38.3%	46.2%	6.2%	9.3%	100%

* NAI = Non-agriculturally Important county; AI = Agriculturally Important county

Table 10. Top 10 Counties with CSA Farms, 2007

County	AI Status	Number of Farms
San Diego, California	Metro-AI	79
Tulare, California	Metro-AI	61
Fresno, California	Metro-AI	59
San Luis Obispo, California	Metro-AI	54
Ventura, California	Metro-AI	52
Hawaii, Hawaii	Nonmetro-AI	48
Middlesex, Massachusetts	Metro-AI	48
Lancaster, Pennsylvania	Metro-AI	47
Sonoma, California	Metro-AI	44
Franklin, Massachusetts	Metro-AI	43

* AI = Agriculturally Important county

Table 11. Top 10 Counties with Value-Added Farms, 2007

County	AI Status	Number of Farms
Hawaii, Hawaii	Nonmetro-AI	266
Clackamas, Oregon	Metro-AI	257
Lancaster, Pennsylvania	Metro-AI	256
Lane, Oregon	Metro-AI	229
Yamhill, Oregon	Metro-AI	184
Jackson, Oregon	Metro-AI	183
Weld, Colorado	Metro-AI	179
Marion, Oregon	Metro-AI	167
Douglas, Oregon	Nonmetro-AI	166
Sonoma, California	Metro-AI	164

* AI = Agriculturally Important county

for CSA farms, value-added farms tend to be found in Nonmetro counties. While the majority of value-added farms are in AI counties, there are a greater number of farms in Nonmetro-AI regions (46.2%) compared to Metro-AI counties (38.3%) (table 9). Again, 15 percent of value-added farms are found in Non-AI counties, with a slight majority in Nonmetro-NAI (9.3%) compared to Metro-NAI (6.2%). The top 10 counties with value-added farms are in largely Metro-AI counties, with a large number in Oregon reflecting the investment in the processing associated with the berry, wine, cheese, and turf-grass industries in the state (table 11).

Farmer Demographics

Each subgroup of farmers has a unique historical and cultural heritage. Recognizing these differences is important for understanding how different types of farmers are able to access information, resources, and land, all of which in turn influence farm structure and farm viability.

As expected, the majority of all farmers are located in AI counties. However, a closer look reveals the nuances in the geographic distribution of different populations of farmers. The majority of Asian farmers (60.3 percent) and farmers of Spanish, Hispanic, or Latino origin (51 percent) are located in Metro-AI counties (table 12). Just under half of African American/Black farmers (46.5 percent) are located in Nonmetro-AI counties and 33.7 percent are in Metro-AI counties. Though not a majority, it is interesting to note that a substantial portion of Hispanic farmers (14.1 percent) and African American farmers (12.5 percent) are farming in Nonmetro-NAI counties. Nearly half of all operators reporting more than one race (49.3 percent) are farming in Nonmetro-AI counties, and 36.2 percent are farming in Metro-AI counties. Over one-third of women operators (38 percent)

Table 12. Farmer Demographics by County Type, 2007

Operator	Metro-AI	Nonmetro-AI	Metro-NAI	Nonmetro-NAI	Total
Asian	60.3%	34.2%	3.1%	2.4%	100%
Hispanic	51.0%	30.9%	4.0%	14.1%	100%
African American	33.7%	46.5%	7.3%	12.5%	100%
Native American	23.9%	44.0%	6.8%	25.2%	100%
Native-Hawaiian	36.0%	57.7%	2.7%	3.6%	100%
More Than One Race	36.2%	49.3%	5.4%	9.1%	100%
Woman	38.0%	47.6%	5.7%	8.7%	100%
Beginning Farmer (less than 10 years)	37.5%	48.3%	5.5%	8.7%	100%

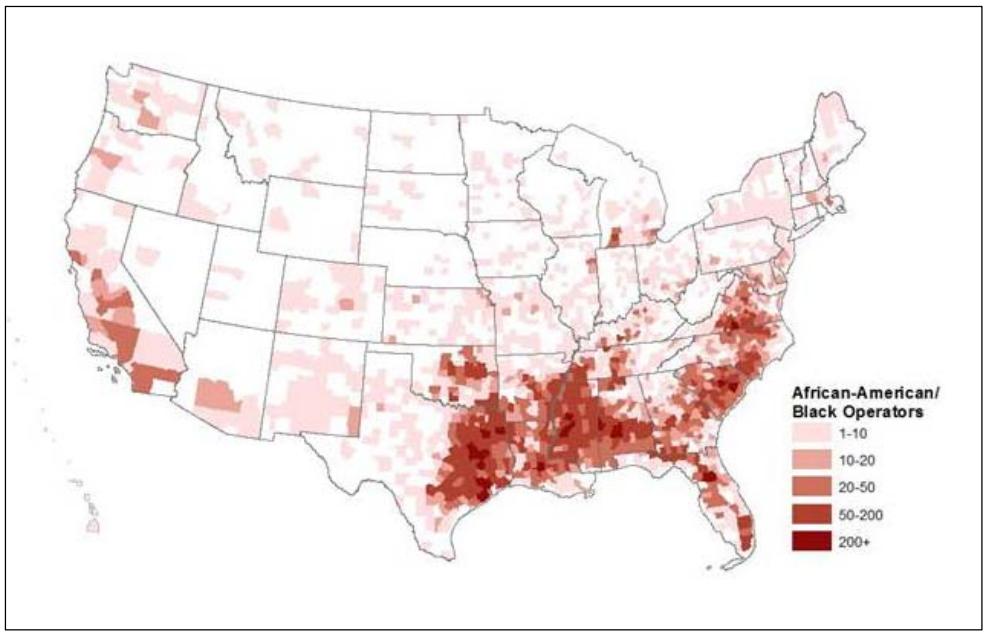
* NAI = Non-agriculturally Important county; AI = Agriculturally Important county

and beginning farmers (37.5 percent) are located in Metro-AI counties.

Spatially, African American farmers are concentrated in the Southeastern U.S. along the Black Belt, a term that refers to the portion of the deep South that was once characterized by planation agriculture in the 19th century, and where today African American communities are disproportionally affected by acute poverty (figure 6). In contrast, Hispanic farmers are concentrated in the Southwest and in Florida where the majority of the Hispanics in the U.S. live (U.S. Census, 2013 (figure 7), while the spatial distribution of women and beginning farmers is fairly even across the U.S.

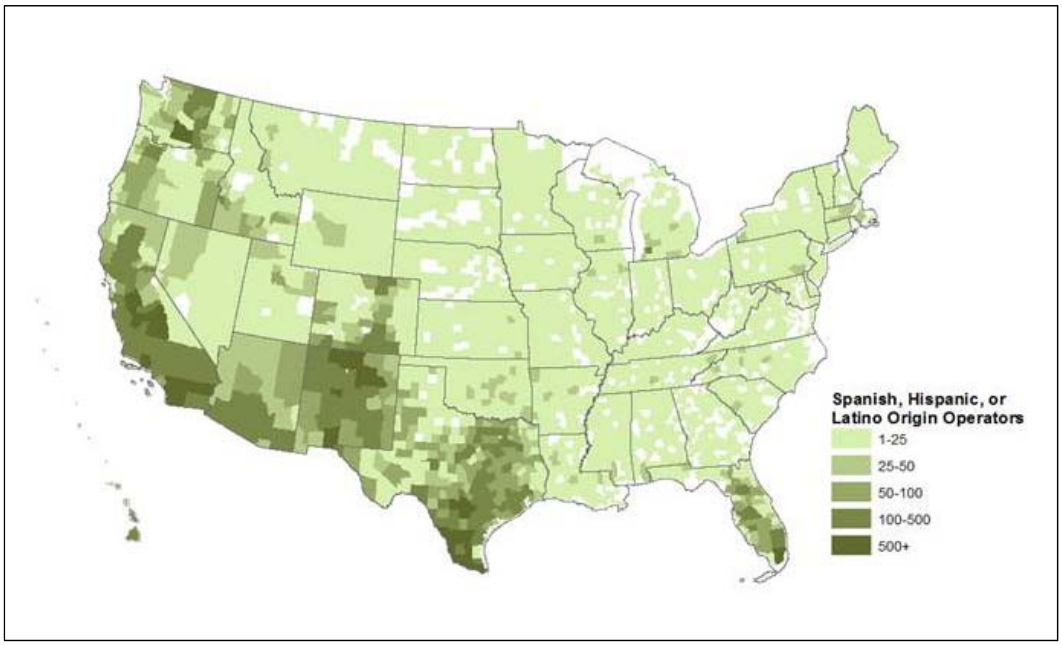
The U.S. Census of Agriculture recognizes two groups of native peoples, Native Americans (including Native Alaskans when reported) and Native Hawaiians or Other Pacific Islander. Both groups have a history of protracted land disputes with the U.S. government. Native American farmers are much more likely to be producing in Nonmetro-AI counties (44 percent) than in Metro-AI counties (23.9 percent), while a quarter (25.2 percent) of Native American farmers are located in Nonmetro-NAI counties. This finding most likely reflects the location of Native American reservations, which have historically been on marginalized lands. Over half of Native Hawaiian farmers (57.7 percent) are located in Nonmetro-AI counties and 36 percent are in Metro-AI counties. This finding most likely reflects the displacement of Native Hawaiians off the island of Oahu (the major metro island in Hawaii) as lands were lost through legal land contracts

Figure 6. Spatial Distribution of African American Farmers, 2007



rather than forced displacement through military action (Levy, 1975).

Figure 7. Spatial Distribution of Hispanic Farmers, 2007



Discussion

This paper provides an updated analysis of metropolitan agriculture by (1) examining whether the production and marketing strategies anticipated to succeed at the RUI are in fact concentrated at the RUI; (2) refining the analysis to account for the degree to which Metro and Nonmetro counties are agriculturally important (or not agriculturally important); and (3) including an analysis of the distribution of producer demographics.

We find that despite the threats from nonfarm development, farming at the RUI continues to significantly contribute to the U.S. agricultural economy. The persistence of agriculture at the RUI is a reflection of community and government efforts, land use policies, marketing programs, and decisions and adaptations made by individual farm families. Due to the design of the analysis, a greater number of sales were concentrated in AI counties compared to NAI counties. However, not all types of high-value production and marketing systems assumed to dominate in metropolitan regions were found in Metro-AI counties as one would expect. Horses, nursery and greenhouse, and direct sales were more prevalent in Metro regions, while organic production, recreation sales, CSA farms, and value-added farms were more likely to be concentrated in Nonmetro counties.

The analysis demonstrated that certain types of high-value production systems that directly feed into consumer needs and interests, such as horses and nursery and greenhouse, do in fact thrive at the RUI. However, the spatial concentration of these sectors in the RUI is also partially a reflection of their connection to larger regional economies. In the case of horses, the counties with the highest horse sales are also major horse-breeding and horse-racing centers. Parallel to horses, nursery and greenhouse production predominates in areas with a milder climate and longer growing season that supply other nurseries across the country that are in cooler climates with shorter growing seasons.

The vast majority of direct sales are in Metro-AI counties. When California is taken out of the analysis, the high number of counties with direct sales in the Northeast demonstrates the role that investments in community-based local food and regional food systems can have. A substantial number of direct sales are in Nonmetro-AI areas, and a small, but present, number are in NAI counties. This finding may reflect the challenge of disaggregating the different types of direct sales the census of agriculture captures under this one variable (Lev & Gwin, 2010). Lev and Gwin (2010) note that livestock farmers are the majority of direct marketers (58 percent), but only account for 31 percent of direct marketing sales. Following up on Lev and Gwin's (2010) recommendations, as

federal policy focuses increasingly on local food systems, it important to evaluate whether more refined data points are needed in order to more accurately measure different types of direct marketing.

Additionally, this analysis examined how a state like California, which produces a large volume of high-value crops and has a significant number of RUI counties, can obscure other regional production patterns. Accounting for the effect of California enables RUI researchers to develop a more nuanced policy analysis when examining production and marketing patterns across the country.

While farms just outside cities may be increasing the number of recreational opportunities they offer through agri-tainment initiatives, this analysis revealed that the bulk of recreational sales are coming from counties that have other outdoor recreation activities and scenic amenities, particularly in the West. Future research should examine how recreational sales play into multifunctional agricultural initiatives particularly at the RUI.

Organic products command a higher premium price. In this analysis organic sales were more concentrated in Nonmetro (taking out California) and AI counties, most likely reflecting the shift of commodity sectors into organic production. This follows the findings of the 2008 USDA Organic Production Survey, which found that 83 percent of organic sales are to wholesale markets (processors, millers, packers, distributors, wholesalers, brokers or repackers), while 10.6 percent are to direct-to-retail and only 6.8 percent of sales are from direct-to-customer exchanges (farm stands, u-pick, farmers' markets and CSAs) (USDA, NASS, 2008). Organic agriculture is important for soil health and ecosystem services, and can significantly contribute to farmer income and farm viability, particularly by adding value to commodity crops. However, organic as a production method itself may not be directly contributing to the economic vitality of RUI agriculture compared to broader local and regional food system development initiatives.

The RUI is a highly heterogeneous place, both in terms of production and farmer demographics. Currently the majority of RUI policies, programs, and campaigns focus on land policy and market diversity, and do not recognize social differences among farmers. Nor do these efforts recognize how cultural and historical legacies may enhance or complicate many of the initiatives directed towards agriculture at the RUI. As new policies and programs are developed to support different types of farmers, it is important to reflect on how the objectives and intended people-based outcomes match up to *where* the targeted farmers are located. This analysis demonstrated that farmers at the RUI are extremely diverse. However, it also found there are a substantial number of beginning and women farmers in Nonmetro-AI counties, and a small but notable number of African American, Hispanic and Native American farmers in Nonmetro-NAI counties. These findings reinforce the need for policy-makers and NGOs to analyze how specific initiatives will affect different types of farmers in different locations.

Conclusion

The now mainstream interest in economic development through food and agriculture and in local and regional food systems has brought a new focus to both the significance of agricultural at the RUI and to the need for additional investment in these regions. Policy-making is often about resource distribution, and given the limited financial resources available, farm advocacy organizations, researchers, and policy- and grant-makers need baseline data to inform their priorities. This paper informs these debates by documenting current production and marketing systems assumed to thrive in agriculturally important RUI counties. We find that urban and consumer-oriented production and marketing systems are not just metro phenomena, but in fact are more prevalent in nonmetropolitan regions as in the case of organic agriculture and recreational sales. These findings, in combination with the regional distribution of nursery and greenhouse and horse sales, demonstrate that policy-makers need to take regional economies, climate, and distribution networks into account when establishing investment priorities. Future research should expand these initial observations to more closely examine the regional dimension to these production and marketing systems.

This paper also provides new information on the spatial distribution of operator demographics

— an issue that has largely been overlooked by RUI scholars. Producers at the RUI are highly diverse, but regional differences do exist. There is a rich tradition in rural studies documenting the extent to which gender, sex, culture, and ethnicity play a role in farmer decision-making and farm structure. This analysis provides initial data on operator demographics at the RUI; additional research is needed to explore the intersection between operators' social and cultural factors and farm persistence and growth at the RUI. The degree to which investments made in production and marketing systems at the RUI are successful is tempered by the extent to which we recognize and incorporate the unique history and technical assistance needs of different types of operators. The next generation of RUI policy and research should build on its historic focus of land use and markets to now include people. 

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Rethinking investment dynamics: An alternative framework of the global land rush

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Abstract

Despite growing interest in "land grabbing," the comparative literature remains biased in several key ways, failing to capture the full diversity of land investments and to incorporate the important findings made by case-study researchers. This paper analyzes in particular three analytical blind spots in current typologies of the global land grab phenomenon: (a) the failure to incorporate nonproductive investments, including speculation; (b) the misguided focus on investor nationality, as opposed to capital flows; and (c) the tendency to ignore how domestic actors shape the terms of a land deal. In drawing attention to these limitations, this paper constructs two typologies of land investment — one describing physical changes in *land use,* and another mapping *interactions* between investors and developing country actors. Working in conjunction, they help to explain why land deals occur where they do and how they change not only the land itself, but also people's relation to the land. This paper therefore calls for a more nuanced analysis of the bargaining processes that underlie every land deal and also of the potential policy alternatives that may attract investment without sacrificing the livelihoods or lands of vulnerable local populations.

Keywords

capital flows, civil society, foreign capital, investors, land, land deal, land grab, speculation, typology

Introduction

Beginning in the mid-2000s, foreign investors started acquiring "undercultivated" agricultural lands across Africa, Asia, Latin America, and the former Soviet Union (Anseeuw, Boche, Breu, Giger, Lay, Messerli, & Nolte, 2012; Hall, 2011). In regions like Africa, where only 2–10 percent of land is formally tenured (Deininger, 2003), this so-called "global land grab"[1] has had devastating

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[1] The term "land grab" is in itself controversial. As Borras, Hall, Scoones, White, & Wolford (2011) point out, it has become a "catch-all" for a wide variety of phenomena. The

consequences for the local communities that live off land not formally belonging to them. Land acquisitions often generate higher local food prices, create fewer jobs than advertised, expel people from ancestral lands, destroy habitats, exacerbate ongoing land disputes, and disproportionately affect vulnerable populations, including women (Anseeuw, Alden Wily, Cotula, & Taylor, 2011; Berhman, Meinzen-Dick, & Quisumbing, 2011; Daley, 2011; Deininger, & Byerlee, 2011b).

Much of this initial investment was in agricultural land, spurred by the growing food insecurity problems of powerful foreign states like the Gulf States and China after the food price crisis of 2008 (GRAIN, 2008). Mineral, water, and forest resources have also been affected (Zoomers, 2010). Many projects are designated for biofuels production, with roughly 40 percent of investors turning to "flex crops" that can be used as either food or fuel (Anseeuw et al., 2012). The term global *land* grab also obscures the role played by water, as large-scale agriculture often competes with and intensifies existing demand for water, sometimes generating social conflict (Anseeuw et al., 2012; Kay & Franco, 2012; Woodhouse, 2012; Woodhouse & Ganho, 2011).

Foreign investors frequently obtain long-term leases of up to 99 years from local governments (Cotula, 2011), although private purchases and conservation acquisitions are also common. Often plagued by corruption, these deals rarely compensate local populations for the resulting loss of access to resources (Vermeulen & Cotula, 2010a).

Estimates for the total scale of these land acquisitions vary dramatically, ranging from 45 million hectares (111 million acres) (Deininger, & Byerlee, 2011b) to over 200 million hectares (494 million acres) (Geary, 2012). Though difficult to quantify (Cotula, 2012), this scramble for land is likely here to stay. Food production must double by 2050 to meet growing global food needs, and much of this increased production will need to occur in developing countries (Food and Agriculture Organization of the United Nations [FAO], International Fund for Agricultural Development [IFAD], United Nations Conference on Trade and Development [UNCTAD], and the World Bank Group, 2008, cited in Borras & Franco, 2010a). In monetary terms, this means US$80 billion of investment *per year* (Blumenthal, 2012). Large-scale agriculture provides one avenue to meet this demand, but more inclusive business models also exist, including contract farming, leases and management contracts, tenant farming, and farmer-owned businesses (Vermeulen & Cotula, 2010b).

Moreoever, the recent land rush is distinct from other, earlier instances of neo-imperial influence. These new investments have attracted new types of investors — especially investors with little experience in agriculture — and are refocusing on countries with weak governance, many of which received little foreign investment until the 1990s (Cotula, Vermeulen, Leonard, & Keeley, 2009; Deininger, & Byerlee, 2011b). Furthermore, these deals share an immediate trigger — the food-price crisis of 2007–2008 — although long-term price expectations, population growth, and resource demand will likely sustain it over the long term (Anseeuw et al., 2011).

Although our knowledge of this land rush has deepened considerably since 2008, there is still much to learn. This paper focuses on *transnational* land deals (excluding purely domestic ones) and notes three limitations in current *comparative* research: (a) the lack of attention paid to nonproductive investments, including speculation; (b) the failure to examine capital flows and how foreign investors may be involved indirectly in "domestic" projects; and (c) the tendency to ignore why and how local governments and civil society organizations may attract, condone, or oppose such investments. Although individual case studies have dealt with some of these issues, especially the role of domestic actors, there has been little comparative work, on either a regional or global level, that addresses these three factors.

To what extent have these omissions in the comparative academic literature biased the extant research agenda? To get at this question, I propose two new typologies that map the interactions

word is highly politicized and may not give investors credit where it is due. For these reasons, I prefer to talk about the "global land rush" or "large-scale land acquisitions in developing countries," although I will occasionally use the word "land grab" for clarity.

between investors and domestic actors, as well as describe changes in land use. These typologies are necessarily simplifications and are no substitute for rigorous case-study analysis. Rather, they allow for primitive accounting of known land deals and suggest new dimensions that may have been overlooked in previous investigation. In this way, these typologies have the potential to reveal undiscovered patterns in the terms of land purchases or leases, to call for increased research on capital flows, and to restore agency and accountability to oft-overlooked domestic actors.

This paper proceeds as follows. First, I analyze existing comparative models of land rush, namely typologies, showing how they have advanced our knowledge of land investment and also how they have fallen short. I then present two typologies of land investment, which together describe the changes in *land use* and *investor-domestic actor interactions*. These typologies are then used to analyze two case studies: the paper pulp industry in Brazil and sugar cane ethanol in the Philippines. Finally, I conclude by discussing the economic, political, and ethical issues highlighted by this analysis. This shift in perspective not only reveals analytical blind spots in the current land research agenda, but it also raises important questions about how we should define justice — and by extension, injustice — in the land-grab debate, calling for a more nuanced understanding of what truly constitutes a "grab."

A Model That Falls Short

The comparative academic literature on the global land grab has come a long way since researchers began studying the phenomenon in earnest in 2008. Many early assumptions — for example, that food insecurity alone drove the investment — have since been relaxed or discredited. There has been a proliferation of thoughtful case-study analysis, as well as increased investigation into green grabbing, water grabbing, and other non-agricultural land purchases. Nevertheless, despite this wealth of case-study knowledge, the comparative literature on land grab, especially existing typologies, remains insufficient, often failing to incorporate the diverse and at times contradictory discoveries made by empirical researchers.

This paper attempts to bring global models of land grab up to date by analyzing a wealth of case-study research, in addition to highlighting where case-study analysis itself could be improved. In this section, I address a handful of limitations of current land-grab frameworks.

First, in comparative studies of land grab, causal explanations have focused almost exclusively on market demand. The prevailing model claims that rising food and fuel prices have made food and energy security a vital concern for many states, prompting increased foreign investment in agricultural lands in the developing world. Despite the evidence for growing demand for such "underdeveloped" land, host countries also play an important role in attracting or at least permitting foreign investment in agricultural land (see, for example, Clancy, Lovett, & Marin, 2011, on Colombian biofuels; MacInnes, 2012, on corruption; Woods, 2013, on Burma's emerging "agro-industrial complex"). What do local states have to gain from selling underdeveloped land? How do domestic elites shape land politics? Such questions are common in the discussion of specific land deals, but they are often lost in more comparative, global models of the land rush.

Second, academics, journalists, and policymakers have overemphasized African cases. The most egregious violations of land rights do occur in Africa, home to anywhere between 62 (Anseeuw et al., 2012) and 70 percent of land acquisitions (Deininger, & Byerlee, 2011b). Nevertheless, this process is occurring elsewhere (in Latin America, Southeast Asia, and Eastern Europe) under very different conditions (Baquero & Gómez, 2012; Borras, Franco, Gómez, Kay, & Spoor 2012; Wolford, 2010a). In order to adequately assess the scope of the global land rush, we first need to document and analyze the full spectrum of variation, not just the types of deals occurring in Africa.

Third, there is little to no aggregate information about who is investing, where they are obtaining land, and at what cost. Many recipient countries lack land registries and some companies obscure this information, making such research logistically difficult (Cotula et al., 2009). Even so, the focus has been on foreign "investors," as defined by their nationality. Source of capital, however, is the more important distinc-

tion between investors, since international firms or intergovernmental investors sometimes fund so-called "domestic investors."

Fourth, speculative land investment is rarely, if ever, studied as a phenomenon unto itself although it is probably rampant. Many agrarian researchers assume that purchased land is ultimately put to *some* productive use, but some investors are in fact buying land for the relative security and high returns of the investment, as compared to other, more traditional asset classes (De Schutter, 2010; Geary, 2012; Liu, Koroma, Arias, & Hallam, 2013; Deininger, & Byerlee, 2011b). To date, only 21 to 27 percent of land deals have led to any "implementation activity" or production, with the rest remaining idle (Anseeuw et al., 2012; Deininger, & Byerlee, 2011b). Although some of these tracts will eventually see agricultural production, this cultivation may not happen in the near term, and in the interim, local farmers are often denied access, inhibiting their own farming (Hinshaw, 2011).

In light of these biases in the comparative literature, we are in need of an alternative framework that better captures the full variation of land deals. In this paper, I propose a new typology that maps the interactions between investors and recipient country actors, thereby underscoring the bargaining processes that lead to a land deal, be they advantageous or detrimental to local interests. In addition to this *interactions* typology, I amend an earlier typology by Hall (2011) to incorporate nonproductive and speculative investments, which may account for up to three-quarters of all land projects. Through careful variable selection, these typologies shed light on underlying patterns in land investment that are particularly noteworthy or have been hitherto ignored by comparative researchers.

Why Typologies?

As an analytic tool, typologies allow us to draw comparisons between existing cases and make predictions about unknown ones based on combinations of a given set of variables. Typologies only focus on a small number of variables, out of a wide variety of potential candidates. Such variables could include land use change, type of investor, extent of land cultivation, business model of the incoming company, amount of "available" land nationwide, and more.

With the "right" variable selection, a typology reveals fundamental causal configurations. That is, it not only answers the questions of *who, where, when, and how,* but also gets at *why* a given outcome occurred. A well-defined typology balances the competing goals of explanatory power and simplicity and can make sense of a complex phenomenon without ignoring variation.

Perhaps the most important feature of a typology is the so-called "empty case." In any typology, some categories will be more common than others, and some will appear to be empty—that is, some variable combinations may, seemingly, not exist. Do these empty cases represent theoretically impossible combinations, or instead, are they a gap in our knowledge that must be filled? In this way, a typology not only highlights what has been understudied by land-grab researchers, but also reveals which variables, which sets of circumstances, are correlated with the *absence* of land grab.

What a typology cannot do is provide detailed information about case studies or tell us much about the variables it overlooks (which will always be many). Where typologies can inform future case-study research is by highlighting important variables, suggesting combinations worth investigating, and allowing cross-case comparison between similar "types." In the end, the following typologies will raise more questions than they can possibly answer. My hope, then, is that those questions may correct misconceptions in the comparative literature to date and lead to more thoughtful, more targeted research in the future.

Analyzing Existing Typologies

Borras and Franco (2010a), Deininger and Byerlee (2011) , and Hall (2011) are among a handful of authors who have built typologies of land deals, providing a solid foundation for the new framework presented in this work. These existing typologies overcome one flawed assumption of the early reports on land grab, which is that it *only* represents a transition from small-scale to large-scale agriculture. Moreover, they acknowledge that not all land deals fit neatly into the "food security" discourse promoted by early researchers. Nevertheless, these typologies fall short because they (a) do

not account for speculative and nonproductive investments, (b) ignore how foreign capital may fuel domestic agricultural investment, and (c) downplay the bargaining processes that take place between investors and host countries, which are already well documented for some case studies.

Typologies by Agrarian Researchers

Building upon Borras and Franco (2010a), Hall (2011) develops a typology of land use change, divided into six types (figure 1).

In Type A (food to food), the land is still used for food production, but this production may have intensified and its goals may have shifted, perhaps from domestic exchange to food production for export. In Type B (food to biofuels), land that was formerly used for food production or to feed the local population has been converted to biofuels production with the hope of meeting rising energy needs. Type C (food to nonfood) often involves displacing local communities in order to carry out mining or tourism projects, whereas in Type F (nonfood to nonfood), "unused" land is converted into tree farms, mines, or ecotourism sites. Type D (nonfood to food) refers to land that was not *primarily* used for food production, but now is. Finally, Type E (nonfood to biofuels) refers to land that was formerly "unused" in some capacity and that is now targeted for biofuels production.

This typology's primary utility is that it allows for an accounting of the net change in land use. Since it operates at the level of individual projects, regardless of scale, we can tally different types and determine whether given regions, countries, or continents are experiencing more or less food production than before. In this way, the typology helps us to gauge the relative importance of food and energy insecurity as drivers of the land rush.

Still, this typology is imperfect because it combines both productive and nonproductive land use into the "nonfood" category. By nonproductive, I mean land that is not productive of food, fuel, or other natural resources. Taking tourism as an example, we see that such "nonproductive" land might still create jobs or income, but it neither produces nor extracts resources from the land, as would occur with other types of "nonfood" uses (e.g., forestry). This *nonproduction* would have distinct effects on the physical and social landscape, whether by preserving natural ecosystems or creating few agricultural jobs.

Typology by the World Bank

Representing another group of land-grab researchers, reports by the World Bank tout the need for foreign direct investment in developing countries as a way to boost productivity in the face of food security concerns. Although this framework does incorporate investor motivations, it too ignores the roles of host countries in attracting, condoning, or opposing foreign agricultural investment.

Deininger and Byerlee's (2011) typology epitomizes the World Bank perspective, focusing on two salient and measurable variables: the availability of uncultivated land and yield gaps. Here, a yield gap is the "difference between possible output and what is currently attained" and reflects "the extent to which gaps in technology, institutions, or other public goods (e.g. infrastructure) prevent existing cultivators from realizing there [sic] potential" (Deininger & Byerlee, 2011a, p. 17).

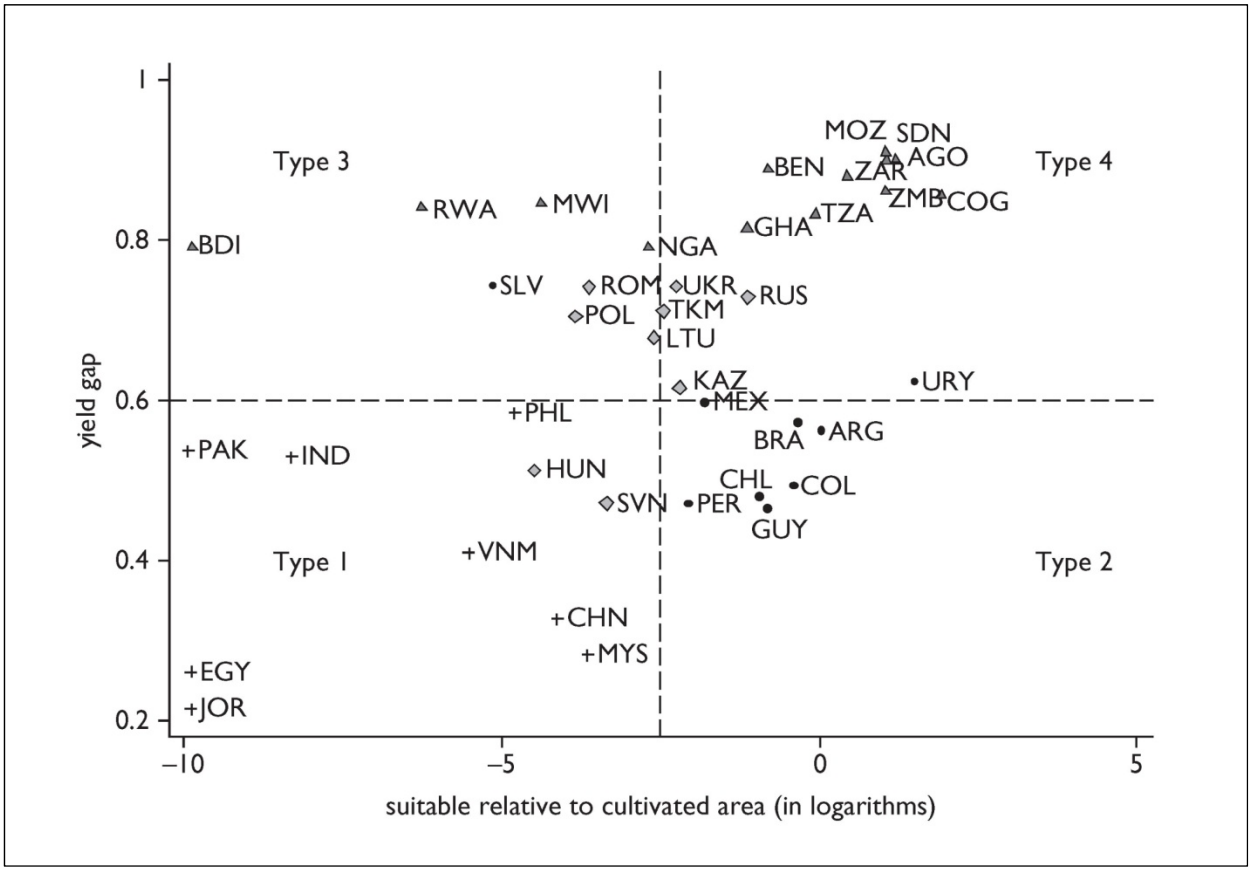
As figure 2 illustrates, countries fall into types based on the relative availability of uncultivated land and their current yield gaps, with the types loosely corresponding to geographic regions.

Figure 1. Typology of Land Use Change, by Hall (2011)

	To Food	To Biofuels	To Nonfood
From Food	**Type A** Food to Food	**Type B** Food to Biofuels	**Type C** Food to Nonfood
From Nonfood	**Type D** Nonfood to Food	**Type E** Nonfood to Biofuels	**Type F** Nonfood to Nonfood

Hall, R. (2011). Land grabbing in Southern Africa: The many faces of the investor rush. *Review of African Political Economy, 38*(128), 193–214. http://dx.doi.org/10.1080/03056244.2011.582753

Figure 2. Potential Land Availability vs. Yield Gap for Developing Countries



Note: Dashed lines indicate average yield gap and 50th percentile for relative suitability.
Source: Deininger, K., & Byerlee, D. (2011). *Rising global interest in farmland: Can it yield sustainable and equitable benefits?* [Based on Fisher & Shah, 2010]. Washington, D.C.: World Bank. Used with permission of The World Bank.

Type 1, which represents low yield gaps and low availability (i.e., high population density), is found predominantly in Asian countries. Type 4 is at the other extreme, representing high quantities of available land and high yield gaps. In the land deals documented by the Land Matrix Project, a full 58 percent of land deals are Type 4, with many of these being in countries in sub-Saharan Africa (Anseeuw et al., 2012). Type 2 is found in several Latin American countries, which have lower yield gaps but still have large quantities of uncultivated land. Finally, Type 3 represents high yield gaps but low availability, which is the case for "most developing countries," according to Deininger and Byerlee (2011).

Unlike the typologies by Borras and Franco (2010a) and Hall (2011), this model only operates at the country level and cannot be applied to specific projects. As such, it loses much of the domestic variation that occurs across different provinces, different types of investors, and different industries. Moreover, the typology uses population density bright lines (e.g., 10 or 25 persons/sq. km) and yield bright lines (60 percent of the potential yield for a crop) in order to determine land that would be "suitable" for cultivation. In this way, the framework ignores the thorny question of what land should really qualify as available and suitable. Population density says little about the extent of cultivation, since some crops are more land-intensive than others. Furthermore, any such bright line wholly ignores a variety of non-agricultural uses for land resources; for example, a tract of land may be a ritual or ceremonial site, provide access to other natural resources like water, or be used for hunting and

gathering. Such lands would qualify as "suitable" for cultivation under this typology, even though it would be unpalatable to local communities.

An Alternative Framework of Land Rush

Even though these existing typologies cover a wide range of land deals, they remain imperfect. In the following sections, I construct a novel *interactions* typology that unpacks investor dynamics, including capital flows, and regulation by host countries. Compared to existing typological frameworks, this work constitutes a shift in perspective, since both investors and domestic actors are to blame when and if land deals harm local populations. In so doing, it restores agency to oft-ignored domestic actors, such as national and local governments and civil society organizations.

In the search for an alternative framework of land rush, I will also amend Hall's *land use* typology to deal with another bias of the existing literature: the dismissal of nonproductive investments, including conservation, tourism, and speculation. Although allowing for nonproduction is an improvement, this revised typology will remain insufficient to explain why land deals occur where they do, necessitating the creation of the *interactions* typology.

Typology 1: Directions of Land Use Change

First, in order to account for land that has transitioned to *nonproduction,* I add a fourth column to the land use change typologies by Borras and Franco (2010) and Hall (2011) to create a new typology (figure 3).

Type D *(food to nonproduction)* involves lands once devoted to agricultural production for food consumption, which are then transformed for nonproductive uses. "Nonproduction" here is a broad category for land that is no longer being cultivated or tapped for its natural resources. That is, there is no agricultural production for food or for biofuels, nor are other resources extracted, such as minerals or timber. This category thus captures several different trends: speculative investment, conservation, and ecotourism, to name a few.

In some cases, formerly cultivated land is taken out of production and investors let the lands sit idle, hoping to recuperate the original price (and then some) in a few years. These investors are unlikely to be driven by food-security concerns, but rather are capitalizing on the accompanying food price spikes in order to resell land and earn sizable returns on their investment.

For example, in 2008, the government of Mali gave 100,000 hectares (247,000 acres) of land for free to Muammar el-Qaddafi of Libya, conditional on ongoing agricultural investment (GRAIN, 2012). After the agreement, local farmers were forced off the land and their houses were leveled, but as of 2012 the land had still not seen agricultural production, neither before nor after the collapse of the Qaddafi regime (GRAIN, 2012; MacFarquhar, 2010). As is often the case, researchers may be unable to determine whether the investor's intentions were speculative, but the failure to initiate production within a few years is a good indication of nonproduction. Even in cases where infrastructure investment and production eventually begin, the interim period of nonproduction often has devastating consequences on the food security and livelihoods of local communities.

Meanwhile, Type H (*nonfood to nonproduction*) represents land settings that were not used primarily for food production in the past, but that are now "nonproductive." Importantly, "nonfood" is at times an amorphous category and may include

Figure 3. A New Typology of Land Use Change

	To Food	To Biofuels	To Nonfood (extractive industries)	To Nonproduction
From Food	**Type A** Food to Food	**Type B** Food to Biofuels	**Type C** Food to Nonfood (extractive industries)	**Type D** Food to Nonproduction
From Nonfood	**Type E** Nonfood to Food	**Type F** Nonfood to Biofuels	**Type G** Nonfood to Nonfood (extractive industries)	**Type H** Nonfood to Nonproduction

lands that are used for some food production, harvesting, ceremonial purposes, or other communal functions. That is, taking these lands out of production may still have tangible and real effects on local populations beyond the mere transfer of ownership.

For example, the proposed Greater Limpopo Transfrontier Park in Zimbabwe sits on the ancestral lands of the Chitsa people, where they have gravesites, perform initiation and circumcision ceremonies, and believe the spirits to reside (Scoones, Chaumba, Mavedzenge, & Wolmer, 2012). Despite numerous attempts to evict them, the Chitsa community continued to fight for restitution of its ancestral lands, and in 2011 a deal was reached whereby the Chitsa community retained access to some of the lands in question, but would be strictly forbidden from poaching or grazing in the adjacent park (Scoones et al., 2012). This attempted eviction illustrates the need for careful definitions of "unused" land and the potential for conservation projects to have adverse effects on local communities.

Why do both speculation and conservation belong to the same category?

Some might object to assigning speculative land acquisitions and conservation to the same category. While speculative investment suggests foreign investors taking advantage of cheap resources abroad in order to turn a profit, conservation projects are often framed as socially and environmentally necessary, including those by organizations like the World Wildlife Fund and Conservation International (Kelly, 2011). In reality, these two seemingly disparate phenomena are similar in that they dispossess local populations of their access to land, putting a halt to agricultural production altogether (Benjaminsen & Bryceson, 2012; Fairhead, Leach, & Scoones, 2012).

Moreover, the resulting social and environmental effects are often similar across nonproductive cases. Like purely speculative investments, conservation projects fail to generate new jobs or even a labor reserve, instead appropriating lands for the physical spaces themselves (Li, 2009). Likewise, designating land for conservation may involve forcible expropriation of land, violent removal of people from the land, destruction of livelihoods, and/or restructuring of the labor sector (Fairhead et al., 2012). Neither speculation nor conservation will in itself generate the same resource depletion that characterizes food production, biofuels, and the extractive industries. Indeed, conservation and tourism projects may experience ongoing investment to preserve fragile, natural ecosystems. Although all of these similarities merit the single category of *nonproduction,* there is considerable within-category variation and engaging with subtypes (e.g., conservation, tourism, speculation, etc.) will better illuminate the unique risks and benefits of a given project.

Typology 2: Interactions Between Investors and Domestic Political Economy

The *land use* typology is still insufficient as a framework for land grab. First, it is best at explaining differences in the effects of various projects, illuminating how the changes engendered by land deals have lasting impacts on the local sociopolitical and environmental landscape. However, it does little to explain why land deals occur where they do and under what conditions. That is, it tells us very little about the bargaining processes underlying the land rush.

The comparative land-grab literature often fails to challenge the prevailing assumption that international investors take advantage of countries with weak governance in orchestrating land deals. This "victim-oppressor" interpretation of land grab overlooks the complex interactions that occur between national governments, local governments, civil society organizations, small-scale farmers, and the investors themselves, be they domestic or foreign. While weak governance may be behind many land deals, it is not a hard and fast rule.

I thus create a second typology with the goal of restoring agency — and therefore accountability — to domestic actors and differentiating between categories of foreign investors (figure 4). This typology recognizes the diversity of actors involved in a given land deal, as well as their implicit and explicit roles in shaping its terms. Where land deals result in unacceptably grave costs, the blame does not fall on the investors alone, but on a whole range of individuals and organizations that either

turned a blind eye or actively pursued policies at the expense of local populations or the environment, and sometimes to their own personal benefit.

This typology has two variables: the nature of the investment and the nature of any land deal regulation. As such, not all categories will be equally exploitative, eventually creating a space for potentially just and beneficial land deals.

Investor Type

The first variable is the *type of investor:* a foreign public investor, foreign private investor, or mixed domestic-foreign investors. Each investor "type" considers not only the investor's nationality, but also whether the source of capital is foreign or domestic. Since this paper will focus on land grab as a *globalized* phenomenon, domestic investors with *purely* domestic capital are omitted from this typology. Such purely domestic investments are also distinct from their transnational counterparts, warranting their exclusion. First, they are governed, at least in principle, by only local and national laws. Second, they reflect intracountry power dynamics between elites and rural populations, as opposed to power and resource differentials across countries. Third, although states must compete to maintain local investment, this competition is distinct from the intense competition they face for foreign investment. Fourth, capital flows remain within the country, whereas foreign capital brings with it the hope (whether false or true) that it will spur development.

The first category of the typology, *foreign public investment,* includes all public-sector actors using public funds to acquire land, be they governments, sovereign wealth funds, or other state-owned companies. Although these investments have drawn considerable attention in the past, states are increasingly moving away from direct investment, preferring to minimize risk by investing in private companies, guaranteeing loans, and providing tax rebates or other forms of assistance (Liu et al., 2013). This category also blurs somewhat with foreign private investments (Cotula et al., 2009). For example, does a partially state-owned Chinese company behave more like a fully state-owned company or a private enterprise? When the son of Crown Prince Sultan bin Abdul Aziz of Saudi Arabia signs a lease for 105,000 hectares (259,000 acres) in South Sudan, is he acting as a private individual or an emissary of the state, and what exactly is the distinction (GRAIN, 2012)?

Foreign private investment makes up the bulk of agricultural investment (Land Matrix Project, n.d.). It may involve one foreign company investing on its own, or a partnership across several different foreign companies. It is important to note that private-sector acquisitions often involve significant assistance from home-country governments in the form of subsidies, soft loans, guarantees, and insurance to private companies pursuing land investment abroad (Cotula, 2011).

The most complicated category, *mixed*

Figure 4. A New Typology of Investor-Host Country Interactions

		Regulation, if any		
		Little to no regulation	**Government-enforced regulation**	**Civil society regulation**
Type of Investor	**Foreign Public**	**Type A** Foreign public investment, little to no regulation	**Type B** Foreign public investment, government-enforced regulation	**Type C** Foreign public investment, civil society regulation
	Foreign Private	**Type D** Foreign investor, little to no regulation	**Type E** Foreign investor, government-enforced regulation	**Type F** Foreign investor, civil society regulation
	Mixed (domestic investor with foreign capital or joint ventures)	**Type G** Mixed investor, little to no regulation	**Type H** Mixed investor, government-enforced regulation	**Type J** Mixed investor, civil society regulation

investment, encompasses all projects where there is at least some domestic ownership, funded at least in part by foreign capital. I further divide these investments into two categories: purely domestic investors with foreign capital, and joint ventures. In the first case, the entire project is owned by a domestic company or individual, but it receives significant funding from international or transnational sources. For example, most authors cite Peru as a case of purely domestic investment (Anseeuw et al., 2012; Deininger & Byerlee, 2011a), despite the fact many projects receive significant foreign funding. Domestic investors — with or without foreign capital — account for the majority of land transactions worldwide, suggesting the need for closer analysis of capital flows in order to understand the transnational dimension of these so-called domestic acquisitions (Liu et al., 2013).

In the second case, several companies (some domestic, some foreign) jointly own, lease, or operate the project. Joint operations are especially common in countries that put limits on foreign land ownership, such as the Philippines (Borras, Franco et al., 2011). Unlike purely foreign investment, these joint partnerships tend to reduce administrative transaction costs (Anseeuw et al., 2012). Furthermore, domestic investors are better equipped to navigate local bureaucracy and engage corrupt officials, allowing for the faster settlement of a land deal (Deininger, & Byerlee, 2011b).

Additionally, I draw attention to an oft-ignored distinction: the difference between foreign investors and foreign capital. The tendency is to talk about "foreign" and "domestic" investors, often ignoring how capital flows may make some domestic investors more similar to their foreign counterparts. I argue that capital is the more salient distinction, hence my inclusion of purely domestic investors with access to foreign capital. What enables land grab is developing countries' desire — and often need — for foreign funds to create growth. In competing for land deals, countries are often forced to make offers that sacrifice livelihoods or the environment for the sake of attracting additional funds. Capital alone is sufficient to create this pressure on states, and so it merits as much attention as the nationality of the investors themselves.

Extent of Regulation

The first category, *little to no regulation*, can be construed as the absence of any meaningful effort on the part of any actor to ensure that local populations and environments do not suffer adverse consequences under a land transfer, such as dispossession, reduced access to resources, environmental degradation, and destruction of livelihoods. Unfortunately, this is the de facto reality under which many land deals occur. Even in this category, there may still be some legal protections in place, but the spirit of the law is rarely if ever heeded. Likewise, there may be some activism on the part of rural social movements, but it is disorganized or weak.

In some cases, *little to no regulation* may entail governments actually seeking out and enabling international investment. Across the globe, governments have explicitly sought out "idle" lands with the goal of attracting increased agricultural investment. For example, in 2009 the Ethiopian government set aside 1.6 million hectares (4 million acres) that it could offer up for agribusiness investment, with the option to extend it again to 2.7 million hectares (6.7 million acres) (Reuters, 2009, cited in Cotula, 2011).

The second category, *government-enforced regulation*, accounts for those cases where national, provincial, or local governments protect local land rights and attempt to reduce adverse effects, at least to some extent. It is important to note that these protections need not be legal, although they often are. This regulation must involve some degree of enforcement; the mere existence of laws governing land grab is insufficient. Moreover, the regulation may come from any level of government. Local officials in particular often fail to act in the community's best interests when allocating land resources (Anseeuw et al., 2012). In Ghana most of the investment appears to occur on customary land, not state-owned land, with investors "exploit[ing] the ignorance" of the councils of elders who manage customary land at the local level (German, Schoneveld, & Mwangi, 2011, p. 20. In contrast, the national government does not seem to engage in negotiations with investors and has not used its right to eminent domain in order to reallocate land to investors.

Moreover, government regulation may emerge out of practice, rather than through explicit policy-making, and may manifest itself in the absence of land grab. For example, in a study on Vietnamese tree plantations, Sikor (2012) highlights how government agencies have accommodated local land rights and set up a bank to increase access to rural finance. Partly as a result of these government practices, rural households continue to own and operate many of the country's tree plantations, while transnational corporations have struggled and largely failed to take control.

The final category is *civil society regulation*. In cases where the government has failed to regulate international acquisitions, and especially in the case where it fails to enforce laws already on the books, civil society organizations may rise to fill the gap, articulating their demands through protests and occupations. This category requires that civil society organizations be sufficiently strong not only to mobilize local communities, but also to force governments and/or the companies themselves to reevaluate the terms of the land transfer.

Civil society regulation is often not purely domestic in nature, but instead linked, either formally or informally, to a transnational activist network. In some cases the organization itself may be transnational, such as the international movement of small farmers Via Campesina. Furthermore, such transnational movements may compete with or contradict each other in the positions they take vis-à-vis land investment, as illustrated by Borras, McMichael, and Scoones's analysis of La Via Campesina and the International Federation of Agricultural Producers (2010). Even relatively powerless domestic organizations may gain influence and legitimacy by positioning themselves in the context of larger social movements or by seeking out international allies who put pressure on the state from outside (Hertel, 2006; Keck & Sikkink, 1998). Indeed, an Oakland Institute brief on South Sudan's largest land deal and the resulting media coverage helped to mobilize local communities against the deal, who successfully halted the project by appealing to the central government (Oakland Institute, 2011). Through engagement with transnational activist networks, civil society protests not only better ensure their own success, but can have a precipitating effect on social movements, either regionally or globally.

Although excluded for the time being, international regulation could be incorporated into this typology when and if it comes into existence. International Codes of Conduct, like the Principles for Responsible Agricultural Investment, jointly developed by UNCTAD, FAO, IFAD, and the World Bank, have been proposed as a way to protect local populations and govern the process of land deals in developing countries, all while allowing them to capitalize on foreign investment (Committee on World Food Security, 2013; FAO, IFAD, UNCTAD, and the World Bank Group, 2010; FAO, 2012; Foljanty & Wagner, 2009; von Braun & Meinzen-Dick, 2009).[2] These principles are currently under consultation, but when they are finalized, a fourth column could be added to the typology. Such international regulation is distinct from the other categories in that third-party organizations or the investors themselves would likely be the ones to implement and enforce it. It is worth adding that this typology illustrates how a code of conduct is far from the only route to more "just" land deals. Regulation can come from a host of different actors and interactions, suggesting that the present focus on a code of conduct ignores other potential sources of regulation.

There is one more category of regulation that this typology omits: regulation by companies themselves. For various reasons, some investors attempt to self-regulate their projects in order to ensure that livelihoods and environments are preserved. In practice, this may be difficult, given the complexities of how governments define unused lands and what little or misconstrued information some investors may receive. Still, a variety of company commitment instruments do exist, with limited endorsement (Zwart & Novib, 2011). Such voluntary regulation is exogenous to the typology because it will only apply to specific projects and/or companies and cannot be generalized to industries or countries. Without this

[2] The premises behind a code of conduct, as well as the solutions promised, have been questioned and are far from universally accepted (Borras & Franco, 2010b).

predictive power, it is not a useful variable in the typology.

Illustrative Cases

In the following section, two illustrative cases of land acquisition help to depict the general characteristics of each type and reveal some of the difficulties in categorization. In each case, the renewed focus on investor–regulatory actor interactions raises unexplored normative, political, and economic questions.

A. Paper Industry in Brazil

> *In land use typology:* Mix between Types C and G (food/nonfood to nonfood)
> *In interactions typology:* Type F (mixed investor, civil society regulation)

Land deals by the domestic and international paper industry in Brazil's Bahía region demonstrate how civil society organizations may step in when the government fails to respect de facto land rights and, in so doing, change the outcome of the land deals themselves. I will focus on the Veracel plantation case, which belongs to Type F in the *actor interactions* typology, representing domestic investors with foreign capital and a deal regulated by civil society organizations.

Veracel began as a Brazilian business conglomerate, but in 1997 a new company, Veracruz, was formed with Swedish Stora, which then merged with Finnish company Enso, of which 60 percent belongs to the state. In 2000, the conglomerate Odebrecht sold many of its shares to Aracruz (Kröger & Nylund, 2011). This case thus epitomizes the complexities of categorizing investor type. Joint operations like Veracel more closely resemble their foreign counterparts in that they are at least partially financed by international funds. Yet with significant domestic input, they are better able to capitalize on local expertise and networks to navigate bureaucracy and strike deals with local officials and communities. As such, they can be considered a "mixed investor."

Tree plantations like Veracel are not new to Brazil's landscape, but in the last decade they have increasingly pushed into state lands, spurring protest movements by local activists (Kröger, 2012). In 2004 activists from Brazil's landless movement MST uprooted several hectares of commercially planted eucalyptus and staged an occupation of the land. Kröger (2011) notes that the government "response to the occupation and its results were swift" (p. 437. The government soon gave the MST 30,000 hectares (74,000 acres) in settlement promises and ordered Veracel to uproot an additional 47,000 hectares (116,000 acres). Slowing the Veracel project was only one of MST's many successes. Throughout the region, their protests have slowed or terminated several plantation expansion projects that would have infringed upon agricultural lands with varying degrees of cultivation (Kröger, 2011).

But, where is the Brazilian government in all of this? The Brazilian Land Reform Institute (INCRA) is weak and grossly underfunded (Kröger, 2011; Kröger & Nylund, 2011; Wolford, 2010b). Moreover, roughly half of all land in Brazil is not registered with the agency (Reydon & Fernandes, 2013). According to Wolford (2010b), INCRA's weak technical capacity and lack of resources have created an opportunity for MST and similar civil society organizations to dispute and shape the terms of Brazilian agrarian policies. Although INCRA's weakness may only partly explain the rise of civil society regulation (Kröger 2011), there is no doubt that MST has played a critical role in shaping and halting these land deals. Land expansions have occurred at slower rates, often with more just terms, or been cancelled altogether. In the Brazilian case, civil society regulation has emerged as an effective means of protecting local landowners and holding the government accountable for the legal protections it has been unable to provide.

Even nonviolent protests, such as those organized by MST, do run the risk of becoming violent and resulting in more harm than gains. In other cases of MST protest, police wearing full riot gear have broken up protestors' camps. Had the activists not removed roadblocks, the military may have intervened, with potentially violent consequences (Kröger, 2011). Since peaceful resolution of the problem is far from guaranteed, analysis of civil society regulation must take into account the

cost-benefit scenarios inherent in citizens' activism.

This case sheds light on an underexplored puzzle in the comparative literature on land deals: the role of civil society organizations in preventing land deals. Type F (*mixed investor, civil society regulation*) is not an empty case, since civil society protests are not completely effective, but it may be that egregious land deals are much less common under this set of circumstances. Are civil society organizations more or less effective at regulating land deals when some of the investors or capital is domestic? In other words, how does investor identity shape the rise of and effectiveness of civil society regulation? By examining this case through the typological framework, we can begin to ask these more targeted comparative questions.

Moreover, this case touches upon the occurrence of land deals in relatively strong states. Weak governance is a common feature where land grabs occur, but they also occur in states with strong institutions. For example, Brazil has strong institutions on the whole, but INCRA is the worst funded and most understaffed agency among them (Wolford, 2010b). Future research would thus benefit from investigating two separate categories of land deals: those occurring in states with overall weak governance, and those occurring in countries with relatively weak land regulation *vis-à-vis* the entire state apparatus. The distinction between overall and relative institutional weakness is an important one, in part because it will likely have implications beyond the extent of government regulation. Based on the events of the attempted Veracel expansion, we might predict that civil society organizations in strong states will be dissatisfied with weak land regulation, have higher expectations for protection of their land rights, and possibly take upon themselves the responsibility to regulate land deals. In this manner, the typology's renewed focus on land regulation probes the assumption of weak governance and guides us to new research questions.

B. Green Future Innovations Sugar Cane Ethanol in the Philippines

In land use typology: Type B (food to biofuels)

In interactions typology: Type G (mixed investor, little to no protection)

Whereas the Brazilian case has seen effective regulation, the sugar cane ethanol industry in the Philippines has not. The contrasts between the two outcomes shed light on the importance of regulation and the potential of mixed investors to inhibit effective regulation by the government or even by civil society organizations. This case thus demonstrates the need to focus on investor's source of capital, thereby separating mixed investors from both their foreign and domestic counterparts.

In recent years, the Philippines has sought out international land investment, primarily for biofuels projects. The search for available "idle" lands is ubiquitous, with targeted food and energy investments in nearly every province nationwide. One example is the Green Future Innovations project in Isabela province, where a consortium backed by foreign and domestic capital has begun acquiring some of the 11,000 hectares (27,000 acres) promised to the project by the Filipino government. Green Future Innovations has Taiwanese, Japanese, and American companies doing most of the processing for ethanol production, while the Filipino corporation is a "consolidator of land" (Borras, Franco, Carranza, & Alano, 2011). It has become a special project of the president and is expected to become the country's largest producer of ethanol.

In the case of the Philippines, a handful of laws exist to regulate foreign investment, including the Republic Act 8179, which puts limits on foreign ownership of corporations and lands (Borras, Franco, et al., 2011). These limited regulations seem to do little to protect local populations. Instead, they encourage foreign firms that seek out partnerships with domestic capital, as occurred with Green Future Innovations. Although further investigation is necessary, this joint partnership seems to have strengthened the project's position in the country. In particular, the project seems to be centered in San Mariano for "no other reason…than it is the apparent pet project of the current mayor" (Franco, Carranza, & Fernandez, 2011, "Preliminary findings," para. 4). Additionally, the domestic partners have close ties to some of

the major players in tobacco, grains, and sugar in the Philippines. In other words, the domestic partnership has allowed the foreign investors to tap local networks and situate themselves within the complex and historical dynamics of elite control.

Moreover, this case demonstrates some of the social consequences of a government's failure to regulate sufficiently. The government's consistent overstatement of the availability of "idle" land has forced officials to go searching for new lands to hand over to the project. These "new" lands were often used for corn production by smallholders, and several officials have expressed concerns that the lease rate is too low and that people will lose lands that are rightfully theirs (Borras, Franco, et al., 2011). This problem is further exacerbated by a lack of formal land titling in the Philippines, putting the lands of local farmers at risk.

Intriguingly, civil society organizations have not risen to fill the gap in regulation, even though they successfully put an end to an earlier, 1.3 million hectare (3.2 million acre) deal with China for food exports (Borras, Franco, et al., 2011). Why did civil society organizations mobilize around the one project, but not around biofuels in Isabela? Is exporting foods uniquely troublesome, given that the Philippines is the world's largest rice importer? Is it a question of scale — the difference between 1.3 million hectares (3.2 million acres) and 11,000 hectares (27,000 acres)? Is there something more unpalatable about the Chinese as investors than a joint operation between Filipinos and foreigners? Why and when do researchers encounter "fear and/or silence" from local residents, as they did with the Green Future Innovations project (Franco, Carranza, & Fernandez, 2011, "Preliminary findings," para. 4)?

Perhaps most importantly, the typology enables comparison across space and time, for example, between the Brazilian paper industry and the Filipino sugar cane industry. Why do we see civil society regulation in Brazil and not in the Philippines? Is it the result of the relative strength of civil society organizations in each country? Or is there something different about a joint venture (as in Brazil) and a domestic investor backed by foreign capital (as in the Philippines)? By focusing on the typology's two salient variables — investor type and extent of regulation — we are forced to examine an oft-understudied aspect of land deals, the bargaining process itself. In this way, these typologies lead us to the difficult questions about *why* land grab occurs and *why* given deals have the results they do. These typologies cannot answer such questions, but they can shift the debate away from a one-sided focus on the *effects* of land grab, encouraging more comparative analysis between existing and future case studies.

Discussion

In this analysis, I have pinpointed and examined three biases in existing typologies of land grab: (a) the disregard for capital flows and the large category of "mixed investors"; (b) the failure to account for speculative and nonproductive investments; and (c) the tendency to downplay or ignore how domestic actors help to decide land deals.

In order to counteract these biases, I have proposed two typologies that, working in conjunction, question why land deals occur where they do and how they change the land itself. I first amend the Hall (2011) typology to include nonproductive land uses, calling for better research on how speculation and conservation projects differ from agricultural or biofuels production in their effects on community dynamics and physical geography.

A second typology maps the interactions between different categories of foreign investors and domestic actors, ranging from civil society organizations to local leaders to national governments. This typology rejects the tendency to focus exclusively on investor nationality and proposes that future research instead examine capital flows as a driver of foreign investment. Moreover, this typology identifies a wide variety of mechanisms with the potential to foster effective regulation, a code of conduct being only one of many.

As a highly stylized model of the global land grab, these typologies will do little to explain variables exogenous to the model and cannot explain every facet of land grab. Although reality is always more complex and contradictory, the typologies' descriptive and predictive power lie in their simplicity. Typological analysis is no substitute for rigorous case studies, but rather should

inform that analysis by illuminating which cases are representative of a more general pattern and which are genuinely anomalous.

Most importantly, by focusing on the investors and regulatory actors themselves, this analysis leads us to hitherto unanswered or undiscovered questions about the global land grab. This discussion explores, in turn, the economic, political, and normative implications of this shift in perspective. Although it is far from an exhaustive list, I hope to show some of the frictions with which future research might engage and how this new framework can be employed to expand and refocus the research agenda on land grab.

Perhaps the most important contribution of this paper will be its call for better analysis of investor types and the existence of purely speculative land deals. Up until now, very little analysis has been done on the investors themselves — who they are, what motivates them, and how they negotiate land deals. What portion of "domestic" investors rely exclusively on domestic funding? Given the growing financialization of agriculture (Fairbairn, 2013), can we better document the extent to which there exist *purely speculative* deals?

By bringing the state back into focus, this work also deepens questions of how recipient country political systems encourage, condone, or discourage large-scale land investments by foreign investors. As is often documented in case-study analysis, states play an active role in seeking out and competing for land investment, such as when the Rwandan government passed a law to bring all marshes under state control with the goal of attracting more intensive agriculture (Veldman & Lankhorst, 2011). Other states, however, may passively allow investment to occur. At what level does government enforcement break down? It is not merely a question of enforcement of legal frameworks, but rather a complex web of political motivations, existing legal frameworks, institutional funding priorities, and the relative strength of institutions governing land grab.

Furthermore, I question the prevailing assumption that land deals in Latin America occur under strong institutional oversight. Under what conditions are the terms of land deals in so-called "stronger" states like Brazil and Argentina more or less favorable to rural populations and smallholder agriculture? Are civil society organizations better organized and more likely to engage in land conflicts in more powerful, wealthier states? Intra-regional and interregional analysis is necessary to test how much institutional strength and the level of economic development affect the scope and gravity of land deals. Brazil is a particularly promising case study for future research because it is both a source of land investment in other countries, like Bolivia, and a site for land deals by other foreign companies (Liu et al., 2013).

Beyond the state, engaging with this typology has the potential to clarify the role of civil society organizations and social movements. When compared to mining industries, land deals for agriculture and biofuels seem to prompt fewer and less cohesive protest movements. Land deals do spark resistance, whether it is the mob in Uganda that killed an Indian man over proposed rainforest clearing or the protestors in Sierra Leone who blocked access to an investment site (Kugelman & Levenstein, 2013). Still, protest is not the norm.[3] Why have we not seen greater mobilization by peasant movements worldwide? Is it a function of the weakness of civil society organizations vis-à-vis investors and state? What are the conditions that enable effective civil society regulation — existing laws to which to appeal? Strong community support? Receptive media sources, as occurred with the *Financial Times* negative coverage of South Korean investments in Madagascar (Kugelman & Levenstein, 2013)?

Moreover, by refocusing the discussion on the interactions between investors and domestic actors, I hope to call attention to the ways in which land deals are settled. Some have suggested that corruption and bureaucratic maneuvering are more effective routes to completing a land deal than formal legal and political processes. For example, Kenyan elites have illegally and/or irregularly accessed

[3] This seeming "absence" of protests may be partly, though not fully, explained by underreporting of protests, especially when compared to the reported number of land deals. Some protests may be deemed insignificant or they may go unnoticed because they occur in hard-to-reach, remote locations (Borras & Franco, 2013).

public lands for personal gain, despite the fact that they were earmarked for the public interest (O'Brien, 2011). In another case, a Kenyan city commission served as a broker and secured public use land for a foreign company (Klopp, 2000, cited in O'Brien, 2011). Globally, how often and under what conditions do foreign companies use elites to secure land, just as has been documented in Kenya? Corruption is likely to be a significant factor at all levels of government and all types of agricultural investments.

Finally, when we examine and discuss land-grab regulation, as in this typology, we must engage with the question of justice in land grab. Defining — if only abstractly — what a just land deal looks like will help us to gauge how other deals measure up. The biases outlined herein provide useful insight into how future research might proceed. They bring into focus a host of ethical questions, only some of which have come to the fore in the debate over agricultural investment. These include: (a) What are the state's responsibilities vis-à-vis local populations? (b) In the face of food security issues, is imposing environmental conservation on cultivated lands — or forests used for harvesting and game — morally acceptable? (c) To what extent are investors responsible for investigating and avoiding the ill effects caused by their projects? (d) Are some categories of the typologies (for example, food to nonproduction) more problematic than others?

Beyond broadening the scholarly research agenda, however, this paper may also facilitate improved policymaking around the global land grab. In particular, this model helps us to identify high-risk areas for land grab: where regulation is weak, where speculative investment is rampant, or where lands were previously used almost exclusively for food production. By taking the project as its unit of analysis, it also helps us to predict, albeit broadly, the causes and effects of unknown cases by drawing comparisons to similar projects of the same type. Perhaps most importantly, this typology opens new avenues for just land distributions by focusing on the various routes to effective investment regulation. Rather than envisioning a world where a growing resource problem will not necessitate some foreign investment, I accept this fact to be true for the foreseeable future. Therefore, the policymaker's challenge is to determine what types of regulation are most effective and how the international or domestic system can foment organic regulation processes in a frenzied investment environment. This task demands the attention of researchers and policymakers alike, and it requires acceptance of the need for increased cultivation and/or improved land yields if future hunger and food insecurity are to be avoided. I only hope that we are able to move past polemical debates about "land grab" and focus on the task ahead of us, for it is an arduous one.

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Consumer characteristics and willingness to pay for locally produced rib-eye steaks: A case study of consumers at farmers' markets

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Abstract

This study examined crucial product attributes, consumer characteristics, and corresponding willingness to pay (WTP) for locally produced rib-eye steaks. We focused on consumers at farmers' markets because the rising trend of buying local is believed to have generated higher sales for local producers in recent years. This paper is the first demand-side study to focus solely on high-value beef cut in the state of South Dakota. We conducted an experimental survey study, and the data suggested a significantly higher WTP for locally produced rib-eye steaks. The results also indicated that all product attributes selected for inclusion in this study contributed to a higher WTP for shoppers at farmers' markets, especially in terms of juiciness and color of the steaks. We also found that two consumer characteristics — household beef intakes and health knowledge — significantly contributed to higher WTP.

We recommend that local producers continue improving the quality of their meat; however, producers should be aware that improving quality would possibly result in diminished profits. Our study also indicates that although consumers at

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farmers' markets are willing to spend a higher price premium for better steaks, the additional WTP vanishes once the product's quality reaches a certain level. To improve profitability, we suggest that local producers develop effective market strategies to target and recruit customers who are willing to pay higher premiums for locally produced food.

Keywords
beef, conjoint analysis, farmers' markets, local food, rib-eye steaks, willingness to pay, WTP

Introduction

Recent years have seen consumers' increasing willingness to pay (WTP) rise for locally grown agricultural products. Although consumers' definition of "local" often varies by product and geographic location, studies have demonstrated significant price premiums for products labeled as locally produced (Darby, Batte, Ernst, & Roe, 2008; Giraud, Bond, & Bond, 2005; Patterson, Olofsson, Richards, & Sass, 1999; Schneider & Francis, 2005; Thilmany, Grannis, & Sparling, 2003). For example, Thilmany, Grannis, and Sparling (2003) compared three geographical regions of Colorado and found that approximately 25 percent of Western Slope respondents preferred to buy beef directly from producers — a rate three times higher than that of consumers in the urban Front Range region. In addition, Patterson et al. (1999) and Jekanowski, Williams, and Schiek (2000) found that consumers generally believed locally produced products to be of higher quality than those produced out of state, and this perceived higher quality resulted in consumers' willingness to pay higher premiums. A similar conclusion reached by Zepeda and Li (2006) suggested that consumers often purchased locally grown food primarily for its perceived freshness and higher quality. However, the intertwined connections between "locally produced" and other product attributes have made an accurate estimation of WTP rather difficult. For instance, Wolf and Thulin (2000) selected 413 sample respondents in Luis Obispo, California, and reported that attributes such as price, value, quality, leanness, and healthiness were more likely (than being local) to affect consumers' preferences of local food products. To avoid unnecessary complication, the authors focused this paper on soliciting the value of WTP for locally produced rib-eye steaks for consumers at farmers' markets, while emphasizing how specific consumer characteristics contribute to the variations in estimated WTPs. Although we also examined WTPs for other product attributes such as color, juiciness, and feed type, the objective of the study was to identify the value of "being local" for rib-eye steaks. We chose to study rib-eye steak because we believe that, particularly in the northern Great Plains, this product's high value and stable supply provide local small- and midscale producers great opportunities to establish value-added niche markets. In addition, while beef is a highly consumed agricultural product in the United States, Midwesterners consume beef at a notably higher rate than the national norm. Indeed, the average annual beef consumption per capita in the Midwest was 73 pounds (33.1 kg.) per person in 2005, or approximately 7 pounds (3.2 kg.) more than the national average (Davis & Lin, 2005).

In addition to the attributes of a product, the attributes of its consumers are also important in determining consumer preferences and WTP (Smith, 1956). In this study, we focused on consumers at farmers' markets because some studies found shoppers at farmers' markets often share similar consumer attributes and a potentially higher WTP for local food (Chang, Xu, Underwood, Mayen, & Langelett, 2013; Crow & Henneberry, 2013; Giraud, Bond & Bond, 2005; Govindasamy, Schilling, Sullivan, Turvey, Brown, & Puduri, 2004; Nganje, Hughner, & Lee, 2011; Thilmany, Bond, & Bond, 2008). The rising sales at farmers' markets in recent years reflects not only consumers' increasing demand for locally produced food, but also their interest in learning more about the source of their food. Farmers' markets provide consumers with both a sense of community and the opportunity to interact with local producers as well as with other consumers. Consequently, such venues have demonstrated great sales in recent years (Brown, Miller, Boone, Boone, Gartin, & McConnell, 2007; Frenzen & Davis, 1990; Oberholtzer & Grow, 2003). On the other hand, under the pressure of increasing input costs and global competition, beef

producers are constantly seeking effective marketing and production strategies. We believe shoppers at farmers' markets represent an important business opportunity for South Dakota's local beef producers to generate higher profit margins. Based on the information gathered from our discussions with local producers and stakeholders, we endeavored to answer the following three questions:

(1) What product attributes would generate higher profits?
(2) What types of consumers were more willing to pay for better quality beef?
(3) Did an emphasis on "locally produced" result in consumers' higher WTP for local beef products?

We organized this paper as follows. In the next section we provide a brief literature review. We then discuss the research methods and empirical model. We introduce the experimental survey design and data collection process, and then discuss the data and study results and some limitation of the study; finally, we offer a conclusion that examines the implications of the study.

Literature Review

Empirical data indicate that sales of local food and at farmers' markets have contributed an increasing portion of local producers' total income (Frenzen and Davis, 1990; Hunt, 2007). For example, a report published by the U.S. Department of Agriculture (USDA National Agriculture Statistics Service, 2006) suggested that products sold in farmers' markets made up about 25 percent of vendors' incomes. Another USDA survey study estimated that in 2000, at the 2,863 identified farmers' markets in the United States, approximately 66,700 farmers and 2,760,000 customers participated in transactions per week (Payne, 2002). The same study also estimated average annual sales of US$11,773 for vendors at farmers' markets during the same time (Payne, 2002). Due to the lack of empirical records for potential sales and profit margins for locally produced beef at farmers' markets in South Dakota, this study included shoppers at five local farmers' markets to estimate their WTP for locally produced rib-eye steaks.

Previous studies have identified potential WTP for beef's intrinsic attributes, including fat content, taste, nutritional value, and tenderness (Bond, Thilmany, & Bond, 2008; Killinger, Calkins, Umbeger, Feuz, & Eskridge, 2004; Platter, Tatum, Belk, Koonz, Chapman, & Smith, 2005; Purcell, 1993; Unnevehr & Bard, 1993), and extrinsic attributes, including GMO, organic production, and fairness (Carlsson, Frykblom, & Lagerkvist, 2007; Loureiro & Umberger, 2003, 2007; Maynard, Burdine, & Meyer, 2003; Umberger, Feuz, Calkins, & Killinger-Mann, 2002; Wolf & Thulin, 2000; Ziehl, Thilmany, & Umberger, 2005). However, most of these studies have focused either on different cuts of beef or on a broader product category (for example "beef" or "meat"). A careful review of the literature also suggests a shortage of demand-side studies for beef products in the northern Great Plains. To the best of our knowledge, consumers' price premiums for high-end beef cuts (such as rib-eye steaks) in this geographic region have never been formally reported in the literature. Therefore we believe this study contributes to the literature from the following three aspects: its focus on a particular cut of beef, its concentration on consumers in the northern Great Plains, and its effort to identify the key consumer characteristics that affect consumers' WTP.

Additionally, while previous studies aimed to reveal the connection between consumers' characteristics and their preferences for local beef, the conclusions were inconsistent, which created difficulty for producers in utilizing the resulting information. For instance, some studies' results implied that consumers, regardless of their similarities or differences, tended to have very comparable preference for specific product attributes. Additionally, Patterson et al. (1999) and Jekanowski et al. (2000) found that consumers generally believed locally produced products to be of higher quality than those produced out of state, and this perceived higher quality was the reason for consumers' willingness to paying higher premiums. A similar conclusion by Zepeda and Li (2006) suggested that consumers often purchased locally grown food primarily for its perceived freshness and higher quality. In contrast, other studies suggested that

consumers' preference and WTP can be notably different. For instance, Rao and Monroe (1988) suggested that the variations in rural consumers' preferences and WTP were due to gaps in their respective incomes, rather than their prior knowledge (or lack thereof) of the products. Two studies by Dentoni, Tonsor, Calantone, and Peterson (2009) and by James, Rickard, and Rossman (2009) suggested that consumers who have better knowledge of a product actually had less preference and WTP for that product's credibility attributes.

Yu and Gao (2010) suggested that variations in study methods, the selection of product and consumer attributes, the study time period, and the geographic locations all contributed to the inconsistency of estimating WTP for beef cuts. For instance, while Maynard et al. (2003) found that consumers were willing to pay a higher premium for locally produced beef, the authors did not specify to what cut of beef their estimated WTP applied. Moreover, even consumers who demonstrated a preference for locally produced products did not necessarily demonstrate a higher WTP for locally produced beef (Empacher, Gotz, & Schultz, 2002; Ziehl et al., 2005). Oftentimes various factors, such as the geographic location selected for study or consumers' definition of "local," can create varying results in consumers' WTP (Burnett, Kuethe, & Price, 2011).

To reduce the potential inconsistency and heterogeneity, we focused on consumers' preferences for only one specific, high-end cut of beef (rib-eye) and its attributes with a survey sample of shoppers collected strictly from local consumers in South Dakota. In particular, we wanted to study the price premium that rural consumers at South Dakota farmers' markets would pay for locally produced, high-end rib-eye steaks, compared to their valuation of other product attributes, such as color, juiciness, fat content, and feed type. In addition, we were interested in examining how specific consumer attributes created variations in their preferences and WTP.

Research Methods

Based on the random utility theory (Lancaster, 1966) and suggestion of Louviere (1988), Louviere and Woodworth (1983), and Louviere, Hensher, and Swait (2000), this study applied the Choice-Based Conjoint (CBC) technique that enabled us to control and design the survey questionnaire to collect essential information for the study. An increasing number of consumer and marketing researchers have applied conjoint experiment analysis to study the values of agricultural products and their attributes in recent years (Carlsson, Frykblom, & Lagerkvist, 2005; Darby, Batte, Ernst, & Roe, 2006, 2008; Darby et al., 2008; Wirth, Stanton, & Wiley, 2011; Manalo, 1990; Wang & Sun, 2003). With a careful control of the survey design and experiment procedure, the conjoint experiment method can elicit respondents' perceived importance of each attribute by their stated preference. Thus, researchers can predict consumers' choice of products and the trade-off between attributes to assist cost-sensitive, local producers in designing production and marketing plans that are more efficient.

According to Lancaster (1966), the utility for consumer i is a function of selected attributes for product j:

$$U_{ij} = U \text{ (Price, brand, other attributes)} \quad (1)$$

We assume that consumer i will make a discrete choice among j mutually exclusive alternatives in each choice set to maximize her or his utility (Louviere et al., 2000; Mayen, Marshall, & Lusk, 2007; Nganje, Hughner, & Lee, 2011). Given that ε_{ij} is a stochastic random error, Equation (1) can be written as:

$$U_{ij} = \beta\chi_{ij} + \varepsilon_{ij} \quad (2)$$

where β is a vector of unknown parameters to be estimated and χ_{ij} is a vector of attributes listed on the right-hand side of Equation (1), random utility theory allows us to separate the utility of individual i for a specific product into two components. The first term (i.e., χ_{ij} in Equation (2)) is a systematic component that will be used to include the utilities obtained from attributes χ_{ij}. The second term is the random term (i.e., ε_{ij} in Equation (2)) that contains the uncertainty resulting from both the unobservable influences of attributes and measurement errors.

We apply conditional logit and mixed logit models to estimate the coefficient values of $\beta's$ for Equation (2) (Louviere et al., 2000).[1] After finding values of $\beta's$, we calculated the corresponding WTP to show our sample consumers' WTP in order to obtain the benefits of the change in a specific product attribute j. For example, a consumer's WTP for a locally produced steak (brand attribute), as compared to a steak bearing a national brand label, is the price difference between the locally produced and the national brand steaks. Mathematically, we can measure the WTP by applying the following formula (Mayen et al., 2007):

$$WTP_j = \frac{\beta_{j=1} - \beta_{j=0}}{-\beta_{price}} \quad (3)$$

where $\beta_{j=1}$ is the estimated coefficient for the attribute j at the desired level, $\beta_{j=0}$ is the coefficient for the attribute j at the base level, and β_{price} is the coefficient value for price. For example, compared to the same product under a national brand, the WTP for a locally produced steak is $(\beta_{local} - \beta_{national})/(-\beta_{price})$. We expect this WTP to be positive if consumers prefer to eat locally grown beef. For other attributes with omitted levels, the coefficient value of $\beta_{j=0}$ will be set as zero. Moreover, if zero lies within the corresponding confidence interval of any estimated WTP (by applying Equation (3)), we should conclude this WTP as statistically insignificant (i.e., indifferent from zero). However, we suggest readers to be cautious in interpreting any estimated WTP that is statistically indifferent from zero.

Experimental Survey Design

Attribute Selection

The first step in designing a CBC survey questionnaire is to select suitable product attributes (i.e., χ_{ij} in Equation (2)). To improve the quality of experiment design, we conducted one preliminary study with different versions of the survey questionnaire given to a small number of interviewees. Combining results from the preliminary study and the information gathered from local producers, we chose the following five beef attributes (in addition to price): brand, fat content, organic production (as opposed to natural[2] or conventional production), color, and juiciness.[3]

The first two attributes, price and brand, are necessary to measure consumers' WTP for locally grown steaks. After collecting shelf prices from various supermarkets, we set four discrete levels for the price attribute ranging from US$4.99 to US$10.39, based on a unit weight of one 8 oz. (0.2 kg.) rib-eye steak. We assigned the brand attribute to four different levels: national brand (Omaha Steaks), regional brand (South Dakota Certified), locally grown, and an opt-out option (none). We used the brand variable to create the profiles (choice sets) for respondents to choose. Combining brand and price attributes to the linear function based on Equation (2), we were able to estimate the monetary value of consumers' preference for a "locally produced" product.

Increased concern for one's health (e.g., fat and cholesterol content) has certainly become one of the most important determinants of U.S. consumers' demand for beef products (Lusk & Schroeder, 2004; Menkhaus, Colin, Whipple, & Field, 1993; Ward, 2004; Ward, Lusk, & Dutton, 2008). Evidence showed that consumers are willing to pay a higher price for reduced fat content in

[1] See Appendix A for a brief discussion of conditional logit and mixed logit models. For the rationale of choosing logit and mixed logit models, read chapter 6 of Louviere et al. (2000).

[2] USDA (2013) defines "natural" as "a product containing no artificial ingredient or added color and is only minimally processed. Minimal processing means that the product was processed in a manner that does not fundamentally alter the product." (USDA, 2013, "Natural," para. 1).

[3] Although there are many factors we could look at, the decision for choosing these five attributes to use in this study was made based on the requests of local producers and stakeholders. We would also like to express our gratitude for Dr. Keith Underwood for his suggestion in attribute selection for this study. While previous studies have recognized WTPs for attributes similar attributes to the ones included in this study, none of these study results can be applied to explain consumers' price premium for the rib-eye steaks produced in South Dakota.

beef. For instance, Ward et al. (2008) found that consumers would pay a premium (ranging from US$0.18/lb. to US$1.39/lb.) for ground beef with at least 96 percent leanness, compared to the same beef cut with 95 percent to 80 percent leanness. Brester, Lhermite, Goodwin, & Hunt (1993) used the hedonic price method to study wholesale beef markets and found that consumers would pay a premium of approximately US$0.02/lb. to increase 1 percent leanness of ground beef. Parcell and Schroeder (2007) applied a similar method to consumers' self-reported records from the Meat Panel Diary data and concluded that a 1 percent increase in leanness would incur an increase of US$0.039/lb. in consumers' WTP for ground beef. Therefore, we included four levels of leanness (80 percent to 95 percent) in this study to estimate consumers' WTP for reduced fat content in rib-eye steaks, assuming that consumers were able to distinguish the difference between marbling (fat within the lean sections of meat) and fat on the exterior of steaks.

As American consumers' concern for their health has increased, so too has their concern about *how* their food is produced; thus organic foods have enjoyed an outstanding increase in market demand over the past two decades. From 2004 to 2007, organic food sales in the U.S. increased from US$11 billion to US$27 billion (USDA-ERS, 2013). The annual growth rates of organic food sales were around 10 percent to 15 percent from 2004 until the financial crisis hit the U.S. economy in 2009 (USDA-ERS, 2013). Nevertheless, even a 7.4 percent growth rate in 2012 was more than double the annual growth rate for all food sales in the same year (USDA-ERS, 2013). However, a product's "organic" designation does not necessarily ensure a stable profit margin. For instance, James et al. (2009) applied the stated choice method in a survey study and found that a better knowledge of agricultural production would actually *reduce* consumers' WTP for organic products. Furthermore, the stiff market competition associated with the organic food industry has created obstacles for local producers to start up a business in organic production. Because industrial-scale farming and long-distance shipping methods have gradually permeated the organic food markets, small and medium-sized local producers cannot compete (Cloud, 2007).[4] In addition, the procedure for getting USDA organic certification can be so costly that many small and medium-sized producers simply choose not to do so.

Since altering the fat content or the production type (i.e., organic, natural, or conventional) of an agricultural product can be extremely costly, this study included these two attributes to determine whether rural consumers (those who frequent farmers' markets in South Dakota) would pay a sufficient price premium to offset the higher costs of producing such products. We also included the attributes of color and juiciness in the survey questionnaires to gather potential price premium information for these attributes, as requested by local producers in the region. Table 1 summarizes all product attributes and the levels of each attribute included in this study.

Experiment Design and Cheap Talk

The second step in creating our study's survey was to design a questionnaire to which respondents could easily and correctly respond (Mayen et al., 2007). The questionnaire in this study contained two parts. The first part of the questionnaire collected required information with which to study consumers' preference and WTP. We applied fractional-factorial design technique with only main effects of the attributes included in this part of the questionnaire. To maintain the best quality of the experimental design, we created an original design with 144 choice sets and applied the blocking technique to assign eight choice sets to each participant (Kuhfeld, 2010).[5] Table 2 shows one of the eight choice sets in the first part of the questionnaires. Each of the first three rows is a choice option representing a set of attributes at specific levels listed on the subsequent columns. The levels for the attributes randomly varied across choices

[4] While we have quoted Mr. Cloud's article here to support our argument, the authors also drew a similar conclusion from the information gathered by personal interviews with local producers who prefer to remain anonymous.

[5] See Kuhfeld (2010) for further information regarding the methods of experimental design and the SAS coding for "blocking" technique.

Table 1. Summary of Selected Product Attributes and Levels

Attributes	Levels
Brand	• National Brand (Omaha Steaks) • State-Level brand (South Dakota Certified) • Locally Grown • None (Opt-Out)
Price	• US$4.49 per lb. • US$6.79 per lb. • US$8.59 per lb. • US$10.39 per lb.
Color	• Red • Cherry Red • Brown
Juiciness	• Very Juicy • Juicy • Not Juicy
Leanness	• 80% • 85% • 90% • 95%
Organic	• Organic • Natural • Conventional Feed

characteristics affected the variations of estimated WTP.

We followed the method suggested by Dillman (2000) in administering the survey. The cover letter explained the research objectives and included an example as well as an explanation of how to answer the questionnaire. In addition, the cover letter contained a color picture of an 8 oz. (0.2 kg.) rib-eye steak in order to provide a consistent image for survey participants. A potential problem of applying CBC studies lies in that respondents tend to overestimate their stated WTP, which could damage the implementation and the usefulness of the study results (Carlsson et al., 2005; Carlsson & Martinsson, 2001; Lagerkvist, Carlsson & Viske, 2006). Therefore, this study included a "cheap talk" treatment in the cover page to reduce the problem of such hypothetical bias (Bulte, Gerking, List, & de Zeeuw, 2005; Cummings & Taylor, 1999).[6] To close the cover letter, we provided the

Table 2. Sample Choice Set Used in the Conjoint Experiment

Brand	Price	Color	Juiciness	Fat Content	Production Type
Omaha Steaks	US$6.79	Brown	Juicy	95% leanness	Natural
S.D. Certified	US$4.99	Brown	Juicy	85% leanness	Organic
Locally Produced	US$10.39	Cherry Red	Not Juicy	85% leanness	Conventional
None					

following the principles of Fractional Factorial design. The last row of each choice set is an opt-out option (i.e., "None").

In addition to basic demographic and socio-economic information gathered in the first section of the questionnaire, the second part acquired information regarding respondents' health condition, nutrition-related knowledge, and shopping behaviors. The questionnaire also requested respondents to disclose their monthly food budget, spending on beef and other meats, and food preferences. This study included these questions to collect information to identify our sample consumers' characteristics. We then utilized this information to investigate how consumer

administrators' contact information to answer any questions that participants may have had.

We chose to deliver the questionnaires through in-person contacts at local farmers' markets. We personally distributed 716 questionnaires at five different farmers' markets during the months of July and August 2011. Of these five markets, one was located in the Sioux Falls metropolitan area, and the rest were located in small, rural towns in eastern South Dakota. We visited each farmer's market twice during the survey period and stayed the entire time period that the market was open on that day. During each visit, research team members

[6] See Appendix B for the script of the "cheap talk" treatment.

stood at the entrances and exits of the market and greeted shoppers. After verbally explaining the purpose and procedure to participate in the survey, we asked participants to complete and return the surveys before a given due date. To increase the sample size, we tried to reach as many shoppers as possible and did not limit our contacts to specific types of shoppers. We also informed participants that their responses would enter them in a drawing to win one of ten US$100 gifts. At this point, we would like to note a potential problem in sample selection bias within this study: since the participants in the study were voluntary, it is very possible that only shoppers who were interested in our study would respond to our request. In addition, although we tried to contact as many shoppers as possible, the sample observations were limited to those shoppers who visited the farmers' market on the same days that the research teams visited the markets.

Results and Discussion

Of the 716 questionnaires delivered, we received 251 returned surveys; however, of these only 212 surveys were usable for analysis. The overall usable response rate for the study was 29.6 percent. We also separated the sample responses gathered in Sioux Falls (denoted as *City*) from those gathered in the small eastern SD towns (denoted as *Rural*) to examine whether significant differences exist between characteristics preferred by city or rural respondents. Table 3 lists the mean value and resulting chi-square value from the Kruskal-Wallis test (titled "Kruskal-Wallis Test/Chi-Square") for each variable.[7] The resulting chi-square value from the Kruskal-Wallis test enables us to test the null hypothesis of no significant difference between *City* and *Rural* groups. For example, the resulting chi-square value for the Kruskal-Wallis for variable *Gender* is 0.415, indicating that we cannot reject the null hypothesis that both groups of consumers have similar gender distribution.[8]

Although we expected more disparity in the characteristic preferences to be demonstrated between city and rural groups, Table 3 suggests there are only a few statistically significant differences. Overall we found a surprisingly similar nature in the demographic and socio-economic backgrounds between *City* and *Rural* groups. Both groups have considerably more female than male respondents, and more than 80 percent of the participants in the survey are the primary shoppers for their households. Both groups also contain a large percentage of Caucasians (98 percent for the *City* group and 95 percent for the *Rural* group), which indicates a lack of diversity among consumers in South Dakota farmers' markets. Indeed, Table 3 shows the only variables that revealed significant differences between two groups are *Age, Bloodpressure, Fambeef,* and *Famchicken.* Therefore, we combined the samples from *City* and *Rural* groups into one group for the following analysis to enhance the quality of the empirical study results. However, readers should avoid assuming that shoppers within the *City* group were all from the Sioux Falls metropolitan area, because some shoppers at the Sioux Falls farmers' market might have travelled from nearby small towns. Conversely, urban residents were less likely to travel 50 miles (80 km.) or more to small-town farmers' markets, especially if they had better shopping options available in the city in which they resided.

Willingness to pay (WTP)

Using the estimated coefficient for each attribute from the results of conditional logit and mixed logit models, we were able to generate consumers' WTP by applying Equation (3).[9] Table 4 shows the estimated WTP and the corresponding 95 percent confidence interval for each level of the selected attributes. If zero lies somewhere inside the confidence interval for an estimated WTP, we considered this WTP is indifferent from zero and

[7] Appendix C provides a summary table of sample consumers' demographic, socio-economic, dietary, and selected behavior-related variables, along with the results of Kruskal-Wallis test.
[8] We choose Kruskal-Wallis test over the conventional one-way ANOVA test because the latter method does not acquire the assumption of normal distribution for the variables. In addition, Kruskal-Wallis tests often generate relatively reliable results when the sizes of the subgroups are not the same.
[9] See Appendix D for the information regarding the estimation results and estimate coefficients from conditional and mixed logit models.

Table 3. Variable Definition and Means of Consumer Attributes

Variable	Definition	Mean Values (Standard Deviation)			Kruskal-Wallis Test/Chi-Square
		Full Sample	*City*	*Rural*	
Gender	Male=1; Female=0	0.30 (0.46)	0.27 (0.45)	0.32 (0.47)	0.415
Married	Married/Live with partner	0.74 (0.44)	0.75 (0.44)	0.72 (0.45)	0.660
Shopper	Primary shopper for the household (Yes=1)	0.86 (0.35)	0.82 (0.39)	0.89 (0.31)	0.130
Caucasian	Yes=1	0.96 (0.19)	0.98 (0.14)	0.94 (0.23)	0.201
High school	Highest degree (Yes=1)	0.10 (0.31)	0.08 (0.27)	0.13 (0.33)	0.285
College	Highest degree (Yes=1)	0.51 (0.50)	0.55 (0.50)	0.48 (0.50)	0.325
Age	1: <16; 2: 16–25; 3: 26–35; 4: 36–45; 5: 46–55; 6: 56–65; 7: ≥66	5.07 (1.47)	4.91 (1.40)	5.21 (1.53)	0.080*
Dependents	Number of dependents in the household/ 1: zero dependents; 2: 1 dependent; 3: 2 dependents; 11: 10 dependents or above (none of the respondents chose "11")	1.35 (0.86)	1.45 (0.91)	1.27 (0.80)	0.129
Employed	Yes=1; No=0	0.77 (0.42)	0.82 (0.39)	0.73 (0.44)	0.128
FamIncome	See Table 3/Household/1: ≤US$15,000; 2: US$15,000–30,000; 7: ≥US$90,000	4.91 (2.10)	5.17 (1.94)	4.67 (2.21)	0.116
Overweight	Number of family members who were overweight or obese	1.94 (0.93)	1.86 (0.86)	2.01 (0.98)	0.249
BloodPressure	Number of family members who have high blood pressure	1.51 (0.82)	1.39 (0.58)	1.62 (0.97)	0.065*
Cholesterol	Number of family members who have high cholesterol	1.65 (1.00)	1.56 (0.83)	1.73 (1.12)	0.333
Fambeef	Beef is the most consumed meat in the household (Yes=1)	0.46 (0.50)	0.36 (0.48)	0.54 (0.50)	0.007***
Famchicken	Chicken is the most consumed meat in the household (Yes=1)	0.39 (0.49)	0.52 (0.50)	0.26 (0.45)	0.0002***
MeatRatio	% of family food budget on meat	2.02 (0.81)	1.99 (0.78)	2.05 (0.83)	0.557
Localbeef	Purchase beef from local producers or self-produced beef (Yes=1)	0.21 (0.41)	0.17 (0.38)	0.24 (0.42)	0.2038
Groclocal	Often purchases groceries at local stores (Yes=1)	0.10 (0.30)	0.08 (0.27)	0.12 (0.32)	0.3813
Knowledge	Number of correct answers from 6 nutrition-related questions	4.09 (0.98)	4.04 (1.00)	4.14 (0.97)	0.3968
Exercise	Frequency of exercise per week/1: none; 2: once 3: 2–3 times; 4: 4–5 times; 5: more than 5 times	2.94 (1.26)	2.92 (1.24)	2.96 (1.27)	0.7417
Better	Participant believes he or she is making better food choice than his or her parents/ 1: strongly agree; 5: strongly disagree	0.69 (0.46)	0.72 (0.45)	0.67 (0.47)	0.4284
Encourage	Family encouraged to eat a healthy diet/ 1: strongly agree; 5: strongly disagree	3.75 (1.04)	3.77 (1.11)	3.73 (0.97)	0.6745

Note: For each variable, the Kruskal-Wallis is applied to test the null hypothesis of no significant difference in mean values between City and Rural groups.
* indicates that we rejected the null hypothesis with a 90 percent confidence level. ** indicates that we rejected the null hypothesis with a 95 percent confidence level. *** indicates that we rejected the null hypothesis with a 99 percent confidence level. No star indicates that we could not reject the null hypothesis.

Table 4. Comparing Results of Willingness to Pay and Confidence Interval Using Two Models: Conditional Logit and Mixed Logit Models (all values in US$)

	Conditional Logit Model		Mixed Logit Model	
Changes in Attributes	*WTP (per lb.)*	*Confidence Interval*	*WTP (per lb.)*	*Confidence Interval*
SD Certified to Locally Produced	$0.68	$0.20–$1.16	$0.15†	–$2.54–$2.57
Omaha Steaks to Locally Produced	$3.47	$2.70–$4.23	$0.02†	–$2.04–$2.34
Brown to Cherry Red	$2.56	$1.85–$3.24	$2.52	$1.83–$3.21
Brown to Red	$2.53	$1.82–$3.23	$2.48	$1.78–$3.18
Not Juicy to Very Juicy	$3.97	$3.10–$4.84	$3.98	$3.10–$4.85
Not Juicy to Juicy	$3.65	$0.43–$1.90	$3.62	$2.98–$4.25
80% to 85% Leanness	$1.17	$0.07–$0.20	$1.18	$0.45–$1.91
80% to 90% Leanness	$1.57	$0.83–$2.31	$1.58	$0.84–$2.32
80% to 95% Leanness	$1.86	$1.08–$2.64	$1.86	$1.09–$2.64
Conventional to Natural Feed	$1.60	$0.93–$2.27	$1.60	$0.93–$2.27
Conventional to Organic Feed	$1.59	$0.96–$2.23	$1.52	$0.89–$2.14
Omaha-Local-Shop Local	—	—	$1.33†	–$3.21–$0.55
SD-Local-Shop Local	—	—	$1.09†	–$2.73–$0.55
Omaha-Local-Beef	—	—	$1.36	$0.22–$2.50
SD-Local-Beef	—	—	–$0.04†	–$0.97–$0.90
Omaha-Local- Knowledge	—	—	$0.63	$0.06–$1.21
SD-Local-Knowledge	—	—	$0.15†	–$0.34–$0.63
Omaha-Local-Meat Budget	—	—	$1.21†	–$0.96–$3.39
SD-Local-Meat Budget	—	—	$0.18†	–$1.44–$1.81

† Denotes any estimated WTP different from zero.

concluded that consumers do not pay to change from one level to another level of this specific attribute. We used the superscript † for any estimated WTP that is indifferent from zero.

The results from conditional logit model analysis suggest that our sample shoppers at farmers' markets obtain a higher WTP (approximately US$3.47) to replace national brand products with steaks produced in South Dakota or in neighboring communities.[10] However, the comparatively small WTP between South Dakota (SD) Certified and locally produced steaks (US$0.68) indicates that our sample consumers do not differentiate between steaks produced in South Dakota and steaks labeled as produced in neighboring communities. This result suggests that our sample consumers define products that are "locally produced" as being produced within the state of South Dakota and not limited to their local communities.

The mixed logit model enables us to identify the variations of WTP for brand preference for the following four types of consumers: (1) consumers whose families eat more beef than other types of meats; (2) consumers who designate a greater portion of their grocery budget for meat purchases

[10] The weight unit for our estimate WTP is 8 oz. (0.2 kg.).

(as compared to other food items); (3) consumers who posses significant nutrition-related knowledge; and (4) consumers who often shop at local grocery stores.[11] Notably, the mixed logit model results show estimated WTP for *SD Certified to Locally Produced* and *Omaha Steaks to Locally Produced* (US$0.15 and US$0.02, respectively) are both trivial and indifferent from zero, indicating consumers' WTP for locally produced steaks is dominated by factors other than the brand preference when the consumer characteristics are included in the analysis. On the other hand, the coefficient for *Omaha-Local-Beef* (US$1.36) suggests that households in which more beef is consumed at home than any other meat also have higher price premiums for locally produced rib-eye steaks. In addition, the coefficient of *Omaha-Local-Knowledge* (US$0.63) shows that consumers with greater health knowledge also exhibit a higher WTP than consumers with poor health knowledge. These results indicate that household beef consumption and health knowledge contribute to the heterogeneity in WTP for locally produced steaks for consumers at farmers' markets. However, the influences of these two consumer characteristics on the brand preference are limited to a national brand versus other options. Again, no price premium exists between steaks labeled as produced by local communities or produced in South Dakota.

To our surprise, a higher inclination to shop locally does *not* affect consumers' willingness to pay, as all related WTP in Table 4 (US$1.33 for *Omaha-Local-Shop Local* and US$1.09 for *SD-Local-Shop Local*) are statistically insignificant from zero. This finding seems to be inconsistent with the findings from other studies. For example, Keeling Bond, Thilmany, & Bond (2006) studied the survey data collected from 3,170 grocery shoppers and found that patrons who frequently participated in direct markets often demonstrated a higher WTP for locally grown food, a conclusion shared by Stephenson and Lev (2004) in their study of consumers in Oregon. However, our study results suggest that consumers at farmers' markets do *not* necessarily pay a higher premium for locally produced steaks. Indeed, Ziehl et al. (2005) suggested that rural consumers often expressed a preference for locally produced products but were also unwilling to pay any premiums for their preferences. Our study result seems to support Ziehl's finding.

The estimated WTP in Table 4 suggests that our sample shoppers are willing to pay for most of the product attributes listed in our survey (i.e., X_{ij} in Equation (2)). The nearly identical results from conditional logit and the mixed logit models indicate that our respondents have very consistent WTP for these attributes, regardless of the differences in consumer characteristics. Among all of the attributes, our sample consumers hold higher price premiums for juiciness and the color of their steaks than other attributes. Table 4 shows the coefficients for *Not Juicy to Very Juicy* (US$3.97 for conditional logit model and US$3.98 for mixed logit model) and *Not Juicy to Juicy* (US$3.65 for conditional logit model and US$3.65 for mixed logit model) are significant and, in fact, are the highest among all other product attributes. The coefficients for *Brown to Red* (US$2.56 for conditional logit model and US$2.52 for mixed logit model) and *Brown to Cherry-Red* (US$2.53 for conditional logit model and US$2.48 for mixed logit model) also suggest that consumers demonstrate a high price premium for better-looking color in their steaks. These results suggest that when choosing high-end cuts of steak, consumers in South Dakota farmers' markets mainly seek a colorful appearance and a superior eating experience.

Table 4 shows that health concerns also created price premiums for related attributes, although the resulting WTP is not as significant as the WTP for improved color and juiciness of steaks. Compared to the omitted 80 percent leanness level, the WTP for three different, higher levels of leanness generate price premiums between US$1.17 and US$1.86. Interestingly, Table 4 shows diminishing price premiums toward the higher leanness level: producers enjoy a US$1.17 price premium to increase leanness from 80 percent to 85 percent, while producers obtain only US$0.69

[11] We selected these four attributes based on the results discussed in Appendix D as well as on our discussions with local beef producers.

(=US$1.86 minus US$1.17) to improve leanness from 85 percent to 95 percent, as Table 4 suggests. In addition, steaks produced from both naturally and organically fed beef generate a price premium of approximately US$1.60 over steaks produced from conventionally fed beef, which suggests that consumers at farmers' markets are not necessarily concerned about the feed type when purchasing high-end cuts of steak. Of particular note, Table 4 indicates that consumers' preference and WTP for specific product attributes can vary significantly even for products within the same category. Compared to our study results, Chang et al. (2013) conducted a survey study in South Dakota and found that consumers in supermarkets obtained the highest WTP to reduce fat content (instead of improving color and juiciness) for ground beef.

Overall, our study results suggest that South Dakota consumers at farmers' markets generally are willing to pay a premium for locally produced steaks. However, the small difference in WTP between steaks produced in-state or in nearby communities implies that these consumers generally define "local" as anywhere in the entire state of South Dakota. Furthermore, the results from mixed logit model analysis suggest that the higher price premium for buying locally comes primarily from consumers whose households consume more beef than other meats and whose nutrition-related knowledge is excellent. In addition, data show that although consumers at farmers' markets express an explicitly higher WTP for better quality steaks, a large portion of their WTP is attributable to avoiding the purchase of low-quality meat (e.g., a prefererence for red or cherry-red colored steaks to brown steaks). For example, Table 4 shows that our sample shoppers are willing to pay US$2.56 to replace steak color from *Brown* to *Cherry Red* and US$2.53 to replace color from *Brown* to *Red*. The difference in WTP between Cherry Red and Red is only US$0.03. In other words, the rewards for beef producers to improve quality of steaks (to sell their products to shoppers at farmers' market) become trivial once the quality reaches a certain high level.

Limitations of the Study

Although this study accomplished its objectives, we also recognize some limitations on which we would like to elaborate before reaching the study conclusions.[12] First, because our sample observations were collected strictly from farmers' markets, we caution readers not to apply this study's results to all consumers. Second, because our sample size was rather small (212 survey respondents), we encourage further research to include a larger sample from which to draw more statistically significant conclusions. Third, while we expected more differences in characteristics between *City* and *Rural* groups, Table 3 indicates that sample shoppers in these two groups were quite similar. However, it is also possible that some sample observations included in the *City* group were actually shoppers who lived in nearby small towns and drove to the metropolitan farmers' market to shop during the weekend. Therefore, we suggest future studies to incorporate questions in their surveys to help researchers to identify where participants reside. Fourth, because the decision to participate the study was voluntary, we admit potential problems of sample selection bias.

Conclusions and Implications

This study applied the CBC analysis to study consumers' preferences and WTP for locally produced rib-eye steaks. We selected shoppers at five different farmers' markets to participate in the survey study in order to acquire information regarding which consumers at farmers' market might potentially pay higher price premiums for locally produced rib-eye steaks. The study results apply to consumers who shop at farmers' market or who prefer to purchase local food.

The study results suggest that all product attributes selected for inclusion in this study contribute to higher WTP for shoppers at farmers' markets. Among all of the attributes included, juiciness and color were the most important product attributes in generating higher price premiums. Likewise, other attributes, including brand difference, fat content, and feed methods, also contributed to consumers' higher WTP, although these attributes did not affect their WTPs as significantly as taste and appearance did. In

[12] We appreciate anonymous reviewers' suggestions.

addition, this study revealed that while being "locally produced" has a notable effect on WTP for shoppers at farmers' markets, only those with high family beef consumption or an excellent knowledge of nutrition demonstrate a significant price premium for locally produced rib-eye steaks.

We recommend that local beef producers in South Dakota continue to improve the quality of their products, as our study results suggested a higher premium for better quality steaks. However, because improving product quality increases production costs, we suggest that beef producers carefully review and prioritize their efforts. For example, Table 4 suggests that juiciness (taste) and color (appearance) of steaks are the most inconsistent yet also the most potentially profitable attributes for beef producers who sell rib-eye steaks at farmers' markets. On the other hand, although these consumers would pay a premium price to reduce exterior fat and to switch from conventional to natural or organic meat, the resulting profit margins are not as high as when producers improve the color and juiciness of their steaks. Our study results also found that while shoppers at farmers' markets are willing to pay for higher quality meat, the profit margins (WTPs) diminish once the quality of steaks improves to a specific (high) level. Therefore, we recommend that local beef producers carefully examine both costs and benefits when making any decision to upgrade product quality.

Based on the differences between our results and an earlier study by Chang et al. (2013), we recommend that future studies on the costs and WTP of beef products focus on a particular beef cut and on a small geographic location in order to generate results that are more precise and to avoid heterogeneity issues. In addition, our study results indicate that consumers with some specific characteristics are more likely to pay higher premiums for locally produced steaks. To help local producers to identify the relationship between consumer characteristics and potential profit margins, we also recommend further research and efforts to include a larger sample pool to generate results that are more robust.

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Appendix A. A Brief Discussion of Conditional Logit and Mixed Logit Models

This appendix provides a brief discussion of the econometric methods we applied in this study. See Greene (2000) for more details regarding conditional logit and mixed logit models.

Conditional Logit Model

The probability that any individual i will choose the j alternative over all other k options from a given choice set C is the probability that the utility of choosing that alternative is greater than the resulting utility from other k options (Mayen et al., 2007; McFadden, 1974):

$$P_{ij} = P\left(\beta\chi_{ij} + \varepsilon_{ij} > \beta\chi_{ik} + \varepsilon_{ik};\ j \neq k \in C\right) \tag{A1}$$

$$P_{ij} = P\left(\varepsilon_{ij} - \varepsilon_{ik} > \beta\chi_{ij} - \beta\chi_{ik};\ j \neq k \in C\right) \tag{A2}$$

We assume that all the error terms ε_{ij} are independent and identically distributed across all j alternatives, with an extreme value type I distribution and scale parameter to 1. Accordingly, the probability of an individual i choosing alternative j is given by (Mayen et al., 2007):

$$P_{ij}\{j \text{ is chosen}\} = \frac{\exp(\beta\chi_{ij})}{\sum_{k=1}^{J}\exp(\beta\chi_{ik})} \tag{A3}$$

By limiting the systematic component χ_{ij} to include product attributes, we estimate the probability of choice by applying the conditional logit model. The vector of coefficients β in Equation (A3) will be estimated to represent the effect of a specific attribute on the utility of the product of interest. For instance, if the law of demand holds, we would assume $\frac{\partial U}{\partial \mathrm{Price}} < 0$ under a perfect competitive market.

Mixed Logit Model

We added the mixed logit model to control the problem of independence of irrelevant alternatives (IIA) and to explore the unobserved heterogeneity of preference and WTP caused by specific consumer attributes (Carlsson, Frykblom, & Lagerkvist, 2007; Layton & Brown, 2000; Louviere et al., 2000; Train, 1998). By including both product and consumer attributes in the vector χ_{ij}, the mixed logit model allows some estimated coefficients β to be random variables and to vary across sampled individuals. For individual i, the coefficient vector β in equation (2) is defined:

$$\beta_i \sim \mathrm{D}\left(\theta, \nu\right) \tag{A4}$$

where D $(\cdot)$ is a probability distribution function with mean θ and variance ν. The mixed probit model allows us to define D $(\cdot)$ either as an individual distribution function for each element or as the same distribution for some or all of the elements in the vector β. Whether θ and ν are independent is determined by the specification of D $(\cdot)$. Given that $\delta(\beta)$ is the density function for random coefficients β, the probability of individual i to choose alternative j is given by:

$$P_{ij} = \int \frac{\exp(\chi_{ij}\beta)}{\sum_{K=1}^{J}\exp(\chi_{ik}\beta)}\delta(\beta)d\beta \tag{A5}$$

This specification enables the researchers to capture the potential heterogeneity in preferences among sample respondents, based on consumer characteristics of interest. Occasionally, if consumers are relatively homogeneous, the estimation results from applying the conditional logit model and the mixed logit model should be equivalent (Louviere et al., 2000).

Appendix B. Script of the Cheap Talk Treatment

Below is the script of the "cheap talk" treatment we included in the cover letter of the survey questionnaire. The purpose of applying this cheap talk treatment was to reduce hypothetical bias.

Before you start the survey, we want to share a major concern with you regarding the accuracy of this survey.

Previous studies have shown that people often respond in one way but act in another. To be specific, people tended to report a **higher** willingness to pay for products than what they really wanted to pay. We believe that the positive feeling associated with "supporting locally produced food products" may create an ideal amount of money that people may be willing to pay for locally produced food in the minds of survey respondents. When we hear about the concept of "supporting locally produced food products," it is only natural for our basic reaction to such a hypothetical setting to be: "Sure, I would be happy to pay more for the locally produced food." In addition, people tend to be more generous when they do not actually have to pay for the purchasing choices reflected in the survey.

However, when the scenario is real and people would actually <u>have</u> to pay for what they select in the survey, people tend to think quite differently. We still would like to support locally produced food products, but when we face the possibility of spending our <u>own</u> money, we start to think about other ways in which to spend the same amount of money. In addition, the limited amount of money we are able to spend will also affect our answers.

In any case, we would like to ask you to answer the following survey questions as if you were **really** going to pay for what you choose. Please keep in mind that a hypothetical high biased price may send the wrong information to local producers. They may invest more of their money and efforts into the business than they should, based on information that you provide in this survey.

Your answers are important because local farmers might make production and marketing decisions based on the results of this study. Your participation and your honesty may have a significant impact on both local food producers and on the community.

Appendix C. Table of Basic Descriptive Statistics for the Sample Consumers

Table C-1. Survey Data Descriptive Statistics

Variable	Mean (N=212) Full Sample	Mean Group 1 (N=100) *City*	Mean Group 2 (N=112) *Rural*
Gender			
Female	149 (70.28%)	73 (73%)	76 (67.86%)
Male	63 (29.72%)	27 (27%)	36 (32.14%)
Primary Shopper for the Household			
Yes	182(85.85%)	82 (82%)	100 (89.29%)
No	30 (14.15%)	18 (18%)	12 (10.71%)
Age			
Less than 26	6 (2.83%)	3 (3%)	3 (2.68%)
26–35	42 (19.81%)	20 (20%)	22 (19.64%)
36–45	20 (9.43%)	12 (12%)	8 (7.14%)
46–55	47 (22.17%)	25 (25%)	22 (19.64%)
56–65	57 (26.89%)	28 (28%)	29 (25.89%)
66 or above	40 (18.87%)	12 (12%)	28 (25.00%)
Married or Living with Partner			
Yes	156 (73.58%)	75 (75%)	81 (72.32%)
No	56 (26.42%)	25 (25%)	31 (27.68%)
Caucasian? (Yes)	204 (96.23%)	98 (98%)	106 (94.64%)
Employed (Yes)	164 (77.36%)	82 (82%)	82 (73.21%)
Education			
High School Graduate	22 (10.38%)	8 (8%)	14 (12.50%)
College Graduate	109 (51.42%)	55 (55%)	54 (48.21%)
Family Income			
Less than US$15,000	11 (5.19%)	4 (4%)	7 (6.25%)
US$15,001–30,000	17 (8.02%)	6 (6%)	11 (9.82%)
US$30,001–45,000	29 (13.68%)	13 (13%)	16 (14.29%)
US$45,001–60,000	29 (13.68%)	15 (15%)	14 (12.50%)
US$60,001–75,000	30 (14.15%)	12 (12%)	18 (16.07%)
US$75,000–90,000	28 (13.21%)	16 (16%)	12 (10.71%)
Higher than US$ 90,000	46 (21.70%)	26 (26%)	20 (17.86%)
Unknown	22 (10.38%)	8 (8%)	14 (12.50%)
% of Family Food Budget Spent on Meat			
≤ 20%	55 (25.94%)	26 (26%)	29 (25.89%)
> 20% and ≤ 40%	106 (50.00%)	53 (53%)	53 (47.32%)
> 40% and ≤ 60%	44 (20.75%)	18 (18%)	26 (23.21%)
> 60% and ≤ 80%	5 (2.36%)	2 (2%)	3 (2.68%)
> 80%	2 (0.94%)	1 (1%)	1 (0.89%)
Buy Beef from Butcher or Produce Beef by Oneself			
Yes	44 (20.75%)	17 (17%)	27 (24.11%)
No	168 (79.25%)	83 (83%)	85 (75.89%)

Appendix D. Estimates Results and Discussion from Condition and Mixed Logit Models

Table D-1. Estimated Coefficients Corresponding to Each Product Attribute

	Conditional Logit		Mixed Logit	
Variables	**Coefficient**	**Standard Error**	**Coefficient**	**Standard Error**
Omaha Steaks	0.248 ***	0.196	2.812***	0.498
SD Certified	1.010***	0.190	2.775***	0.465
Locally Produced	1.195***	0.192	2.817***	0.457
Price	–0.273***	0.018	–0.276***	0.019
Red	0.696***	0.087	0.696***	0.088
Cherry Red	0.689***	0.088	0.686***	0.089
Very Juicy	1.084***	0.091	1.100***	0.092
Juicy	0.996***	0.089	1.00***	0.090
Lean 85%	0.319***	0.100	0.326***	0.101
Lean 90%	0.428***	0.098	0.436***	0.010
Lean 95%	0.508***	0.102	0.516***	0.102
Natural	0.437***	0.087	0.443***	0.087
Organic	0.436***	0.083	0.420***	0.084
Heterogeneity in the Mean (Brand-Consumer Attribute)				
Shop local				
Omaha Steaks	—	—	–0.497*	0.287
SD Certified	—	—	–0.563**	0.257
Locally Produced	—	—	–0.865***	0.256
Beef is the Most Consumed Meat in the Household				
Omaha Steaks	—	—	1.128***	0.210
SD Certified	—	—	1.518***	0.190
Locally Produced	—	—	1.505***	0.186
Meat to Total Food Budget				
Omaha Steaks	—	—	–0.780***	0.296
SD Certified	—	—	–0.494**	0.212
Locally Produced	—	—	–0.444**	0.186
Nutrition-related Knowledge				
Omaha Steaks	—	—	–0.618***	0.102
SD Certified	—	—	–0.482***	0.093
Locally Produced	—	—	–0.442***	0.904
Log Likelihood	–2227.5		–2226.5	
Pseudo-R^2	0.128		0.162	

* Significant at the 90% confidence level; ** Significant at the 95% confidence level; *** Significant at the 99% confidence level. The null hypothesis assumes the estimated value is statistically indifferent from zero.

Table D-1 summarizes the estimated coefficient value for each attribute by applying conditional logit and mixed logit models. By analyzing the resulting coefficient, we are able to examine consumers' preference for each product attribute through the sign and magnitude of the corresponding coefficient value. Table D-1 shows that most brand-specific parameters (i.e., *Omaha Steaks*, *SD Certified*, and *Local)* are statistically significant, suggesting our sample shoppers at farmers' markets would choose any of the three brand choices rather than the opt-out option. The conditional logit model result also shows that the difference in coefficient values between *SD Certified* (1.01) and *Local* (1.195) is relatively small, which indicates our sample shoppers have similar preferences for beef produced either by state certified producers or by the nearby producers. Moreover, the coefficient value for *Omaha Steaks* (0.248) is notably smaller than other brand options. This result shows that our sample consumers at farmers' markets, compared to their preference for state certified or locally produced beef, obtain less satisfaction from national brand steaks.

We utilized the advantage of mixed logit model to study the influence of consumer characteristics on their brand preference. As indicated, the differences in the magnitude of coefficients for brand-related attributes disappear from the result of applying mixed logit model (2.812 for *Omaha Steaks*, 2.775 for *SD Certified*, and 2.817 for *Locally Produced)*. This finding implies that although consumers have an obvious preference for state or locally produced rib-eye steaks, the price premium of "being local" itself becomes irrelevant after controlling for consumers' differences in characteristics. In other words, not all consumers would pay a higher price premium for locally produced steaks.

Additionally, Table D-1 shows a similar pattern of consumer preference for color and production/feed differences. Compared to the omitted brown color, the estimated coefficients for *Red* (0.696 for both models) and *Cherry-Red* (0.689 for conditional model and 0.686 for mixed logit model) are both statistically significant. The similar estimated values from both models (conditional logit and mixed logit models) imply that all sample consumers at farmers' markets share a similar preference regarding color difference in rib-eye steaks. However, the small gap of coefficient values between *Red* and *Cherry Red* (i.e., approximate 0.01) also suggests that their utility does not increase by upgrading the color of steaks from red to cherry-red. Similarly, compared to the omitted conventional feed, the estimated coefficients for *Natural* (0.437 for Conditional Logit model and 0.443 for mixed Logit model) and *Organic* (0.436 for Conditional Logit model and 0.420 for mixed Logit model) are statistically significant and quite similar. The comparable values of these coefficients from conditional logit and mixed logit models suggest that our sample shoppers prefer to purchase steaks produced from natural or organic feed cattle, regardless of the differences in characteristics. The similar values of *Natural* and *Organic* also imply that consumers will not pay premium prices to switch from natural to organic steaks.

In addition to the color and feed attributes, Table D-1 shows consumers' utility increases steadily as the fat content decreases. Compared with the omitted 80 percent leanness, the coefficients for all three higher levels of leanness are significant and constantly rise as the leanness level increases. Both conditional and mixed logit models show an approximate 0.09 difference between the two levels of leanness (i.e., from 85 percent to 90 percent and from 90 percent to 95 percent of leanness). This result suggests that consumers' utility increases as the unwanted fat decreases. The similarity in the estimated coefficients for leanness between both models suggests that our sample respondents exhibited comparable preference towards fat content, regardless of their differences in characteristics.

To measure the potential heterogeneity of preferences caused by the selected four consumer characteristics, we applied mixed logit model to allow the preference for "being locally produced" to vary. As indicated in Table D-1, the tendency to shop locally (denoted as "*Shop Local*") has a significant effect on consumers' brand preference. Compared to *SD Certified/Shop Local* (–0.563), the estimated coefficient of *Local/Shop Local* (–0.865) suggests our sample respondents who reportedly prefer to shop locally also often enjoy a larger utility by consuming locally produced rib-eye steaks. In contrast, the heterogeneity in brand preference caused by household meat preference suggests that the difference in coefficients between *SD Certified* (1.518) and *Locally Produced* (1.505) is very small, indicating that families that eat more beef than other

meats enjoy a similar utility by consuming either SD Certified or locally produced steaks. Moreover, the heterogeneity caused by household meat budget as well as nutrition-related knowledge both demonstrate a similar pattern: consumers prefer a locally produced product, but the difference between SD Certified beef and locally produced beef — to most consumers — is trivial. On the other hand, the coefficients of *Price*, resulting from conditional logit (–0.273) and mixed logit models (–0.276), are nearly identical, indicating that differences in consumer characteristics do not affect our sample consumers' price sensitivity.

Finally, Table D-1 suggests that our sample respondents generally prefer SD Certified and locally produced steaks. However, the mixed model results indicates that the preference demonstrated by our sample shoppers for purchasing "locally produced" rib-eye steaks varies according to different consumer attributes. Additionally, the estimated coefficients of color and feed/production variables indicate that consumers' utility only increases by switching from low to middle or from low to high quality meat; however, the difference in utility between consuming middle and high quality steaks is negligible. Instead, the increasing coefficient values for leanness suggest that decreasing exterior fat in steaks will constantly advance consumers' utility. We find that for our sample shoppers at farmers' markets who demonstrate a significant preference for locally produced steaks, their definition of "locally produced products" simply means products produced in South Dakota.

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Peri-urban food futures: Opportunities and challenges to reconfiguring sustainable local agri-food value chains on the Sunshine Coast, Australia

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Abstract

A new rural development paradigm has emerged over the last decade. It is multifaceted by nature, connecting practices of landscape management, agritourism, organic and sustainable farming, and value-chain analysis and management. Increased food production in peri-urban areas in the developed world is typical of this new paradigm. Peri-urban areas are the transitional zones between rural and urban landscapes that experience constant population change and disturbance of traditional social, environmental, and economic characteristics. Sustainable community development initiatives are complicated in these fragmented and often contested landscapes. A case study on Australia's Sunshine Coast analyzes the challenges and opportunities of reconfiguring agri-food production systems to achieve the type of multifunctional landscape preferred by the community and primary producers alike. Scenario analysis, interviews, and surveys of traditional midscale farmers with more recent micro- to small primary producers and food artisans provide insight into the challenges faced at a grassroots level. The role of government in facilitating supportive policy and planning and connecting and building the capacity of key actors involved in local

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Note: This paper is based on the principal author's trans-disciplinary doctoral research that investigated planning, policy, and agricultural extension requirements for improving the sustainability and resilience of coastal peri-urban agriculture.

and regional food value chains is reviewed. The paper argues that the government is essential to the successful planning and management of peri-urban areas because of the fragmented and/or contested quality of this unique agri-food landscape. Without further investment in place-based collaborative research, planning, capacity building, and economic development, the local food movement in these peri-urban areas is likely to continue to occupy only a narrow "alternative" cultural and economic space.

Keywords
local and regional food, peri-urban, rural development, sustainable agriculture

Introduction and Literature Review

Introduction

Peri-urban food and agricultural systems in the developed world are part of a rural development trend that highlights the importance of ecosystem and social services (Ashley & Maxwell, 2001; Lerner & Eakin, 2011; van der Ploeg et al., 2000). Peri-urban areas are transitional zones between rural and urban landscapes that mediate between the competing pressures of agriculture and urbanization, development and conservation, settlement and production, and growth and sustainability (Mackenzie, Whelan, & Oliver (2006). As part of a new rural development paradigm, the production capacity of agriculture is reconceptualized by scholars to include a broad range of "public goods," such as amenity landscapes and natural values (Sonnino & Marsden, 2006; van der Ploeg, et al., 2000; Zasada, 2011). Rural development in this context is multifaceted in nature and connects practices of landscape management, agritourism, organic and sustainable farming, and value chain analysis and management. Within this scholarship alternative food systems have been portrayed as distinctive, but still contested, elements of the new rural/regional economy (Sonnino & Marsden, 2006), which is particularly important in peri-urban areas due to the rapid socio-economic transitions that typify the urban-rural interface.

Lerner and Eaken (2011) suggest there is increasing evidence that the growing middle-class demand for healthy, more sustainable foods can potentially reverse the trend of dwindling agricultural production in peri-urban areas of the developed world. We argue that in order to meet this demand, collaborative initiatives between industry, local and regional government must deliberately rearrange the social, economic, and ecological connectivity of the agricultural system to adapt to new circumstances, perform new tasks, and recover from the damage caused by unsustainable agriculture and rural socio-economic decline.

Key questions remain as to the extent to which peri-urban agri-food systems will respond to market forces and to what extent policy, planning, economic, and community-development interventions by governments can effectively facilitate the transition to a new paradigm. Stevenson, Clancy, King, Lev, Ostrom, & Smith (2011), for example, argue that midscale food value chains present a promising business model that require public policies to effectively connect and support agricultural producers at a local scale as they endeavor to engage growing markets for differentiated, higher-value food products. While interest in the wider social, cultural, economic, and environmental implications of food has flourished among policy-makers and academics since the late 1990s (e.g., Maxey, 2006), the local food literature tends to ignore the regulatory and service-provider roles of the state (Baker, 2011; Born & Purcell, 2006). Our study therefore aimed to further critically explore the identified gaps and weaknesses in the literature as part of a regional Food Futures Initiative on the Sunshine Coast, Queensland.

The Food Futures Initiative has been underway in this rapidly growing peri-urban region of Australia over the last five years. This series of projects spanned the agri-food value chain and featured a high level of collaboration with industry, local government, university, and other researchers. Led by the Queensland Government as part of a pilot "networked government" service delivery model (Goldsmith & Eggers, 2004), the projects involved research, planning, extension, and business development activities as part of ongoing sustainable-agriculture extension networks and

regional economic-development programs. This case study article focuses on the results and implications of the semistructured interviews and social surveys of micro- to midscale farmers and food producers, together with scenario planning with the broader peri-urban community. It documents the opportunities and challenges for reconfiguring local agri-food value chains to enhance their resilience and sustainability, as well as and respondents' perceptions as to the pilot networked service-delivery model.

A review of the literature (e.g., Barham, 2012; Bradley, 2013; Lev & Stevenson, 2011; Martinez et al., 2011; Oberholtzer, Clancy, & Esseks, 2010; Sharp, Jackson-Smith, & Smith, 2010) suggests that Australia lags behind the U.S. in terms of government and institutional investment in the place-based collaborative research, planning, capacity-building, and community-development initiatives required to achieve sustainable food futures in peri-urban landscapes. Based on this review and the results of the case study, we argue that to be successful, programs to develop resilient multi-functional landscapes in Australian peri-urban areas require increased direct investment and involvement by government. The investment is required to drive a range of interventions that can reconfigure fragmented peri-urban localities to increase the likelihood that they become multifunctional landscapes with sustainable agricultural systems and resilient food producing communities. Further, focusing this investment and service delivery on cooperative industry and community initiatives will increase its impact. Actions should aim to enhance economic options for primary producers, diversify rural enterprise, and facilitate hybrid and alternate aggregation and distribution systems (Bills & Gross, 2005; Lerner & Eakin, 2011).

Drivers and Dimensions of Local Sustainable Food Systems

Globally there is a growing consumer trend to minimize the environmental footprint of food purchases and demonstrate social responsibility by purchasing local and regional foods (Carnell, 2011; Davey, 2008; Kneafsey, 2010; Parker, 2010; Socio-economic Research and Intelligence Observatory, 2008). Assurance about the chain of custody and environmental credentials for all fresh produce has led to growth in the Australian market for healthier, more sustainable products (Sullivan, 2010). Health (e.g. organic), connectivity (e.g. with the producer), and convenience have been identified as behavioral consumer megadrivers that hold the key to the future for the Australian food industry (Davey, 2008). However, there is a "green gap" between consumers' concern and their taking action that is attributed both to price differential and confusion caused by unclear labeling and marketing (Sparks, 2011; Sullivan, 2010). While provenance is a very important driver of consumer choice, with the "Australian Made" symbol ranked as the most influential in the market, only 33 percent of consumers claim to buy local food and drinks regularly (Datamonitor, 2010; Paish, 2011).

As part of this emerging global trend, regional networks of stakeholders in the local food movement are developing action plans that aim to connect, expand, and enhance information flow and business relationships along local and regional food value chains as part of efforts to achieve sustainable rural futures (Ethos Foundation, 2011; Flaccavento, 2009; Hawkesbury Harvest, 2004; Niagara Economic Development, 2009; Wisconsin Local Food Network, 2011; Wells & Waterman, 2011). Frequently this involves "buy local" campaigns such as Select Nova Scotia in which societal rather than purely economic benefits are highly valued by the consumer (Knight, 2013). Winter (2003) found that local food figured more highly in these campaigns than organic and argued that, in part, this movement was driven by the defensive politics of localism rather than being embedded in a sustainability ethic. However, others identify a more positive form of localization involving a "process of embedding the economic and social interactions of a food system within a distinct, bounded place. The resulting local food system reduces unnecessary and redundant trade, strengthens and diversifies the local economy, and increases sustainability and food security" (Baker 2011, p. 9). Dukeshire, Garbes, Kennedy, Boudreau & Osborne's (2011) consumer survey supports this notion, revealing that those respondents who believed that buying locally produced food is good for the local economy,

helps the environment, and means more money goes to the farmer, had a higher propensity to buy local product.

Advocates of localization highlight that economic development in this context can drive innovation within farms considered "superfluous" in the modernization paradigm (van der Ploeg et al., 2000). Localization facilitates new value-chain interrelations with other farm enterprises and segments of the urban and peri-urban population that also enhance social cohesion. A particular focus in developed countries is on small- to midscale farm production, value adding, and the evolution of aggregation and distribution entities to achieve economies of scale (Barham, 2012; Cheng & Seely, 2012; Mackenzie, et al., 2006; Metcalfe, 2012; Metcalfe & Widener, 2011). Increasingly, small- to midscale farms are implementing innovative forms of cost reduction and direct marketing, integrating environmental, land and water management into the farm, and producing high quality and region-specific products (Goodman, 2004; Sonnino & Marsden, 2006; van der Ploeg et al., 2000).

It is often presumed that smaller farms and food producers do not cause the same negative environmental or social impacts as industrial-scale farms as they tend to diversify their crops and agricultural techniques to make the most of their land. However, local food systems are no more likely to be sustainable or socially just than systems at other scales (Born & Purcell, 2006). Oberholtzer, Clancy, and Esseks consider that "the availability of technical assistance and funding programs that relate to direct marketing and alternative agricultural products be supported and better promoted at the local, state, and national levels, and that new programs be developed in areas currently lacking these programs" (2010, p. 71).

In Australia the potential for micro- to midscale sustainable agriculture and food enterprises to benefit from consumer demands is constrained by the countervailing domination of the food supply by two large supermarket chains that control 78 percent of the market (Carnell, 2011). While there are efficiencies associated with this duopoly, it favors larger primary producers and food manufacturers and limits market access to others. There is, however, potential for growth in direct-to-consumer markets if U.S. trends are more pervasive through other peri-urban regions of the developed world. In the U.S. this market segment has grown by more than 100 percent over 10 years in seven rural/urban interface counties, likely as a result of the farmers' better access to urban consumers in those counties (Oberholtzer et al., 2010). Similarly, there is an opportunity for U.S.-style midscale food value chains to provide models of how farms, processing, distribution, and retail businesses can prosper by acting collectively to construct a "third tier" in the Australian agri-food system. Lev and Stevenson highlight "the importance of acting collectively at three distinct levels: horizontally among producers, vertically within food value chains, and horizontally across food value chains" (2011, p. 121) and recommend establishing learning networks across value chains. The above drivers and dimensions of local and sustainable food systems are further influenced by the social and institutional dynamics of the peri-urban zone, where both community conflict and/or a new relationship between the traditional farming community and incoming residents can emerge (Barr, 2003; Mackenzie et al., 2006)

Social and Institutional Dynamics Influencing Production in Peri-urban Areas

Problems associated with scale, social change, and fragmentation in peri-urban food systems complicate policies and programs aiming to achieve sustainable multifunctional peri-urban landscapes (Low Choy, Sutherland, Gleeson, Dodson, & Sipe, 2008; Mackenzie et al., 2006). Of particular import for peri-urban areas is the understanding that local knowledge of landscapes and farming systems, built up over time and events, is crucial to successful farm and community innovations and the resilience of agricultural enterprise over time (Davenport & Anderson, 2005; Wardell-Johnson, 2008). Innovation and adaptive practices are more likely to withstand future shocks if they link the tacit local knowledge of longer-term landholders with the predominantly scientific knowledge brought in by new settlers in peri-urban landscapes (Smith & Bosch, 2004; Stockwell, 2011; Wardell-Johnson, 2008). For these reasons rural

development policies should focus on strengthening proven community and industry networks and supporting the emergence of new ones (Van der Ploeg et al., 2000).

The combination of the "old" with the "new" will be a decisive element in these endeavors (Stockwell, 2011; van der Ploeg, et al., 2000; Wardell-Johnson, 2008). For example, deliberate values-based engagement and commitment to non-economic goals can lead to successful inter-organizational coordination in hybrid food value chains that build aggregation and distribution in local food systems on pre-existing conventional infrastructure (Bloom & Hinrichs, 2011). Investigation of U.S. counties on the rural/urban interface have shown the importance of government programs and supportive governance frameworks. Those counties with formal institutional arrangements (e.g., committees supporting agricultural economic development or food policy councils) have more local food system development programs and policies and have key stakeholders with a greater level of optimism about the future of local agriculture than those that do not (Sharp et al., 2010). This brief review provides useful guidance as to the mechanisms required to address challenges and take advantage of opportunities to reconfigure local agri-food value chains in peri-urban areas.

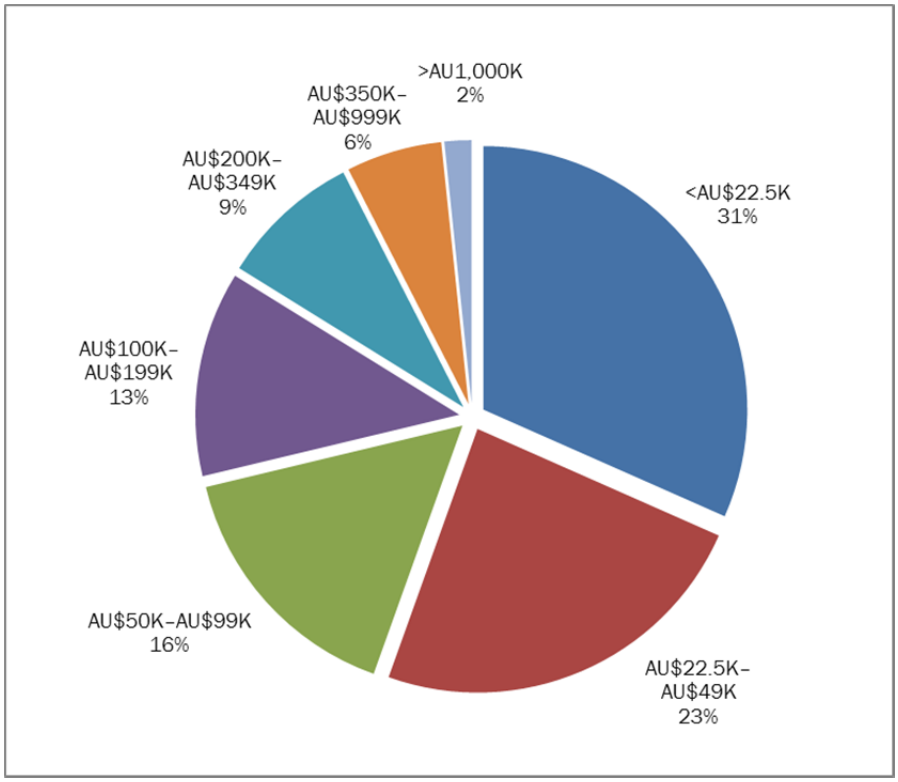
Applied Research Methods

Study Area

The Sunshine Coast is one of Australia's fastest-growing regions and is situated just north of Queensland's capital city Brisbane. Historical analysis of food production in the region shows that food producers have always faced challenges with distribution, marketing, transport, and responding to the impacts of national and global economic forces (Gregory, 1991; Lloyd, 1981). Underlying resilience in the system is evidenced throughout local history with the industry and community continuing to find innovative ways to deal with the forces of change through diversification, experimentation, and cooperation. The shift to more peri-urban forms of agriculture commenced in the late 1970s and has continued to grow since then.

Between the 2000–01 and 2005–06 agricultural censuses there was a nine percent increase in area under production, with holdings of 645,000 acres (261,000 ha) in the region (Australian Burea of Statistics [ABS], 2008). That data shows that 54 percent of the holdings in the region had an estimated value of

Figure 1. Distribution of Estimated Value of Agricultural Holdings in the Sunshine Coast Region



Source: Australian Bureau of Statistics (ABS), 2008.

agricultural operations of less than AU$50,000 per annum (less than the national average wage for one person at the time of AU$61,000) (see Figure 1).

The agricultural lands of the Sunshine Coast are predisposed to the global trend of landscape transition and farmland conversion (Alig, Kline, & Lichtenstein, 2004; Barr, 2003; Bills & Gross, 2005; Busck, Kristensen, Præstholm, & Primdahl, 2008; Canarchon, 2005; Daniels & Bowers, 1997; Errington, 1994; Low Choy et al., 2008; Petit, 2009; Swaffield & Fairweather, 1998; Walker, 1987). In 2006 the majority (54 percent) of midscale producers, natural resource managers, and scientists participating in a forum on best management practices suggested that there was less than a 15 percent likelihood that adopting a "business as usual" approach would achieve sustainable coexistence between agriculture, the community, and downstream fisheries in the region (Nicholls, Stockwell, & Layden, 2007). However, they were far more optimistic when considering a scenario in which an integrated area-wide sustainable agriculture extension program was delivered across the region in conjunction with incentives for the adoption of the best management practices that they had jointly agreed upon at the forum. Eighty-three percent of those participants considered that such a scenario had a greater than 60 percent chance of achieving a sustainable future for farmers and fisherman (Nicholls, Stockwell, et al., 2007). This result led to the ongoing implementation of the FarmFLOW sustainable agriculture extension program focusing behind the farm gate (see Stockwell, Layden, Nicholls, & Carter, 2012) and stimulated the Food Futures Initiative, including broader value-chain research and scenario-analysis activities exploring aspirations, opportunities, and challenges for achieving desired sustainable agri-food futures.

Over the last five years there has been a steady growth in micro- and small-scale food manufacturers in the region. These businesses are typically niche marketed, value-added, and are often incorporated within the value chain for tourism and/or the food-service sector. Generally, these businesses market a gourmet, high quality, distinctive product in small quantities, usually by hand or using traditional methods. (In this study we refer to interviewees from such enterprises as food artisans.)

Case Study Methodology

Our case study of the Sunshine Coast makes use of four methods: scenario analysis involving 102 primary producers and peri-urban residents; semi-structured interviews with 34 traditional midscale farmers; face to face questionnaire surveys delivered to 168 micro- to small primary producers and food artisans; and document analysis of four reports from other projects in the Food Futures Initiative and various correspondence between stakeholders.

Scenario analysis

The scenario analysis adopted the first two stages of the social-ecological framework developed by Bohnet (2004), wherein landscapes and community perceptions are characterized, and then landscape scenarios are developed and discussed with community members and stakeholders. The framework incorporates participatory tools such as landscape visualizations and community workshops in an exploration by stakeholders of options for sustainable landscape development. Desktop studies and participatory rapid rural appraisal were undertaken to understand the natural, socio-cultural, and economic dimensions of the region in order to gain an understanding of landscape character and community perceptions and visions (see for example Nicholls, Layden, & Stockwell, 2007). The Sunshine Coast landscapes and community perceptions and visions identified were very similar to those characterized by Bohnet in her North Queensland study area. Participants at field days and workshops across the region were asked to nominate their preferred future scenario between 2007 and 2009. The scenarios adapted from Bohnet (2004) included:

- *Increased Production from Monoculture and Grazing*: Cropping and/or sugar cane, ginger, pastures, and remnant vegetation are common features in the landscape. The grassed hills have pushed the forest back, allowing cattle farmers to increase their grazing land and subsequently the number

of cattle. Remnant vegetation remains only in areas "unsuitable for agricultural production.

- *Midscale Diversified Sub-tropical Agriculture, Cooperative Farming:* Declining farm incomes from monocultural crops like sugar, pineapples, and ginger have led many farmers to supplement their income. Increasing pressures have now forced these farmers to pool their ideas and resources to overcome the crisis. Farmers have diversified their businesses and their cooperatives. In addition to cane, a variety of grain, subtropical fruit, bamboo, and cabinet timber are grown. Subtropical fruit juices are pressed and cabinet timber is milled in diversified cooperatives. Employment opportunities retain young people in the community, and also attract newcomers.
- *Small-Scale Envirofriendly and Organic Systems*: Development pressures lead council to approve subdivisions on land previously used for agricultural production and classified as suitable agricultural land. Some buyers of these new blocks are choosing to carry out some sort of agriculture, often environmentally friendly or organic. Subdivisions on hill slopes are only approved under strict codes. Buyers have to "screen" their new homes with forest trees. Cane has gone from the landscape and sugar cane paddocks have been replaced by residential developments and small-scale cropping. Some pastures remain on steep slopes and most remnant vegetation is now joined by tree plantings or residential properties.
- *Controlled Rural Lifestyle with Patches of Agriculture:* The landscape is still dominated by agricultural land uses. However, some agricultural land has been lost through subdivisions. These have been approved only in identified locations under strict development codes. Newcomers to the areas have brought with them different ideas and values about farming, and rural lifestyles have changed the face of the landscape. The agricultural patches within the landscape structure have become smaller in size.
- *Residential Development on Caneland:* Development pressures lead the council to approve subdivisions on land that was previously used for agriculture; as the cane industry is unviable, change is primarily taking place on cane land. The grassed hills are still utilized by the few remaining cattle farmers. However, regrowth is slowly covering slopes. People move to the area for its scenic beauty and favorable climate.
- *Intensive Eco-tech in Managed Landscapes:* Production of food and lifestyle horticulture is concentrated in highly intensive enterprises managed under strict environmental management systems with urban waste recycling and closed loop environmental technology. Highly variable climate and environmental factors result in minimal traditional agriculture, with intensive covered animal production, aquaculture, and farming of climate-adapted native fauna replacing extensive beef production. Cropland is used to grow biofuel crops and trees, which together with waste streams feed into local energy generation. The extent of natural areas is greater as a result of a market for ecosystem services.

Semistructured interviews and social surveys

The 2010 interviews with midscale farmers investigated the current state of, and perceptions about, the local food supply chain. Thirty-four producers with an average farm size of 94 acres (38 ha) (with an average of 57 acres or 23 ha in production) across a wide range of crops were interviewed on their farm using a semistructured approach with a set of guiding questions applied in an open framework.

Subsequently, in 2011 micro- and small enterprises (primary producers, value adders, and food artisans) in the Mary Valley with a median property size of 12 acres (5 ha) were surveyed to ascertain both qualitative and quantitative data. This survey aimed to establish the types and quantity of food produced identify issues that affect production and marketing of the produce, future plans, and capacity. Views were also elicited on the current trends associated with food production in this area.

Of the 98 interviews with farmers, most were conducted in person at the property, with others conducted by phone.

A subsequent and similar survey of 70 micro- and small enterprises in 2012 focused on coastal catchments and the Blackall Range. The median area range for land under primary production of this sample was 2–12 acres (1–5 ha) with a median property size of 27–49 acres (11–20 ha). This survey aimed to establish what was being produced and how much, and to examine issues associated with production, marketing, capacity, distribution, and interest in meeting local demand. The survey was followed by a workshop engaging key stakeholders across the food value chain, to explore the survey results and issues associated with food distribution in the region and potential functions and models for developing a local food distribution hub.

Document analysis

Reports and data from the Pumicestone FarmFLOW sustainable agriculture case study (Stockwell, et al., 2012), as well as linked surveys of restaurateurs and chefs (Lawrence & Cheung, 2011), medium to large food manufacturers (Wright 2012), and residents and visitors to the region (Birch, 2012), were analyzed to validate and augment data from primary producers and food artisans. Correspondence, minutes, and reports from industry and government working groups, capacity-building workshops, and a regional stakeholder symposium on the future of food (Stockwell & Law, 2012) were also analyzed to evaluate the impact of service delivery and stakeholder response to research findings by stakeholders.

Results and Discussion

Agri-food Industry Demographics

The farmers surveyed grew 48 types of primary produce, ranging from avocados to snails. The food artisans surveyed produced 19 food products, ranging from alcoholic beverages to tempeh (a cultured soy product). The median size of farms influenced the marketing of produce, with central wholesale markets still attracting 41 percent of the product from midscale farmers, compared with an average of 11 percent across all the micro- and small producers surveyed (Figure 2). Half of the smaller producers marketed directly to the public, either via farm gate sales or at markets.

Our surveys confirm an increase in micro- and small-scale food manufacturers entering the industry in the last decade, with full-time primary producers who have over 10 years of experience representing only 31 percent of the sample. This underpins the strong interest in and need for capacity building in the sector around small-scale production, marketing, and other relevant small-business skills.

Desired Food Futures

There were two scenarios which the majority of farmers and rural residents perceived to be a desirable future state of affairs for agriculture in the region (Figure 3). *Midscale Diversified Sub-tropical Agriculture, Cooperative Farming* was the most favored future scenario (39 percent) with the *Small Scale Enviro-friendly and Organic Systems* next, preferred by 33 percent of respondents. The least preferred scenarios were those envisaging residential development of cropping land, increased production from monoculture, and highly intensive horticultural and animal production based on eco-technologies.

Views about the most likely future that would result if the status quo were maintained (i.e., if government and industry adopted a "do nothing more" strategy) were antithetical to participants' desired futures. For example, almost half of a highly informed group of agricultural, food, and tourism stakeholders together with academics and government policy and service delivery officers at the Southern Queensland Future of Food Symposium perceived that this approach would most likely result in conversion of farming land to residential land (Figure 4).

Key Challenges Identified in Local Food Supply Chain

The initial survey of midscale farmers identified that 60 percent of producers who were not currently involved in local short supply chains wished to supply locally if a number of specific challenges could be addressed. Their sentiments

Figure 2. Comparison of the Proportion of Product Marketed Through Various Channels
(Midscale farmers, n=34; micro and small producers and food artisans, n= 168)

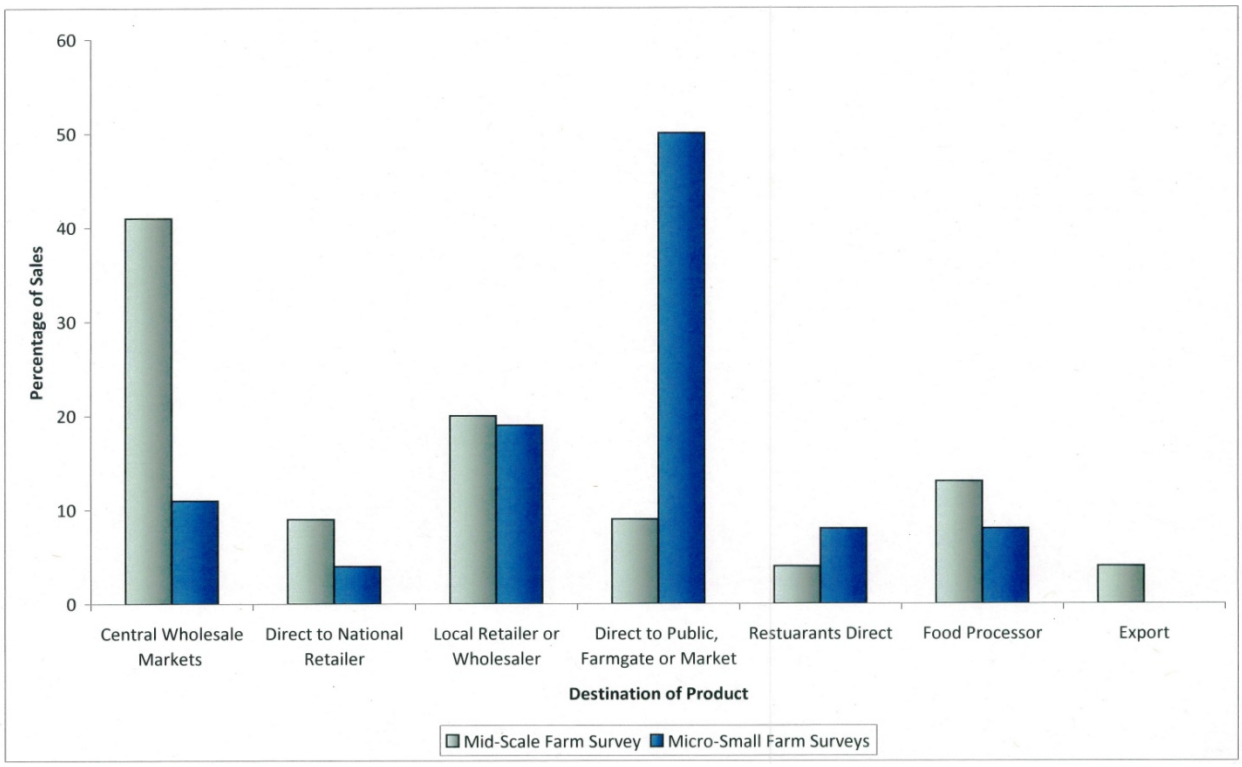


Figure 3. Preferred Future Agricultural Scenarios for the Sunshine Coast (n=102)

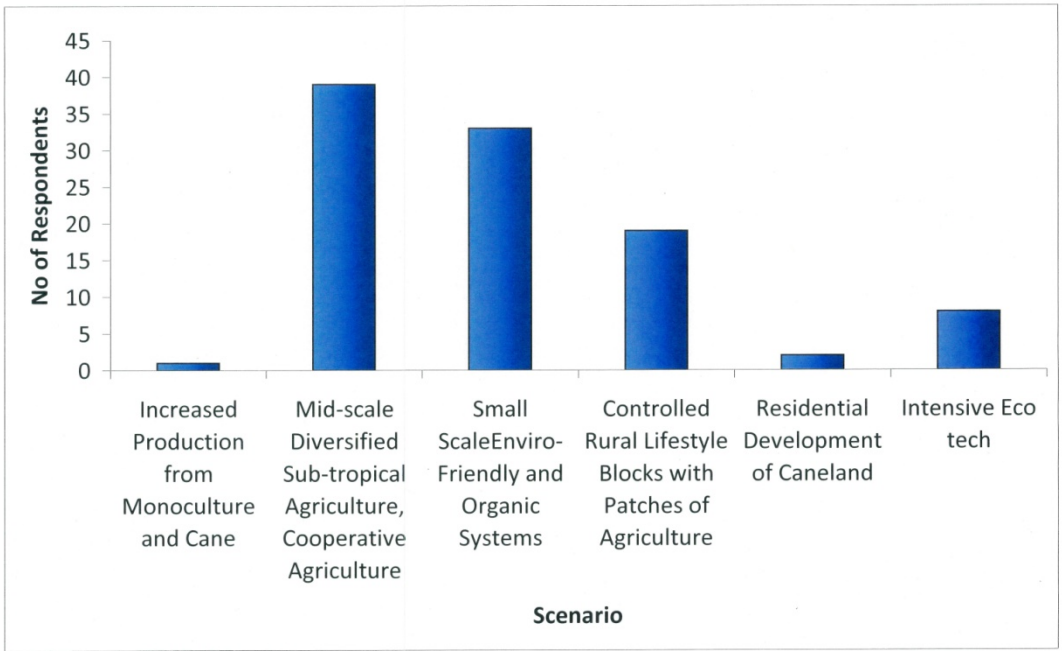
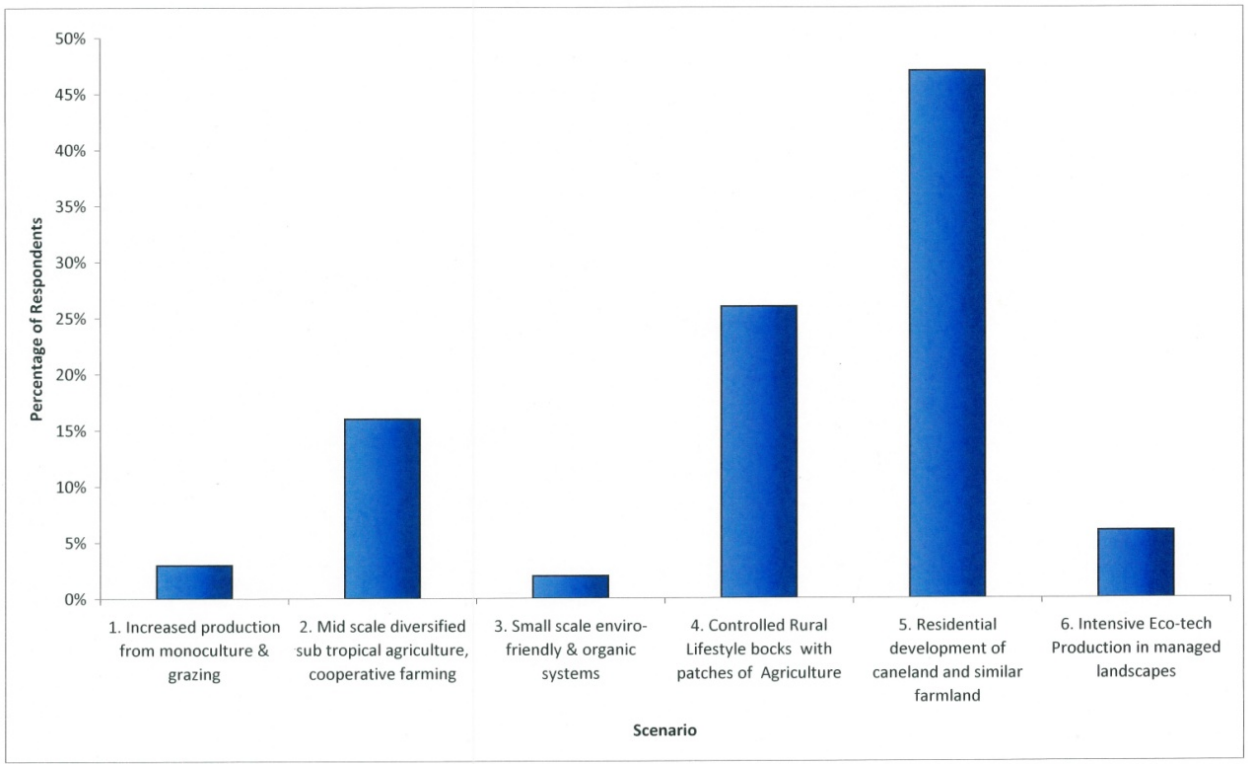


Figure 4. Stakeholder Perceptions of the Most Likely Future Agricultural Scenario if the Status Quo Were Maintained (n=84)



Source: Stockwell & Law, 2012.

about dealing with restaurants are typical of the broader response in regard to a number of short supply chain options (e.g., farmers' markets, direct to retail). For example, one midscale producer responded, "I have found a lot of restaurants that like to 'talk' local fresh food but not many that are willing to come part of the way to make it possible." Consistent ordering based on seasonal menus and purchasing on the basis of quality rather than price were thought to be critical to improving value-chain relationships and information flow between producers, restaurants, and distributors who supply restaurants. One producer reflected that, "supermarket pricing has a big effect on prices — customers have an unrealistic expectation sometimes because the supermarket specials are lower than production costs."

Farmers perceived that restaurants need to change their menus to recognize local sources and to respond to the availability and seasonality of produce that is suited to the region's growing conditions and climate. Those producers who had attempted to supply restaurants frequently had concerns around the lack of consistency in ordering. Comments suggested that farmers felt most food-service buyers are purchasing on price rather than on quality and provenance. More than 50 percent agreed that inadequate prices were the main reason that they didn't supply to restaurants. For a further 25 percent, logistics was a constraint to restaurant supply as they did not have the time and/or capacity to deliver their own produce.

While producers reported experiences and perceptions that suggest that the local food-service sector is ambivalent toward local and regional supply, Lawrence and Cheung (2011) found there was strong level of espoused support for local farmers in that sector, with 74 percent of restaurateurs and chefs surveyed espousing a commitment to buying local food. The majority of chefs and restaurateurs expressed a level of satisfaction with local supply. However, when actual purchasing

behavior was analyzed, this commitment has resulted in only patchy behavior (Lawrence & Cheung, 2011).

More generally the cost of labor is identified as a major factor restraining expansion, with one small producer providing the following comparison: "Cost of labor was not keeping pace with the returns. Ten years ago pickers had to pick 21 kg at [AU]$7/hour to cover cost, now 31 kg at [AU]$20/ hour to cover cost." The availability of skilled labor was also a constraint, particularly for machinery operation. Overall, however, our surveys reveal cautious optimism within the industry and an increasing producer interest in exploring opportunities to be involved in the local food value chain.

Marketing and Branding

Almost one half (47 percent) of midscale farmers supported some form of branding; however, 44 percent of midscale farmers considered that a regional brand would not be successful. National retailers were identified as the major stumbling blocks to regional branding. There was a higher level of support specifically for local branding, with 60 percent of midscale farmers interviewed agreeing that it was a good idea. This support, however, was similarly tempered by concerns about brand standards and substitution. Concerns were expressed that the reputation of a local brand could be tarnished by dumping of inferior produce if uniform standards of "best practice" were not set and enforced. It was also thought that local branding would be under threat from nonproducers sourcing cheap inferior products and "passing them off" as local. Substitution of second-grade product from central capital city markets is perceived as a widespread practice in farmers' markets in the region.

Support for local and regional branding was higher in the micro- and small producers and food artisans surveyed. The development of a local or regional brand was overwhelmingly supported by the micro- and small producers (85 percent), with an understanding that a brand would promote local food production as an industry attracting both local consumers and tourists. Smaller producers and food artisans viewed local or regional branding as a means to build a sense of connection and belonging to the Sunshine Coast. Branding was perceived as benefiting smaller producers and food artisans by connecting them to a larger collective brand that would enable them to talk about their produce as part of a regional food story.

Birch's (2012) online survey of consumers of local food in the region supports producers' views about the need for improved marketing and branding. Both residents and tourists suggest the five most significant barriers to consumption of local food were its lack of promotion; lack of information on where to find it; that it is not clearly branded as local; that it is not readily available; and that it is not well labeled.

The low level of marketing capacity within the micro- and small- sector was found to be a barrier to food systems development. When asked to describe their marketing strategy, 60 percent of the respondents reported they rely on word of mouth and repeat sales. This group did not proactively engage in marketing; rather they depend on the product "speaking for itself." Another 14 percent stated they did not have a marketing strategy. However, 30 respondents were involved in a business group external to their farm that shares aspects of crop production and marketing to maximize sales and profits. The need for coordination in local food supply chains, more effective marketing processes, and capacity-building for producers were frequently raised by respondents.

Capacity-building Along the Value Chain

Almost 60 percent of midscale farmers agreed they would explore their options for entering a local food supply chain if there were more support available to learn how to adapt their enterprise to profit from this transition. The provision of technical support and training was also a key issue for the micro- and small -scale producers and food artisans surveyed. A perception that changes in government priorities had led to a significant reduction in government agricultural extension was frequently raised as a major constraint to capacity throughout the value chain. Added to this were reports by many horticulturalists and dairy farmers, regardless of scale, that they are very time-poor and that day-to-day operations on-farm restrict their

ability to attend training and extension activities.

Despite these concerns, evaluation of five years of capacity-building activities specifically customized to peri-urban primary producers reveals high levels of participant satisfaction, knowledge-building, and behavior change, all leading to more sustainable production (Stockwell et al., 2012). Similarly, customized workshops run by state and local governments targeting the training and support needs of food artisans in topics such as marketing, exhibiting and event sales, food safety, and business management received strong support and positive feedback. The capacity-building program was observed as building and strengthening relationships. Typical feedback showed the transformative potential of capacity-building for micro- and small food enterprises; for example, one operator stated, "Holy COW!_You have truly changed our business forever. I really wanted to write and say thank you for reaching out to a business like ours. I could hardly sleep since meeting with you. For the first time in ages I felt that someone really got small business."

Frequently these sessions involved one-on-one follow-up with business development officers along with mentoring sessions with highly experienced professionals. Feedback suggests this form of capacity-building is highly regarded by the industry. For example, one participant wrote to the relevant minister suggesting, "The course about culinary tourism was great … I feel I can incorporate this into [my business]... and will easily work without huge set-up costs. A big thanks to the State Government for recognizing our needs and putting an excellent team and plan into action."

Capacity To Respond To Increased Demand

Further document analysis confirms that the Sunshine Coast is experiencing similar trends to published national and international data with regard to increased demands for local and regional food supply. Wright's (2012) report on interviews with medium to large food manufacturers and Birch's (2012) consumer survey identified strong interest in increased local food and regional food supply. The most important drivers for local and regional food purchases by residents in the broader South East Queensland region include a desire to support local producers and retailers, the local community and the regional economy; and intrinsic qualities including freshness, reduced food miles, traceability, including connection with local producers and knowing the origin of local food and beverages (Birch, 2012). Quality, convenience, and customer service were more important for manufacturers (Wright, 2012). Further, a local produce distributor has suggested demand from restaurants for local food is approximately twice as high as current supply levels (Lawrence & Cheung, 2011).

Transitioning midscale producers to more active involvement in local and regional supply chains will be critical to meeting substantial increased demand. Our interviews found that 41 percent of this sector already supplied some or all of their produce locally, but this was as much as they could supply under their current production and marketing arrangements. Most were in favor of a local distribution system but were skeptical as to how it might work.

Midscale and micro- and small producers and food artisans all shared similar views about the most important factors likely to influence their future decisions with respect to increasing their supply to local and regional food chains. Both groups ranked increased demand for quality product as the most significant factor, with more attractive prices being the next highest ranked. An efficient local distribution system, increased promotion of local food, and increased information on local demand were the three other most highly ranked factors ranked by both groups.

Respondents suggested the main constraints to expansion of production for local food supply included labor, land availability (size of plot, soil type, etc.), transport, infrastructure, funds, and access to resources. They were optimistic that most distribution challenges could be addressed by the facilitation of better relationships and collaboration between value-chain members rather than new infrastructure. There was strong support across all supply sectors surveyed for online information and an electronic trading and distribution system. The enthusiasm of producers and food processors for the development of an online data and a trading portal was matched by support in the food-service and manufacturing sectors (Wright, 2012). The

food-service sector welcomed the concept, with more than 90 percent suggesting they would use a portal, while just over 70 percent of the manufacturing sector suggesting they would (Wright, 2012).

Networked Government Service Delivery Model

The Sunshine Coast Food Futures project adopted a collaborative service-delivery model that involved the state government allocating business development officers and agricultural extension officers to support farmers and food artisans; contracting specialist presenters to lead targeted training workshops, followed by one-on-one mentoring; and local government program support to create and market a collective regional brand. Research projects were embedded within service-delivery projects and distributed between academics, local food social enterprises, and local food champions with results rapidly communicated to stakeholders. This delivery model received strong support from industry. For example, one food enterprise owner suggested "I have been involved in a long list of Government private sector collaborations — this one is by far the most productive, useful and meaningful."

As part of the Food Futures Initiative, a symposium involving 84 key agri-food and tourism industry stakeholders, government officers, and academics reinforced the ongoing need for initiatives that build connections across the food value chain and between industry and government (Stockwell & Law, 2012). The highest priorities emerging from the symposium were to: (a) foster relocalization of production and retention of agricultural land through changing planning laws and reducing red tape to allow farmers to undertake multifunctional farming; (b) improve the skill base of producers and knowledge of consumers; (c) enhance communication and trading along the food tourism value chain; and (d) develop an e-portal trading site to facilitate networking, collaboration, and distribution. The deliberations and recommendations from this expert group are consistent with our findings above about the desired delivery model and the mechanisms to reduce barriers to increase participation in local and regional food vale chains.

Discussion

The dominant aspirations and concerns expressed in those forums and the subsequent interviews and surveys suggest trends on the Sunshine Coast are consistent with the rural development, peri-urban, and food system literature reviewed. The results clearly outline a suite of challenges and opportunities facing enterprises seeking to engage in local and regional food value chains, including the need for continued policy and planning reform to facilitate resilient multifunctional peri-urban farms and landscapes; a need for improved marketing and labeling of local and regional food to capture consumer interest and reduce substitutions of inferior product at farmers' markets; and a mismatch between current skills, experience, and the competencies required.

Our proposition is that without further intervention, individual endeavors and consumer drivers are unlikely to achieve resilient, sustainable agri-food systems at a landscape scale. From a producer perspective these interventions need to address knowledge and information gaps, reduce regulatory impediments, facilitate relationships along the value chain, and coordinate solutions to the problems of disaggregated supply and demand.

Policy-makers, planners, and government service delivery need to intervene in ways that support rather than constrain local and regional food enterprises. For example, the lack of long-term farm management experience by new entrants and unfamiliar farming techniques required to diversify traditional farms have led to frequent calls for increased government investment in agricultural extension officers. Further, lack of regulatory provisions to set standards, safeguard brands, and protect agricultural land from subdivision and inappropriate adjacent uses are also cited as factors inhibiting the growth of the local supply chains from a grower perspective. On the other hand, a reduced government presence in terms of prohibitive regulations and local government compliance costs (e.g., expensive planning applications) for on-farm value adding or building agritourism ventures is a frequent call from enterprise.

Reconnecting producers and food artisans in alternative food networks underpinned by sustainable production processes may be a key mechanism

in differentiating local and regional foods from mass-produced offerings (Ilbery, Morris, Buller, Maye, & Kneafsey, 2005). This process may further lead to the revival of peri-urban agriculture and an increased likelihood that farmers can achieve increased returns compared to that typically provided by central markets and agents, while achieving a greater focus on rural development and strengthening a local, sustainable food system (Louden & MacRae, 2010; Winter, 2003). Enthusiasm for such concepts in the case study region were, in many cases, not supported by the experience, skills, and knowledge of how to facilitate, analyze, and manage sustainable value-chain improvements. We argue that government support with programs to enhance skills, coordination, and connectivity along the value chain is a critical component of sustainable peri-urban food systems and will help address the other challenges.

Conclusions

There are still many questions about how the new paradigm in rural development can achieve sustainable food futures in peri-urban regions. In this paper we argue for a range of interventions that can reconfigure fragmented peri-urban localities to increase the likelihood that they become multifunctional landscapes with sustainable agricultural systems and resilient food-producing communities. The literature suggests that community-development initiatives aiming to respond to increased demand for sustainably produced local and regional food are complicated in these fragmented and often contested landscapes. In peri-urban landscapes, social, environmental, and economic attributes are impacted by constant population change and other disturbances that raise a number of challenges to achieving the opportunities presented by this growing demand, as evidenced in the views of respondents.

Our research suggests that traditional elements associated with market failure (e.g., incomplete knowledge along the value chain, the duopolization of food and grocery markets, and unaccounted externalities of unsustainable agriculture) need to be addressed if the preferred agricultural future of a region is to be realized. These failures, together with the disproportionate political power of corporate agriculture and food interests, will reduce the prospects for the emergence of sustainable and resilient peri-urban regions in the developed world.

The case study demonstrates a number of key challenges that can be addressed by a networked government service-delivery model that responds to industry needs. Responses include reducing regulatory and planning impediments; supporting local and regional branding to connect otherwise fragmented production to a larger collective brand; capacity-building activities specifically customized to peri-urban agri-food value-chain participants; facilitation of an efficient local distribution system; development of an online data and trading portal; and increased promotion of local food. Our results are consistent with those of Oberholtzer, Clancy & Esseks (2010), who argue that in the U.S. "urban fringe counties need to increase their efforts to maintain a viable agricultural sector by taking into account the unique farming and demographic characteristics of their county" (p. 71).

We conclude that there is a role for government in coordinating and connecting networks to achieve the desired future scenario for peri-urban agri-food systems. Reconfiguring agri-food systems in peri-urban landscapes will require collaborative initiatives between industry, local councils, and regional government to deliberately rearrange the parts of the system in order to adapt to new circumstances, perform new tasks, or recover from damage. This will further require investment in place-based research and planning, capacity-building, and economic-development activities. Without such initiatives the local food movement in these areas in Australia is likely to continue to occupy only a narrow "alternative" cultural, geographic, and economic space.

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Small organic farm renewable energy demonstration project based on incremental capital investment and community participation

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Abstract

Rising fuel prices, energy security, and climate-change awareness are all incentives for farmers to implement efficiency measures and renewable energy systems, such that all or part of a farm's energy needs are produced locally. This practice, known as clean energy farming, complements principles of sustainable agriculture such as promoting environmental stewardship, reducing dependence on nonrenewable resources, increasing economic viability, and strengthening farm families and society as a whole.

Farmers who entertain moving toward a more sustainable energy portfolio are often unsure where to begin and how to approach such an endeavor. This uncertainty, combined with the perceived enormity of the task, create an insurmountable roadblock for many. Overcoming these barriers and engaging in small-scale renewable energy projects can benefit the farmer and the larger community. Exposure to such projects is an invaluable means of fostering support for renewable energy as it helps the public better appreciate the human ecological connection between daily energy consumption, the source of that energy, and the overall effect on the environment.

The central objective of this paper is to demonstrate a model for sustainable energy for a working farm based on community participation and incremental capital investment. A small organic farm was used as the model to show how to migrate toward energy independence through efficiency and conservation measures, and the incorporation of technologies based on renewable resources. It is a portfolio approach, which allows for multiple technologies such as wind, solar, biomass, and efficiency measures to be implemented over time as funds become available.

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clean energy farming, community, efficiency, renewable energy, sustainability

Introduction

Overwhelming scientific consensus exists that anthropogenic emissions of carbon dioxide and other greenhouse gasses will lead to significant and potentially catastrophic climate change in the next half-century (Intergovernmental Panel on Climate Change [IPCC], 2007). Reducing the use of fossil fuels and shifting toward a greater emphasis on renewable energy are the most urgent challenges in the effort to mitigate climate change (Walker, 1995). Agriculture worldwide is a significant contributor to the problem of climate change, accounting for up to 20 percent of total annual greenhouse gases. Emissions from agriculture are estimated at 6 gigatonnes (Gt) of carbon dioxide equivalents (CO_2e) and are expected to reach 8.3Gt CO_2e per year by 2030 (Niggli, Schmid, & Fliessbach, 2007). The food production system accounts for 17 percent of all fossil fuel use in the United States (Horrigan, Lawrence, & Walker, 2002).

Sustainable farms have already made strides in reducing the carbon footprint of food production by limiting the use of fertilizers and pesticides and providing a local source of food to communities, which reduces emissions from food transportation (Weber & Mathews, 2008). Implementing measures so that all or part of a farm's energy needs are produced sustainably and locally takes the concept of sustainability a step further. This practice, known as clean energy farming (Friedman, 2012), complements principles of sustainable agriculture such as promoting environmental stewardship, reducing dependence on nonrenewable resources, increasing economic viability, and strengthening farm families and society as a whole (Gerber, 1992). In recent years, the number of farms considering and implementing on-farm energy production systems has risen (Delhagen, 2008). The myriad of efficiency and renewable-energy efforts implemented on small farms across the country are often in conjunction with universities, extension programs, and nonprofit organizations that offer resources and information for farmers (Center for Ecological Technology (CET), 2012; Center for Rural Affairs, 2012; Purdue Extension, 2009). One example is New York small farm energy innovators (Masler & Bass, 2010), a compilation of energy efficiency and renewable energy projects on six New York farms.

In addition to issues of climate change and rising and unpredictable fuel prices are incentives for farmers to reduce energy costs from heat and electricity (Chel & Kaushik, 2011). This is especially important for small farms, which allocate a greater proportion of their operating budget to purchased inputs such as energy (Thompson, 1986). While small farms make up only 10 percent of gross farm sales, almost seven in 10 of the 2.2 million farms in the U.S. can be classified as small (D'Souza & Ikerd, 1996). This provides a significant opportunity for farms to play a vital role in shaping public opinion regarding energy conservation and the adoption of renewable sources of energy while strengthening their own resilience by transitioning away from fossil fuels.

A significant barrier to the widespread transition to renewable sources of power is the lack of public support for the adoption of renewable energy technologies (Stern, 2007). Despite obvious human, social, and cultural drivers of climate change, the link between fossil fuel production and consumption and global climate change is not well understood by the general public (Dwyer, 2011). According to Mulligan (2010), this is due to a lack of exposure to the fundamentals of energy on the practical side and an absence of the human ecological connection between man and nature on the conceptual side. Understanding issues of energy and climate in terms of human experiences will be needed to change energy use as well as to generate support for renewable energy development.

Arguably many small farms by their very existence already help educate the public about the connection between the food people eat and how and where that food is grown (Darnhofer, 2010). In the same way, moving toward a sustainable energy portfolio by engaging in small-scale renewable energy projects can serve to educate the larger community while also benefiting the farm economically and socially. Exposure to such projects is an invaluable means of fostering widespread understanding (National Environmental Education

and Training Foundation & RoperASW, 2002) as it helps the public better appreciate the human ecological connection between daily energy consumption, the source of that energy, and the overall effect on the environment (Mulligan, 2010).

While implementing efficiency and renewable energy projects can be an effective strategy for strengthening a farm and the surrounding community, the capital required and the perceived enormity of the task may deter farmers from engaging in such projects. Farmers who entertain moving toward a more sustainable energy portfolio are often unsure where to begin and how to approach such an endeavor. In addition, limited access to capital is often a barrier for small farms, making them slower to adopt technologies as compared to larger farms (Bieri, de Janvry, & Schmitz, 1972). Therefore the central objective of this study is to demonstrate a model for integrating sustainable energy production into a working farm based on community participation and incremental capital investment.

A small, organic farm was used as the model to show how to migrate toward energy independence through efficiency, conservation, and the incorporation of renewable resources. It is a portfolio approach, which allows for multiple technologies, with different cost and benefit profiles, to be implemented over time as funds become available. This strategy of incremental capital investment requires a modest initial investment with the ability to realize the greatest gain at the early stages of the multistage project. By implementing efficiency measures and deploying technology over a period of time, farmers as well as businesses, organizations, and individuals can better afford to move to a more sustainable energy portfolio.

This paper details a renewable energy demonstration project on an organic farm. The three main pillars of the project are to (1) plan and follow through on a variety of conservation and renewable energy projects, (2) provide detailed financial and logistical information on each project, and (3) ensure energy education and community engagement through hands-on participation and ongoing outreach and dissemination of information.

Overview

The energy demonstration project was implemented at Beech Hill Farm and funded through a grant from Efficiency Maine Trust. Beech Hill farm is a 73-acre (30-ha), small organic farm on Mount Desert Island on the coast of Maine. The farm has eight field units under tillage with a total of five acres (2 ha) of crop production. There are an additional 12 acres (4.9 ha) of open land that include two acres (0.8 ha) of heirloom apples in three small orchards. The rest is forested land. The farm has many of the essential elements common to small vegetable producers: several acres of fields requiring pumped irrigation, commercial greenhouses that requires seasonal heating, a farmhouse, a multipurpose building for storage and office space, and a farm stand.

In addition to the strong financial and mission-driven incentives for small, sustainable farms to move away from the use of fossil fuels, there are numerous other reasons that a small farm is an ideal setting for this demonstration. First, farms have diverse energy needs and significant open space to model technologies such as solar and wind. Second, the solutions developed for a farmhouse are applicable to many residences, thereby making this useful to homeowners as well. And finally, the farm stand attracts customers who can then be exposed to the energy-saving and renewable energy innovations.

Beech Hill Farm is particularly well suited for community outreach both because it is owned by a college and is located in the same community as a national park. The college's sponsorship of workshops , class projects, student internships, and work-study positions provide exposure for the renewable energy demonstration project. The farm is a member of the Maine Organic Farmers and Growers Association (MOFGA) and is operated under an "open-book" policy, allowing other farmers to learn from the financial experience and alternative production techniques of the farm. Additionally the farm has a tradition of providing tours to visitors and groups from local schools and summer camps. A natural audience exists for the messages from the farm since it is located in the same community as Acadia National Park, which attracts 2.5 million visitors each year (Trotter,

2011). This provides a broad and diverse spectrum of people to the farm stand, which itself draws over 15,000 visits per season.

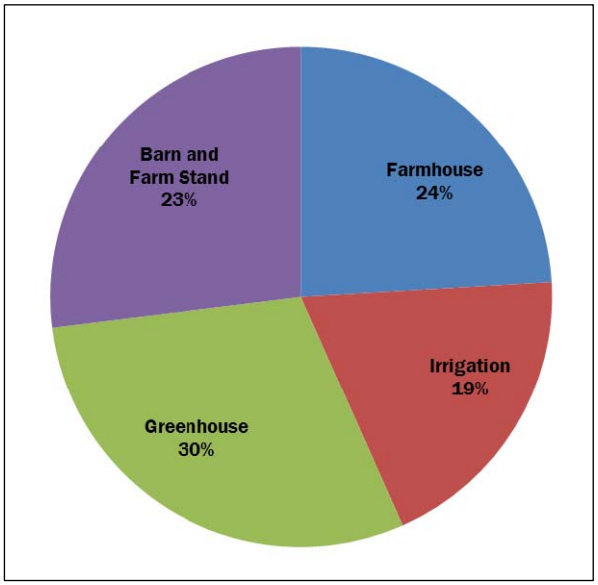
Process

The initial phase of the project was to inventory energy consumption on the farm and gain a thorough understanding of the energy-dependent systems throughout the year. First, we collected baseline data to determine the total energy consumption on the farm, which was 54.4 megawatt hours (MWh) per year for heating and electricity. Four separate electricity meters and three separate fuel bills provided the relative difference in energy use between the many farm systems. Figure 1 details energy use by sector at the farm. Second, we documented procedures and growing cycles to gain an understanding of the farm's operations and each one's associated energy demands. Finally, we documented shortcomings of farm infrastructure and procedures as understood by the farmers.

Findings from this initial research provided a host of valuable information. Energy data confirmed high heating demands for the farmhouse and the greenhouses. Additionally the data showed that the water-pumping system was responsible for a large percentage of electricity use at the farm. This data aligned with what was learned about farm operations as shown in Table 1.

A systematic approach was taken to determine the most suitable strategy for implementing efficiency measures and renewable energy production at the farm. The approach selected one aspect of each of the major energy consumers on the farm: irrigation, greenhouse heating, and the farmhouse.

Figure 1. Farm Energy Use by Sector



Demonstration of energy efficiency and non–fossil fuel based energy production was a key goal of this project. Therefore, we initiated projects for each of the major farm systems. Decisions on which efforts to invest in depended on three criteria: availability of funds, projected return on the investment, and demonstration potential for other farmers and the community.

Renewable Energy Installations

Solar Photovoltaic

As on many small produce farms, well pumps for the water used for irrigation and processing vegetables account for a substantial proportion of the farm's electricity. The farm has four wells; two are

Table 1. Farm System Information for Beech Hill Farm Energy Demonstration Project

System	Conditions	Issue
Greenhouse	An older glass greenhouse is heated starting in early February for seed germination.	High heating demand
	The largest greenhouse is heated from early April through mid-November	Fossil fuel heat
Irrigation	Irrigation of the fields generally becomes routine in May.	High electricity
	Produce is washed from May through October.	High electricity
Farmhouse	Farmhouse basement is damp and unsuitable for storage due to mold issues.	Health and quality of life
	The farmhouse is drafty and cold. A portion is closed off in the winter because of this.	Quality of life

used for irrigation, one for washing vegetables and general barn use, and one for the farmhouse. Each of the wells is on a separate electrical service, which allows easy analysis of individual use. The average total electricity consumption of the well pumps, averaged over three years, is 10.5 MWh per year, which is approximately 60 percent of the total electricity consumption on the farm.

Several strategies were explored in considering this issue. One approach was to reduce the overall water needed by changing to drip irrigation, a more efficient irrigation system. This approach met with resistance as the farmers were uncomfortable with changing an irrigation system that has worked very well for the past 20 years. This is a realistic response that highlights the human ecological component to migrating to a more sustainable energy platform. Forcing substantial changes of habit often increases resistance to action and support for projects. Acknowledging that conservation and climate change cannot be the sole metric for adopting a new energy portfolio, a multiyear plan was established to address irrigation issues. This includes installing monitoring equipment to study watering patterns and consumption. The results will provide the farmers with a comprehensive review of the cost, labor, and ecological footprint of using drip irrigation rather than the existing system.

In the near term, solar photovoltaic panels were used to reduce electricity use from water pumping. Water pumping is one of the simplest and most appropriate uses for solar photovoltaic (Chel & Kaulshik, 2011). The number of solar panels installed was based on available resources and with the possibility of future expansion. Fourteen 230W (Yl230-29B) solar panels were installed, each with a micro-inverter (M190). The micro-inverters allow for system expansion and individual panel adjustment for shading. This is a grid-tie system that falls under a simple net metering agreement with the local utility as regulated by the state of Maine. This is a standard agreement that allows the farm to store excess electricity as kilowatt credits for up to one year. This is advantageous for the farm because energy consumption is not evenly distributed throughout the year. The solar panels will produce power during the winter when the farm consumes very little energy. Credited energy can be used during the growing season when the farm will consume more energy than it produces.

Solar Photovoltaic Cost and Payback Calculations

The combination of the fourteen 230 W panels gives the farm a total installed peak capacity of 3.2 kWatts. The panels are producing 4360 kWh of energy and offsetting roughly 4,400 lbs. (1,996 kg.) of CO_2e each year. This accounts for 41.5 percent of all of the electricity needed for farm water pumping, as shown in figure 2. The total cost of installing the solar systems was $19,487, which gives an installation cost of $6.05 per watt. This was on par with the average installation cost in the northeast at the time, which was $6.30 per watt (Barbose, Darghouth, Wiser, & Seel, 2011).

While installation costs are a good measure for whether a contractor provided fair pricing, the calculated payback of the system is what dictates whether a project will be economically feasible for a business owner or individual. In order to properly calculate payback, state and federal rebate and tax incentive programs must be taken into account. Rebates vary from state to state; in the state of Maine the rebate is US$500 per 1000 kWh estimated annual production with a maximum of US$2,000 for residential and US$4,000 for commercial (U.S. Department of Energy [U.S. DOE], 2012a). Based on these rules, this project qualified for a US$2,000 state rebate. The federal rules provide a 30 percent tax credit (DOE, 2012a), which amount to US$5,846. There are also federal rules that allow accelerated depreciation on tax returns for solar installations. However, because tax rates are not uniform and depreciation rules fluctuate, they have been left out of the payback calculation. Combining state and federal incentives, the total cost of the project is reduced to US$11,641, Using the current cost of electricity, US$0.17/kWh, the simple payback time on the system is 15.7 years. As solar panels hold a 25-year warranty and are reported to last up to 40 years in some instances (Black, 2009), this is a suitable return on investment for many. However, solar costs have declined rapidly in the past year and are now at an average installed cost of US$4.44 per watt (Wesoff, 2011). The solar arrays at the farm would have a payback

time of 10 years given the current pricing, which makes a project like this even more attractive.

Biomass

The farm has four greenhouses, two of which are heated. The smaller, older heated greenhouse needs significant structural investment and is estimated to use at least as much energy as the larger, newer heated greenhouse. We launched a longer-term analysis of energy issues pertaining to the smaller greenhouse. Data gathered will be utilized for future improvements and/or a reduction in the heated use of that greenhouse. Therefore efforts for this work were focused on the newer, heated greenhouse. It is the largest greenhouse (Nor'-easter, Rimol) and is used from early April through the middle of November. Heating requirements for the greenhouse are to maintain it to 60° F (16° C) from April 7 to May 15 for tomatoes, and at 38° F (3° C) throughout March, October, and the first half of November for crops like carrots and greens.

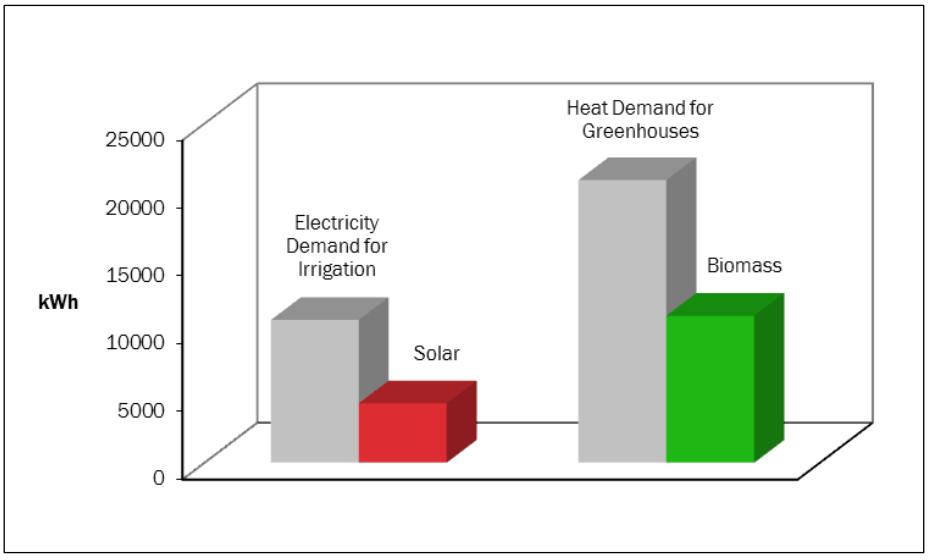
Several options were considered as a renewable source of heat for the greenhouse, including a heat pump, cord-wood boiler, and pellet hot-air furnace. The cord-wood boiler was closely considered because the farm includes of over 65 acres (26 ha) of woodland. In addition to the higher cost, the added labor involved in harvesting wood, starting and feeding the boiler, and cleaning it more frequently was not realistic for the farmers given their extensive workload and unpredictable and often insufficient work force.

Ultimately a wood pellet heating system was selected and installed to replace the propane system as the primary source of supplemental heat in the greenhouse. This offset 10,000 lbs. (4,536 kg.) of CO_2e each year. The system cost US$5,800 and consists of a pellet furnace (RH360), which is automatically fed pellets from a 600 lb. (272 kg.) storage pellet bin, known as the hopper (Mini, Mafa) through a 5.6 ft. (1.7 m.) augur (Pellx 20kW). The pellet heating system represents a modest increase in labor for the farmers compared to the propane system, as they periodically need to refill the hopper, empty the ash draw, and clean the furnace.

Biomass Costs and Payback

The amount of heat needed for the larger greenhouse was calculated to be 31,000,000 BTUs (31 MMBTU) for the season based on the average nighttime temperatures, required inside temperatures for spring and fall, and the make and model of the greenhouse. Wood pellets provide 320,000 Btus per bag. They are purchased by the ton (fifty 40 lb. [18.1 kg.] bags), at a cost of US$245 per ton (907 kg.) (U.S. Energy Information Administration [EIA], 2012). Therefore the pellet furnace, which has an efficiency of 85 percent, will burn 2.3 tons (2,087 kg.) of pellets in a season at a cost of US$564. Propane provides 91,300 Btus per gallon. Using the three-year average price for propane of US$2.83/gal. (U.S. EIA, 2012), an 85 percent efficient propane system will burn 404 gallons (1,529 liters) of propane, equivalent to 10,810 kWh, in a season at a cost of US$1,143. Given the difference in heating costs, the pellet furnace has a simple payback time of 10 years. Figure 2 illustrates the

Figure 2. Irrigation and Greenhouse Energy Demand and Production



energy demand for total greenhouse heating and for electricity for irrigation with the associated renewable energy production.

Heat Pump

Demonstrating a lower carbon and low cost heat source for the farmhouse was of particular importance due to the location of the project. More than 80 percent of Maine households rely on oil for heat, the largest percentage of any state in the United States (U.S. EIA, 2012). The farmhouse was heated by a wood stove and a propane wall-mount heater (RHFE-559FTA). We investigated heat pump technology as it conformed to Maine's Climate Future report (Demeo, Peterson, & Rubin, 2009). The report proposed that heat pumps in conjunction with wood stoves are the optimum heating configuration for homeowners since they work most efficiently in moderate temperatures, while wood burns most efficiently in the coldest temperatures.

A mini-split air-source heat pump (12RLS2) was installed as part of a community workshop in which participants learned about heat-pump technology and then assisted in the installation of the system. This heat pump is rated to perform down to –5° F (–21° C) and has an efficiency of 300 percent (DOE, 2012b). The heat pump replaced the existing propane heater, but the wood stove remains the primary heat source.

Heat Pump Cost and Payback

Supplemental heat to the wood stove in the farmhouse consisted of 200 gallons (757 liters) of propane. The propane heater has an efficiency of 85 percent; therefore it provided 15,521,000 total Btus or 4,549 kWh of heat each year. The heat pump has an estimated electricity load of 1,173 kWh per year, which results in a net reduction of 3,377 lbs. (1,532 kg.) of CO_2e per year. Given US$2.83 per gallon for the cost of propane and US$0.17 per kWh for electricity, the savings amount to US$367 per year. The heat pump cost US$3,350 (installed), and therefore the payback on the system is nine years. This is considered a relatively long payback for the heat pump due to the fact that the primary source of heat for the farmhouse is the wood stove rather than a fossil fuel source. The manufacturer payback of two to three years is reasonable for homes that use propane or oil as the primary heat source.

Wind Turbine

A wind turbine (Skystream 3.7) was installed as part of a college course prior to the start of the renewable energy demonstration project. The installation was the centerpiece of the course "A Practicum in Wind Power" offered in 2009 by the College of the Atlantic. Funding for the course and the turbine came from a combination of donors and a grant from the U.S. Environmental Protection Agency (U.S. EPA). The location of the turbine was chosen based on proximity to the farmhouse, available open space not needed for crops, and visibility to the community. The local ordinance for the town imposed a 40' height limit on the turbine.

Wind Turbine Cost and Payback

The height restriction, in addition to the other citing considerations, resulted in poor energy production for the turbine. In addition to the course itself being a good learning experience, however, the knowledge gained by the community as to the need for proper planning and good ordinances to produce wind power was invaluable. For example, if a taller tower had been permitted, in theory the turbine would be capable of producing almost three times as much energy per month, which would have reduced the payback time on the investment by nearly 20 years.

The students in the wind turbine course gave a presentation to the town planning board as the town worked to develop a wind power ordinance. The project and the presentation spurred extensive conversation about the role residential wind power could have for the wider community and how that would compare, from both aesthetic and energy generation perspectives, with larger, industrial-scale turbines.

In terms of the energy demonstration project for the farm, cost and installation information about the wind turbine is very instructive. The total installation cost of the project was roughly US$18,000. State and federal tax incentives and rebates on a project of this size amount to

US$7,400, bringing the total cost of the project to US$10,600. The total average yearly energy production for the turbine is 2223 kWh, or about half of the farmhouse electricity load. This translates to US$378 savings in electricity costs and 2,224 lbs. (1,009 kg.) of CO_2e per year. At that rate, the wind turbine will pay for itself in 31 years, which is beyond the lifespan of the turbine.

Efficiency Measures

The farmhouse is a significant aspect of this project even though its energy consumption is a small proportion of the overall energy use of the farm. This is because the improved quality of life and reduction in residential energy use is not only relevant to farmers but to individual homeowners as well. The farmhouse is a one-story, 1,600 square foot (149 square meter) contemporary, two-bedroom house with a full basement. The farmers close off the back living space through the winter since the heating system is inadequate to maintain a comfortable temperature for the entire house.

The basement can be accessed via interior stairs or through a deteriorated external bulkhead and its unsafe stairway. The basement has a dirt floor and extended 10' 8" (3.2 m.) concrete walls. Excessive moisture is present in the basement due to foundation mortar deterioration. There is extensive mold on the exposed fiberglass insulation in the floor joists and evidence of flooding. With the exception of a washer and dryer located on a raised platform at the bottom of the interior stairs, the basement is unusable.

Energy Audit

While understanding the electricity for irrigation and propane for heating the greenhouses is fairly straightforward, understanding the complexities of the energy use at the farmhouse required a professional energy audit. The audit was commissioned as the first expenditure for addressing the farmhouse.

The energy audit indicated that the farmhouse had an air exchange rate per hour of 0.7; the target is 0.35 for an energy-efficient house. This means that the building is 100 percent overventilated, or "leakier," than energy-efficiency standards. Annual energy use for the house consists of heating (67 percent of total usage), domestic hot water (16 percent), and appliances and lights (17 percent). The audit found that 55 percent of heat is lost through infiltration, while 24 percent is due to surfaces and doors and 17 percent due to windows.

The total estimated cost to complete all improvements to the house to make it highly energy efficient is US$60,000. Implementing the improvements all at once was not a fiscally viable or desirable approach. Rather, we put into place an incremental approach to improving the energy efficiency of the farmhouse. Decisions about which items to take action on in the near term were based on available funds and health and quality-of-life concerns for the farmers. Concentrating primarily on the basement served to make the largest impact on the energy loss in the house while also addressing air-quality and safety concerns for the residents. Increased storage space in the basement is an additional value to this approach.

Insulation and Air Sealing

Insulation is a critical component of energy efficiency. The EPA estimates that homeowners can typically save up to 20 percent of heating by air-sealing their homes and adding insulation (Energy Star, n.d.). The perimeter of the upper basement walls was insulated with 3" (7.6 cm.) thick closed-cell spray foam R21 insulation. Insulating the perimeter of the basement allowed for the removal of the moldy fiberglass insulation in the ceiling bays. The basement was further sealed with the installation of a 15-mil. vapor barrier over the dirt floor of the basement. This sealed barrier served to reduce moisture and heat loss. Window sashes were replaced with 2" (5 cm.) foam board inserts. The existing exterior bulkhead structure, stairs leading down to the basement, and interior door at the bottom of the bulkhead stairs were all replaced. Two-inch (5 cm.) polystyrene foam board was used to insulate the exterior walls of the basement.

Insulation and Air Sealing Costs and Payback

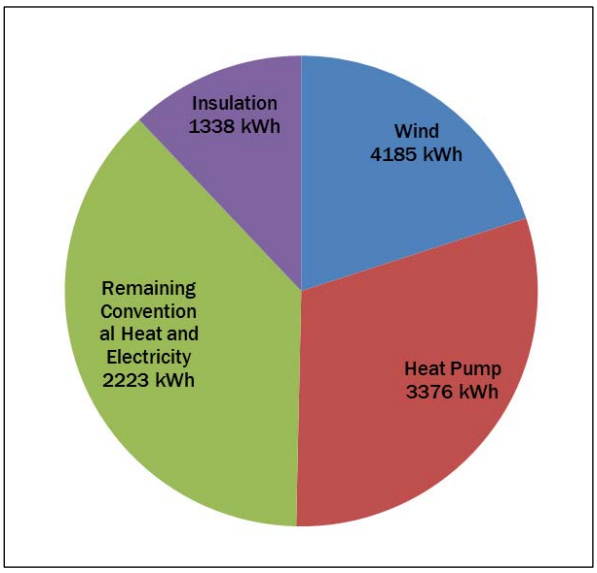
The total cost of this work was US$8,082. Actual savings cannot be determined for some time, but overall payback for the improvements was estimated in the energy audit to be about 16 years. Carbon dioxide reductions due to this work is estimated to be 1,000 lb. (454 kg.) per year. Some

of the improvements, such as the vapor barrier, did not include a financial savings estimate as the vapor barrier will not perceptibly lower the heating needs of the building. It will improve air quality and aid in protecting the longevity of all insulation improvements. Three important benefits beyond financial savings include improved comfort of the house, increased value of the building, and ability to utilize the large basement space for storage. Figure 3 details the proportional impacts of energy efficiency and renewable power production for the farmhouse.

Outreach

Beyond moving an organic farm toward fossil fuel independence, a wider reaching goal of this project is to engage the community so that community members can both participate in the work and utilize the results in a beneficial manner. Research shows that the ability to disseminate information into a community can promote not just individual benefits but also add to the overall strength of a community (Flora & Flora, 1993). We held seven workshops in all, attended by anywhere from five to 20 people. Students, community members, business owners, and other farmers all had the opportunity to participate. Participants learned about the particular energy issue being addressed and why and how the given solution was chosen. Then they were taught about the specific technology and went on to help in the installation process.

Figure 3. Farmhouse Wind Turbine Energy Profile



For example, two separate photovoltaic arrays were installed, one roof mount and one ground mount, as part of two separate workshops. Participants learned the difference between grid tie and off-grid systems, how to read the sun resource calibrator, and how to prepare the foundation and install the panels. Real-time and historical performance of the solar panels as well as updated cost information are provided through a website for the public to reference.

We interviewed workshop participants who took personal action as a result of their involvement in the energy project as a means of tracking community impact. We conducted the interviews in accordance with proper human subject procedures and approval. As an example, we interviewed a local mechanic about a solar array he installed for his business subsequent to participating in numerous outreach events. When interviewed the participant remarked that renewable energy had always been of interest to him, but he had assumed previously that solar was not cost-effective on the coast of Maine. He explained that being able to view live data from the farm's solar array and inspect the solar panels first-hand prompted him to pursue the subject further.

After looking at the cost of the solar arrays at the farm and learning about state and federal incentives that are available, he obtained a quote for a solar array installation on his 2,500 square foot (232 square meter) mechanic's garage. He consulted project team members and outreach material throughout the purchase and installation of 20 solar panels, totaling 4.6 kW of peak capacity. The business, located in a small town where the primary employment opportunities are boat building, fishing, and tourism, has created a ripple effect within the community. The owner has fielded questions about his solar array and directed people to resources for further information.

We also interviewed a homeowner who participated in both the roof-mount solar installation and the heat-pump workshop. He sought out the workshops with the intention of moving to a more sustainable energy source for his personal residence. In addition to participating in the workshops, he

Table 2. Cost and Payback for Demonstration Project Measures

Technology	Cost (all in US$)	Energy Produced/Saved (kWh/year)	Payback Period (Years)	Notes
Solar	$11,641	+ 4,360	15.7	Falling solar costs reduce a project of this size to US$7,856 with a 10-year payback.
Biomass	$5,800	+ 10,800	10	Payback based on propane replacement.
Heat Pump	$3,350	–3,376	9	Payback 2–3 years for average home heating use in Maine (U.S. DOE, 2012b).
Wind	$18,000	+ 2,223	31	A turbine mounted on a taller tower would perform better.
Energy Audit	$500	NA	NA	Maine offers stipends for insulation work if a professional energy audit is completed first.
Insulation and Efficiency	$8,082	–1,370	16	Energy saved and payback are estimates based on findings from the energy audit.

took part in a farm tour during an open-house event and utilized the web resources for the project. In a follow-up interview about the project he explained that he had been leaning toward installing a wind turbine at his home. However, after discussing permitting requirements for wind turbines with students and other team members and looking at the energy production of the farm's wind turbine, he began to explore solar panels instead. By monitoring online the energy production of the farm solar panels he found the optimum array size for his house. Learning the basics about solar energy during the workshop, especially the importance of the optimum angle and position of the solar panels, gave this homeowner confidence to invest in solar energy. He is currently working with a local solar distributor to determine the total cost for a home system.

In addition to solar panels, the homeowner is actively pursuing installing an air-source heat pump in his home. The heat pump workshop he attended began with a PowerPoint presentation describing heat pump technology and how it can be best used. In the interview, the homeowner explained that he had just superficial knowledge of heat pumps prior to the workshop and was impressed with the efficiency of the technology. Upon further investigation he found that the initial cost and relatively short pay-back period made the investment worthwhile to him.

A number of methods were utilized to ensure that information about the project continued to be disseminated to the wider community. An annual "May Day" celebration was started to draw attention to the energy efforts at the farm. The inaugural event brought in over 100 people and included tours of the renewable energy projects. Additionally, a website was developed containing all of the information about the project, including manufacturers, cost analysis, a video, and links to real-time energy production of the solar panels and wind turbine.[1] We also developed a comprehensive brochure and sent it to the local chamber of commerce, MOFGA members and made it available at the farm stand and online. The farm stand also has a large poster that describes the overall project and enables interested people to take a self-guided tour of the project.

Discussion

The goal of this work is to demonstrate a strategy for small farms as well as homeowners and small businesses to move to a more sustainable energy portfolio. The strategy is based on an incremental capital investment approach that allows improvements in efficiency and renewable energy projects to be implemented over time as funds become available. This paper details the first round of efforts, any one of which could be a first step for a farm, business, or homeowner. In all, US$47,000 was spent on energy-related work at the farm during this demonstration project. Table 2 details the

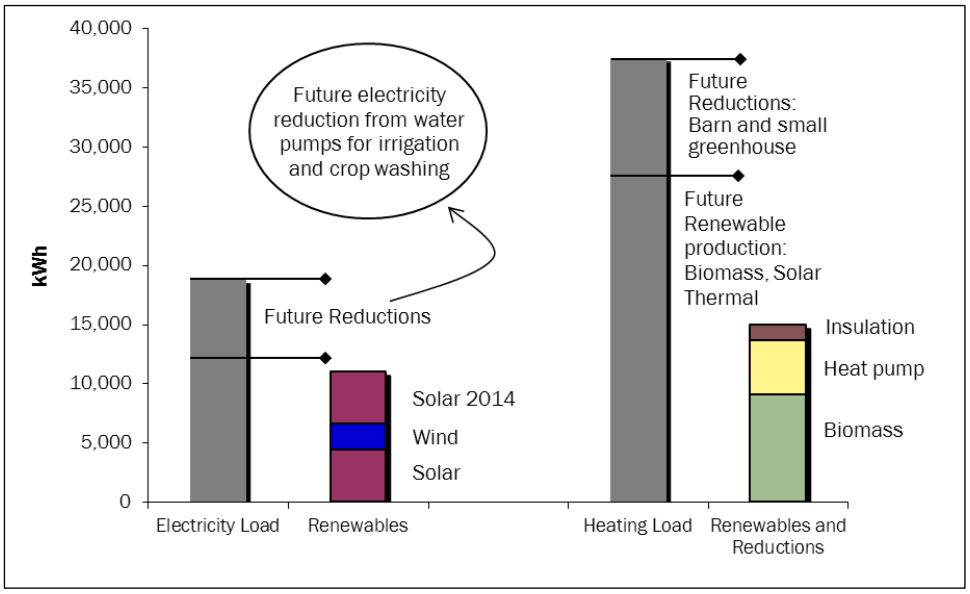
[1] http://www.coa.edu/energy

costs and estimated paybacks of each project. Taking into account efficiency measures, the heat pump, and projected greenhouse heating, the net total heat and electricity consumption of the farm going forward is 37,800 kWh/year. Total renewable energy production on the farm, including solar, wind, and biomass account for nearly 22,200 kWh, or 59 percent of the total energy consumption. The greenhouse gas emissions saved from the culmination of this project are 21,300 lbs. (9,662 kg.) of CO_2e/year.

Although the economic gains from the work will accumulate over time, the outreach and educational values are more immediately evident. Utilizing an incremental approach to migrating to a sustainable energy is beneficial from an educational standpoint as well as an economic one. The renewable-energy project funded internships for college students that allowed them to play a central role in facilitating every aspect of the work. One of the first interns to work on the project describes the internship in a follow-up interview as her first opportunity to work with professionals in the field on a "real" project. Her responsibilities included communicating with vendors to get pricing information, helping to analyze data, and organizing workshops and other related events. The student explained that the experience taught her valuable lessons in communication, creativity, and project-management skills. She had a chance to use her coursework in a hands-on, real-world setting. She noted that the experience taught her how to get things done, which has proved a valuable skill in many of her endeavors since. In addition to going on to be a teaching assistant for both a solar course and a sustainable-energy course at the college, the student proceeded to work on several renewable energy projects within the community and beyond. She dedicated a full term to working within the green business department of the college to further a private-public partnership focused on renewable energy projects for nonprofit organizations. The following summer she completed an internship as a project manager for a solar installation for a local business.

The college is known for its hands-on educational philosophy, and the farm is instrumental in providing real-world experience in farming, science, and now, through this work, energy. Building on the success of the energy demonstration project, and striving to incorporate a growing student interest in real-life, hands-on energy projects, the farm energy work has been incorporated organically into coursework at the college. Over the next three years more energy projects will be implemented through student coursework, internships, and workshop participation, with the goal of making the farm free of fossil fuels. Projects based on data collected as a result of this work will include reducing energy from water pumping for irrigation and vegetable processing, reducing or eliminating heating in the oldest greenhouse, incorporating more solar energy, and utilizing pumped storage. Figure 4 shows the breakdown of renewable energy and efficiency measures, present and future, in relation to heating

Figure 1. Farm Present and Future Energy Demand and Production



and electricity loads.

Rather than simply hiring professionals to do this work, an incremental approach over time allows a multitude of students to gain real experience. In the spring 2013 term offering of "The Math and Physics of Sustainable Energy" course, students performed a term-long investigation of irrigation and water issues at the farm and presented their findings and recommendations to the college administration and area farmers. The fall 2013 "Practicum in Renewable Energy" course will focus exclusively on implementing some of their recommendations as well as laying the groundwork for other components of the farm energy work. With this structure, each new student group or class will have the opportunity to install or implement a shovel-ready task and then investigate and analyze a new topic and lay the groundwork for the next group to implement. Such a format allows students to participate in different stages of project management as well as gain insight into more than one type of project.

Conclusions

The purpose of this project was to demonstrate a variety of conservation and renewable energy measures while transitioning a local organic farm to a sustainable energy portfolio. By implementing and documenting a range of strategies, others are able to have first-hand exposure on how to go about approaching energy-related projects and therefore better plan for making similar investments on an incremental basis. The farm's location and academic affiliation were paramount in effectively reaching a significant number of people with relatively modest resources. The location of the farm and open-book policy enables seasonal tourists and year-round residents to take tours as well as have full access to online data and vendor information.

Rarely is there a one-size-fits-all approach for projects of this nature, and this demonstration is no exception. There are numerous challenges for those who seek to replicate this approach. Each property is unique, with its own set of advantages, disadvantages, needs, and constraints. Determining in which order to approach projects can be time-consuming, as cost and paybacks need to be calculated and weighed against other factors, such as initial capital required and the potential increase in quality of life. An energy auditor can help with this, but that expense will not have an immediate return.

Another challenge is navigating federal and state tax incentives, rebates, and loan programs, which make these projects viable but can be confusing. This is compounded by the fact that the programs and rules can change every few years. Vendors and installers can assist with some of the paperwork involved in recovering state and federal funds, and knowledgeable accountants can help with tax and depreciation incentives.

The energy demonstration project at Beech Hill farm benefited greatly from the close relationship with an academic institution in that the college provided resources, a work force, and knowledge. Given fewer resources, some farms will require a longer time line to accomplish goals of energy sustainability. However, the approach detailed here remains relevant. Gathering baseline data to understand where and how energy is consumed is an essential first step for any sustainable energy project. Determining where to allocate limited resources will always be challenging, but realizing that each endeavor can be thought of in terms of cost, benefits, consequences, and paybacks is a useful frame from which to view options. Finally, implementing projects one system at time, as funds become available, alleviates some of the financial pressure while at that same time providing a clear path forward.

Building on this work, beyond making Beech Hill Farm free of fossil fuels, is to investigate the potential for farmers, small business owners, and individuals to work together, leverage larger purchasing power, and thereby reduce costs. Also of interest is to examine the way in which nonprofit organizations can partner with for-profit entities so that they may benefit from state and federal subsidies. Both of these endeavors build on the basic goal of this project, which was to move toward a more sustainable energy portfolio in a way that is economically viable and offers benefits to the business, the community, and the environment. From a societal perspective, fostering similar projects through public participation, outreach, and education strengthens support for larger renewable

energy projects and helps the public make the human ecological connection between energy-consumption habits and the environment.

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Tradition of healthy food access in low-income neighborhoods: Price and variety of curbside produce vending compared to conventional retailers

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Abstract
This paper describes the longstanding, naturally emergent model of curbside vending of whole fruit and vegetable produce across several low-income, low-health Philadelphia neighborhoods. We conducted open-ended interviews with managers of 11 curbside produce vendors and compared prices and varieties of fruits and vegetables with the 11 closest conventional outlets. We find that produce trucks offer significantly lower prices on common fruit and vegetable items and they carry a variety of items comparable to that carried by limited-assortment grocery stores. We conclude with recommendations regarding zoning, licensing, and Supplemental Nutrition Assistance Program (SNAP) authorization that could stabilize and expand this model of healthy food access.

Keywords
food access, health disparities, mobile vendors, produce, spatial intervention

Introduction
Over recent years, a broad literature has documented and described the nature of urban health disparities, including racial, ethnic, and income disparities in access to healthful foods (Beaulac, Kristjansson, & Cummins, 2009; Bodor, Rice, Farley, Swalm, & Rose, 2010; Treuhaft & Karpyn, 2010). Researchers have quantified negative health outcomes associated with poor access to healthy foods, including high instances of obesity and other diet-related disease (Ingami, Cohen, Finch, & Asch, 2006; Larson, Story, & Nelson, 2009). Moti-

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vated by these findings, a broad range of stakeholders have proposed and implemented numerous responses, including financing for food retailers in underserved areas (e.g., the federal Healthy Food Financing Initiative, Pennsylvania's Fresh Food Financing Initiative, and California's FreshWorks Fund); incentives for existing convenience and corner store retailers to stock more healthful foods (Gittelsohn, Rowan, & Gadhoke, 2012; Laska, Borradaile, Tester, Foster, & Gittlesohn, 2010); and "pop-up" food retail, such as mobile produce trucks and farmers' markets (American Planning Association [APA], 2007; Cannuscio, Weiss, & Asch, 2010; Dunkley, Helling, & Sawicki, 2004; Larsen & Gilliland, 2009; Markowitz, 2010; Raja, Born, & Russell, 2008; Raja, Yin, Roemmich, Ma, Epstein, Yadav, & Ticoalu, 2010; Short, Guthman, & Raskin, 2007). Researchers are beginning to note that small, mobile retailers such as produce trucks and healthy street food vendors may offer better food environment interventions because they require little start-up, can easily target schools and neighborhoods with poor access to healthful foods, and circumvent the need to own real estate (Algert, Agrawal, & Lewis, 2006; Evans et al., 2012; Leggat, Kerker, Nonas, & Marcus, 2012; Tester, Yen, & Laraia, 2010; Yasmeen, 2006).

Thus far, researchers have paid little attention to curbside whole fruit and vegetable produce vendors, which are long-standing traditions in many cities (Bhowmik, 2005; Vallianatos, 2009), despite the fact that many have operated in neighborhoods, including West Philadelphia, for over a decade, many in the same location and regularly used by residents, particularly low-income residents. In a 2010 door-to-door survey about food shopping habits of 514 residents of West and Southwest Philadelphia, 48 percent of participants said they purchased fruits and vegetables from curbside produce vendors. This percentage is comparable to the use of farmers' markets (48.2 percent), and far greater than the use of corner stores (10 percent), co-ops (8.7 percent), community supported agriculture (less than 5 percent), and urban gardens (20 percent) (Karpyn, Tappe, Hillier, Cannuscio, Koprak, & Glanz, in press). Several other studies have referenced the 2008 New York "Green Carts" initiative that allow permits for mobile vendors to sell raw, whole fresh fruit and vegetables in underserved areas of the city. Researchers have found that carts locate on the most trafficked streets (Lucan, Maroko, Shanker, & Jordan, 2011). Produce carts are also thought to increase overall demand for fresh fruits and vegetables (Leggat et al., 2012), though these studies did not document vendors sales, profitability, or prices compared with nearby food outlets.

The purpose of this paper is to (1) describe curbside produce vendors and how they operate in West Philadelphia, and the policies and fees that regulate these small businesses; (2) analyze their location relative to demographic patterns, health outcomes, and other food outlets; and (3) compare the prices and varieties of whole fresh fruits and vegetables between curbside produce vendors and conventional outlets, including full-service supermarkets, limited-assortment grocery stores, and produce stores. We conclude with recommendations regarding zoning, licensing, and Supplemental Nutrition Assistant Program (SNAP) authorization that would help stabilize and expand this long-standing and popular model.

Methods

Identifying Whole-produce Vendors

We acquired a citywide list of fruit and vegetable vendors from the city of Philadelphia Department of Public Health's environmental health division. We chose the area in West Philadelphia defined by six ZIP codes as our study area because it had the highest concentration of curbside vendors. Motivated by previous research identifying the need to verify administrative data about food stores with on-the-ground observations (Lucan, Maroko, Bumol, Torrens, Varona, & Berke, 2013; Rossen, Pollack, & Curriero, 2012), we ground-truthed the list for vendors inside the study area by visiting each site and taking a photograph of what vendors sold. Of the 107 vendors on the city's list in our study area, 12 sold whole fruit and vegetables, 27 sold cut-up fruit salad, and the rest were not at the registered location or sold prepared food and not fresh produce exclusively. We focused on whole-produce vending in this study, and not carts that sell prepared or cut-up fruit. Whole-produce

vending is not considered "street food," which is prepared to eat upon purchase and is comparable to restaurant food. Mobile vendors who sell cut-up fruit salad operate under different licensing, while whole-produce vending mimics the function of and is more readily compared to supermarkets.

Combining our own knowledge of the neighborhood and that of long-term residents with the list from the Department of Public Health, we identified 11 whole-produce, curbside vendors in six ZIP codes in West and Southwest Philadelphia. Using a U.S. Department of Agriculture (USDA) list of all SNAP-authorized vendors, we identified the food outlets (including 4 full-service supermarkets, 3 discount supermarkets, 3 produce stores, and 1 co-op) closest to the whole fruit and vegetable trucks in order to compare prices and variety of fresh produce. We did not include farmers' markets in the comparison because they are not daily, year-round alternatives for produce access.

Study Area

Philadelphia has a vibrant fresh produce supply system. The Port of Philadelphia specializes in importing fresh produce, and the regional transit system moves more food into the Philadelphia region than out of or within it (Delaware Valley Regional Planning Commission, 2011). Philadelphia also has the largest cold-storage produce terminal market in the United States (Marder, 2011; Philadelphia Wholesale Produce Market [PWPM], 2012). The PWPM relocated from its old warehouse, built in 1959, to a new 700,000 square foot (65,000 square meter), cold-storage facility, built in 2011. PWPM houses operations for 26 merchants who set their prices hourly according to fluctuations in USDA food index reports, weather-related ripening, local demand, and personal relationships with buyers (PWPM, 2012). Produce from the PWPM goes to restaurants, smaller grocers, and private individuals. Not all produce sold in Philadelphia, however, flows through the PWPM. Some supermarkets fill their orders at the PWPM, but many also contract directly with wholesale distributors.

The population of the study area is 75 percent Black/African American, 15 percent White, 6 percent Asian, and 1 percent Hispanic (U.S. Census Bureau, 2010). The area has a poverty rate of 28 percent, slightly above the citywide average (U.S. Census Bureau, 2005–2009), and a homeownership rate of 47 percent, substantially lower than the citywide rate of 54 percent (U.S. Census Bureau, 2010). Findings from the 2010 Public Health Management Corporation (PHMC) Community Health Survey (CHS) show that residents in this area are less likely to eat three or more servings of fruits and vegetables per day, more likely to suffer from higher rates of obesity and diabetes, and less likely to be satisfied with the quality of their grocery stores than resident averages for the city and region (see table 1) (PHMC, 2012).

Table 1. Health Indicators for Study Area Versus Citywide and Regional Averages

ZIP Code	Less Than 3 Servings FV/Day	Obesity Prevalence	Diabetes Prevalence	Feel Grocery Quality Is Fair or Poor
19104	49.5%	29.0%	13.6%	24.6%
19131	60.6%	27.9%	14.9%	16.5%
19139	66.3%	46.6%	16.1%	38.4%
19142	78.9%	36.8%	13.9%	36.6%
19143	60.5%	34.0%	15.6%	43.2%
19151	60.0%	29.8%	19.7%	23.0%
Study Area	62.3%	33.9%	15.6%	31.9%
Citywide Average	57.9%	32.1%	13.4%	22.2%
Regional Average	48.6%	26.3%	10.9%	12.8%

Source: Public Health Management Corporation. (2012). Community health data base (2000, 2002, 2004, 2006, 2008, 2010, 2012) Southeastern Pennsylvania Household Health Survey. Retrieved from http://www.chdbdata.org/

Location of Curbside Produce Vendors

We geocoded the location of the 11 curbside produce vendors along with conventional food outlets (supermarkets, limited-assortment grocery stores, corner stores, and produce stores) and farmers' markets using ArcGIS 10.1. The list of food outlets was based on a list of all SNAP-authorized vendors and was ground-truthed for a USDA-funded study on food shopping and physical activity (Hillier, Cannuscio, Griffin, Thomas, & Glanz, 2012). Vendors were mapped relative to census tract–level rates of household participation in SNAP within the study area using data from the 2006–2010 American Community Survey. We conducted a spatial join between the curbside produce vendors and conventional outlets to identify the closest conventional outlet to each curbside produce vendor.

We created a 0.25-mile (0.4 km) buffer around the 11 vendors and 11 food outlets in order to consider the immediate surroundings of vendors and supermarkets. This distance was chosen to allow the buffer to incorporate the area immediately around the vendor, even if he or she was located at the intersection of several census tracts. We conducted a spatial join in ArcGIS 10.1 to connect these buffers to underlying SNAP participation rates by census tract; buffers that included more than one census tract were assigned an area-weighted average. Every buffer provides a very general idea of surrounding neighborhood characteristics, enabling some comparison of mobile vendor locations versus conventional supermarket retailers.

Manager Interviews

We visited each truck vendor in July 2012 and conducted an informal interview with the manager. The manager was asked about days and hours of operation, staffing, location, years of operation, source of produce sold, whether the business was authorized to accept SNAP, and barriers to maintaining and expanding the business. Managers were also asked about their country of birth.

License and Regulations

There is no single source for citywide licensing and regulations surrounding whole-produce curbside vending. Researchers scanned multiple city websites pertaining to health and zoning ordinances and verified their findings with city officials.

Price and Variety Inventories

To compare price and variety stability, we conducted the produce inventory at the whole fruit and vegetable vendors and conventional outlets in July 2012 (T1) and September 2012 (T2). To limit temporal and weather-related variability, the inventory and price of produce from trucks were compared with that of the 11 supermarkets within the same week. We used the following culinary categories to organize the varieties of produce identified through our inventory: squash, leafy green vegetables, tomatoes, green vegetables, peppers, root vegetables, citrus, melon, tree fruit, tropical fruit, grapes, berries, and herbs (see the appendix for a list of specific produce items included in each category). We conducted pricing surveys at TI and T2 for only the most common produce varieties in each of the culinary categories that also map onto USDA fruit and vegetable categories (dark greens: cucumbers; red/orange vegetables: sweet potato; starchy: bananas; other vegetables: cabbage; berries: blueberries; melons: cantaloupe; and other fruit: navel oranges). The USDA produce categories are commonly used in public health literature, and by including them in our study we hope to make this novel methods approach more translatable and transferable (USDA, n.d.a , n.d.b).

We compared prices between and among produce trucks and conventional outlets at T1 and T2. To standardize fruit and vegetable prices, we used the USDA nutrient database for conversion factors for the number of fruits or vegetables in a pound.[1] We used standardized one-tailed paired t-tests assuming unequal variance to test for significant differences between prices for each outlet at T1 and T2. We used a two-tailed t-test for independent groups to compare average prices and varieties by fruit and vegetable category across curbside produce vendors and conventional outlets. This research protocol was approved by the University of Pennsylvania Internal Review Board.

[1] See http://www.nal.usda.gov/fnic/foodcomp/search

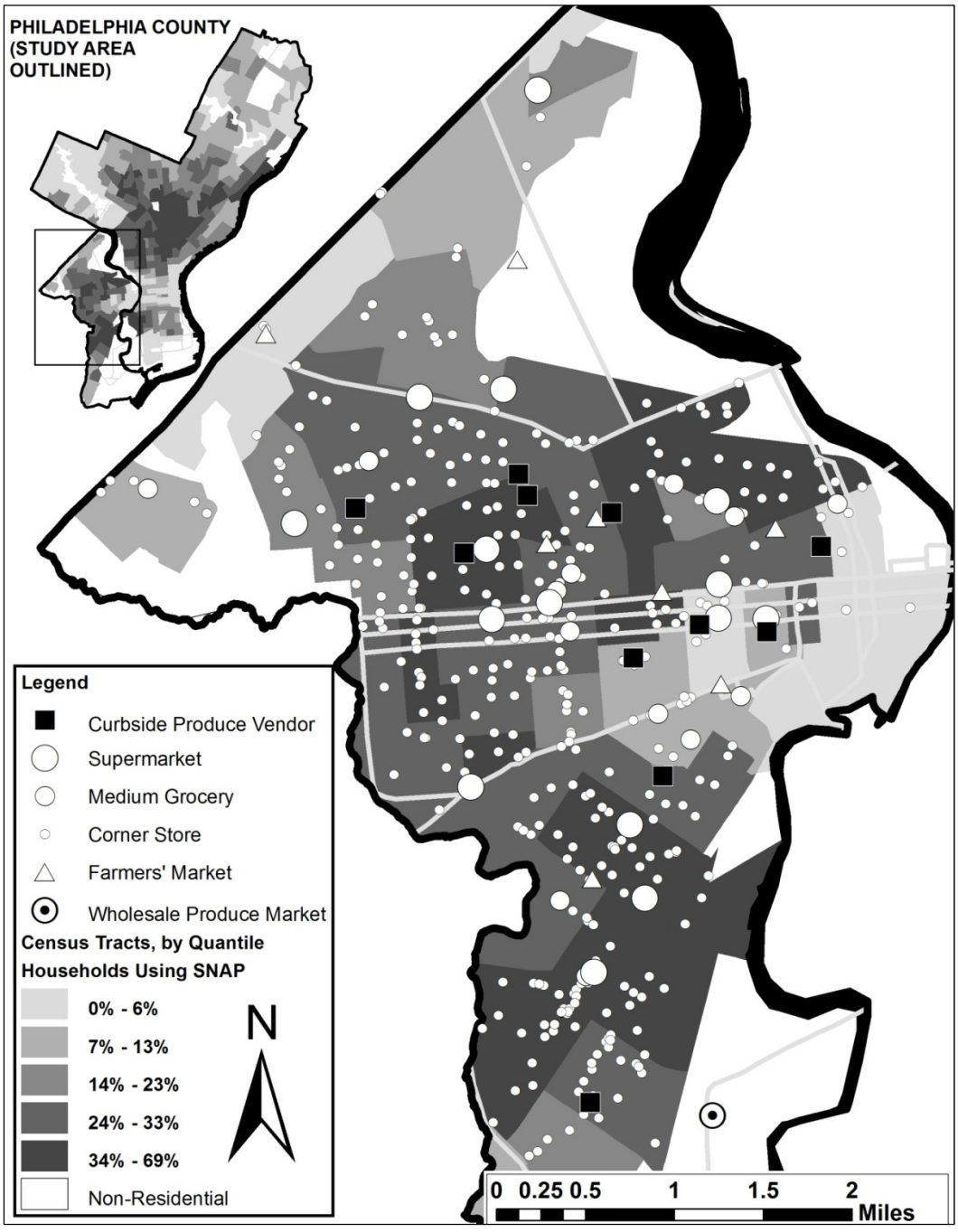
Findings

Location of Curbside Produce Vendors

The study area included 330 SNAP-authorized food outlets, including 10 chain convenience stores, six chain pharmacies, seven full-service chain supermarkets, nine limited-assortment grocery stores, 13 dollar stores, 15 medium-sized independent grocery stores, and 270 corner stores. Many of the curbside whole-produce vendors were located within a few blocks of a supermarket (see map 1).

Many vendors are located next to a

Map 1. Location of Curbside Produce Trucks Relative to Conventional Outlets, with Median SNAP Usage By Census Tract



supermarket. Three vendors are currently located less than a block from a supermarket, and two operate in a location where a supermarket opened within three blocks during their tenure. The four produce trucks that are not located near supermarkets are located on commercial arterials (see map 1). On average, vendors were located 0.41 miles (0.66 km) away (standard deviation ± 0.22 miles or 0.35 km) from a conventional supermarket, with a maximum distance of 0.78 miles (1.26 km). Additionally, vendors were located an average of 0.60 miles (1.0 km) away from their nearest curbside produce vendor competitor (std. dev. ± 0.50 mile or 0.8 km, nearly the same as the average distance between supermarkets within the study area (0.57 miles or 0.92 km, std. dev. ± 0.42 miles or 0.68 km). Because curbside produce vendors were located so close to other food outlets, there was little difference in neighborhood-level SNAP participation. The average percent of SNAP-participating households within a quarter mile (0.4 km) of curbside produce vendors was found to be 25.5; for supermarkets, the figure was highly comparable, 26.3 percent.

Curbside Model

Most of the curbside produce vendors within the study area operate from the back of a single stationary box truck, as shown in figure 1. As shown in figure 1 at left, auxiliary wooden stands were set up on the sidewalk for all but two of the produce trucks. Two operators use only the auxiliary stand, and two operators have multiple auxiliary stands (figure 1, at right). Typically, produce is displayed in crates and often bagged on site to be sold in US$1.00 units. Most operators use vans to deliver produce from the PWPM to these stationary curbside operations; the tires of the box truck are often deflated. When the produce vendors are not open, operators close and padlock the metal lift gate on the back of the truck and empty the stands. The newest curbside produce vendor, the West Philadelphia Food Hub (WPFH), is the primary exception in how it operates. Rather than a box truck, WPFH uses a mobile ice cream car, moving to different scheduled locations on different days. It is also sells eggs, milk, bread, and a limited amount of dry goods (Taurino, 2012).

Survey Responses

Ten of the produce trucks were open 6 or 7 days a week, roughly from 9 am to 8 pm. None of the trucks post hours of operation. Eight of the trucks were managed by African immigrants, from Mali, Eritrea, and the Ivory Cost. One was managed by a Vietnamese immigrant, and the other two were managed by people who were U.S.-born. All of the vendors are male and bought the majority of their produce from the PWPM, with the exception of the WPFH, which purchases food from local farms.

Figure 1. Examples of Two Curbside Produce Vendors

The left image shows auxiliary wooden display units outside the box truck. The right image shows a consumer view into the truck. Photo credit: Catherine Brinkley.

Most operations employed one full-time and one part-time worker. Managers estimated profits at US$150–US$200 daily, though most managers emphasized the uneven nature of the fresh produce business by noting that they may operate at a loss for weeks if the weather is hot and food spoils. Sales are also influenced by the time of month that customers receive their paychecks and SNAP or other food benefits.

While most vendors had moved their location over their first years to find a busy street, the majority of trucks had occupied their current location for over 15 years, with some in continual operation in the same location for as much as 40 years. The more established vendors emphasized that they were dependent on word-of-mouth and community relations for their success. While we did not systematically analyze who was shopping at the trucks, it was apparent that managers knew many of their customers. Vendors reported offering informal credit lines to customers, leaving spoiled produce for neighbors to make smoothies or compost, and donating food to neighborhood functions such as block parties.

The relationship to nearby supermarkets is tenuous. Vendors indicated a preference for locating near a supermarket so that customers who are already food shopping can also do business with them. At the same time, two vendors said they were forced to move away from a supermarket due to zoning litigation and a nuisance petition believed to have been started by supermarket management. In one situation, the vendor explained that he opened in a location where a supermarket had closed. When another supermarket chain bought the property two years later, the new owners used a nuisance petition to force the curbside vendor to relocate. The vendor estimates that he lost 60 percent of his business due to the relocation and indicated that other produce vendors had faced similar relocation mandates and lost business. Several other vendors described facing similar issues with real estate developers. Some hired attorneys and were able to stay in the contested location, but at least two were forced to move to less favorable locations. At least two other produce trucks (not included in this study) went out of business altogether after relocating. Vendors complained about these conflicts with supermarkets and developers. As one vending manager noted, "It's not like I'm standing on the corner selling cocaine. I'm selling fresh fruits and vegetables."

At the same time, whole fruit and vegetable vendors remain solvent while some neighborhood supermarkets close. Two vendors currently operate in a location where a supermarket closed during their tenure. When a grocery store near one vendor closed, he lost business due to a decrease in foot and car traffic, yet his business continued.

While whole-produce vendors emphasized the daily hardship of managing a business that is subject to variable produce pricing, weather, and personal relationships with sellers and buyers, most thought that the new PWPM improved their business and the city regulations, licensure and inspection did not hinder their operations. They agreed that the new PWPM had a better facility with better produce, but this ultimately drove up the final cost of their inventory.

Six of the produce trucks are authorized to accept SNAP benefits, redeemed with customers' Electronic Benefit Transfer (EBT) cards, which operate functionally as a debit account. Vendors indicated that being able to accept SNAP had an impact on their business, with one noting that nearly 80 percent of the business during the previous summer came through SNAP, while another estimated that US$100,000 annually came from SNAP sales. Two other vendors reported that they had applied for SNAP authorization and the wireless system required to accept SNAP benefits, although they were unlikely to use it because the monthly transaction fees would be financially burdensome. Currently, SNAP provides support for wireless transaction services to supermarkets and retailers with landline access, but most curbside or mobile vendors do not have an occupancy license to run a landline to their business location.

Mobile Produce Vending Policy Framework

As part of the Get Healthy Philly initiative funded through the Centers for Disease Control and Prevention (CDC), the city of Philadelphia Health Department has been reviewing and revising the permitting process for stationary food businesses and mobile vending (Department of Public Health,

City of Philadelphia, n.d.). At present, the annual permitting fees for running a wholesale produce truck are between US$570 and US$3,570, not including the cost of fuel, overhead maintenance of the site, and salaries (table 2). According to city code (Philadelphia City Code Regulating Street Vendors, §9-203), all street vendors are required to be licensed by the Department of Licenses and Inspections contingent on compliance with the provisions of Title 6 (Health Code). Trucks must present to an inspection station during designated times and days for license renewal, which carries a US$150 fee. The health department requires a health department vendor ID# (US$650 for filing and US$190 for inspection). This is included in the US$340 annual food license application, contingent upon a US$50 annual Philadelphia business privilege license (which requires a federal employer identification number, a city of Philadelphia tax account number, and a Pennsylvania state sales and use tax number) and a license eligibility report issued by the health department. Alternatively, vendors may obtain a one-time business privilege license for US$300. The food license application requires a one-time department of health plan review with a US$65 filing fee, US$190 submission fee, and a US$150 mobile vending fee. All food handling requires that an individual with a valid city of Philadelphia food establishment personnel food safety certificate (initial issuance fee of US$30, annual replacement fee of US$50) contingent upon presenting the copy of licensure from an approved commissary or service support facility that has passed inspection. Produce trucks must also conform to all applicable local or state agency codes or requirements, such as those from the state of Pennsylvania Department of Labor and Industry, state Department of Environmental Protection, state Liquor Control Board, and Philadelphia zoning, building or plumbing codes.

Multiple sections (§ 9–205) of the city are off-limits to street vendors, or limited to a few vendors who pay an additional annual fee of US$3,000 to operate in special districts or US$300 to operate in neighborhood vending districts. The regulations also have provisions for the size of auxiliary carts (shall not exceed four feet [1.2 m] in width, eight feet [2.4 m] in length and eight feet [2.4 m] in height) and do not allow vending between midnight and 7:00 a.m. Our study did not investigate how vendors become aware of these regulations or the extent of compliance.

Price and Variety Comparison

The 11 curbside produce vendors offered between 18 and 71 different varieties of fresh produce (mean = 35 varieties, std. dev. = 19). On average, the produce trucks offered 21 varieties of vegetables (± 12) and 19 varieties of fruit (± 11). All of the curbside vendors offered cucumber, tomato, navel orange, apple, and potato. Eight of the 11 curbside produce vendors offered cabbage, lemon, lime, banana, peach, plum, grape, mango, garlic, carrot, sweet potato, yellow onion, and peanut. Most items sold in units for US$1.00, and the most expensive item, watermelon (US$4.00–6.50), also had the largest price range among produce trucks.

Using the USDA's vegetable and fruit categories, we chose the most common variety sold at the curbside produce vendors in each category on which to base our price comparison. Selected food items ranged from staple market-basket options such as navel oranges to blueberries and cantaloupe, which are more expensive and therefore potentially more illustrative of price differentials.

A paired t-test comparing varieties and prices at T1 and T2 at each of the 11 produce trucks and 11 conventional outlets showed no significant difference across time; subsequent prices and

Table 2. Annual Fees and Permits for Curbside Whole-Produce Vendors

Permit	Fee (all US$)
Food license from the Department of Licenses and Inspections	$150
Health Department approval for food license	$340
Philadelphia business privilege license (commercial activity license)	$300 lifetime or $50/year
City of Philadelphia food establishment personnel food safety certificate	$30
Special district or neighborhood vending fee	$300–3,000

Table 3. Varieties of Fruit and Vegetables by Outlet Type

	Co-op (n = 1)	Discount Supermarket (n = 3)		WPFH Truck (n = 1)	Curbside Truck (n = 10)		Produce Store (n = 3)		Supermarket (n = 4)		All Outlets	
		Mean	Std. Dev.		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Squash	3	1.0	1.00	3	0.6	0.70	1.7	2.08	6.3	0.96	2.0	2.34
Green Vegetable	10	4.0	1.73	3	4.2	2.78	6.3	6.66	9.8	1.50	5.7	3.75
Tomato	4	2.7	1.53	1	1.7	0.67	2.3	1.53	5.0	0.82	2.6	1.56
Pepper	3	3.3	0.58	1	1.9	1.73	4.3	1.53	6.8	1.71	3.3	2.36
Leafy Greens	6	2.7	2.08	3	1.2	1.03	2.7	3.79	8.0	2.16	3.1	3.11
Lettuce	6	2.7	1.15	0	1.7	1.25	6.3	6.66	10.5	3.00	4.2	4.34
Mushroom	5	1.7	1.53	1	0.6	0.84	1.3	2.31	6.3	3.77	2.1	2.83
Root Vegetable	6	2.0	1.00	4	2.9	2.08	2.3	3.21	6.0	1.83	3.5	2.36
Sweet Potato/Yam	4	4.0	1.73	3	2.1	1.29	3.0	1.00	6.0	1.63	3.3	1.91
Onion	5	2.7	1.15	2	3.0	1.89	2.3	0.58	7.0	2.94	3.6	2.42
Citrus Fruit	5	3.0	1.00	2	2.9	0.57	3.3	1.53	6.5	0.58	3.7	1.62
Apple	4	3.0	1.00	2	2.8	1.55	3.3	1.53	8.8	0.96	4.0	2.62
Other Tree Fruits	10	3.7	0.58	2	2.5	1.27	4.7	6.35	8.8	4.27	4.4	3.79
Tropical Fruit	6	2.3	1.15	2	3.7	2.00	4.3	1.53	6.5	1.91	4.1	2.14
Grape/Cherry	3	3.0	0.00	1	1.6	1.17	2.7	1.53	4.8	0.50	2.5	1.53
Berry	3	2.0	0.00	0	1.6	1.35	1.7	0.58	3.0	1.41	1.9	1.27
Melon	3	3.0	1.00	0	1.4	0.97	3.0	1.00	3.8	0.50	2.3	1.35
Herb	2	0.0	0.00	2	0.6	1.26	0.3	0.58	1.8	2.87	0.8	1.53
Total Vegetable	54	26.7	10.07	23	20.5	12.13	33.0	28.58	73.3	17.06	34.3	24.59
Total Fruit	34	20.0	3.61	9	16.5	6.22	23.0	12.77	42.0	6.16	23.0	12.00
Total Fruit and Vegetable	92	48.7	14.64	33	38.3	18.62	58.7	42.91	118.8	22.77	59.3	37.44

variety comparisons were based on T1 data only.

The number of varieties offered at curbside produce vendors was significantly less than that offered at all food outlets ($p < 0.05$) for all culinary categories except root vegetables, tropical fruits, berries, and herbs. When conventional outlets were subdivided into categories, curbside vendors were shown to offer a similar number of varieties of fruits and vegetables as limited-discount supermarkets (tables 3 and 4).

While the curbside produce vendors had fewer varieties of fruits and vegetables, they offered lower prices and less price variance than conventional outlets for all items except cantaloupe. Prices for cucumber, navel orange and sweet

Table 4. Comparison of Prices Between Fruit and Vegetable Trucks and Supermarkets

Pricing Unit	Outlet Type	N	Mean	Std. Dev.
Per Cucumber	Curbside Truck	11	$0.37	(0.14)
	Conventional	11	$0.73	(0.71)
Per Cantaloupe	Curbside Truck	7	$2.18	(0.72)
	Conventional	11	$1.73	(0.50)
Per Cabbage	Curbside Truck	8	$1.09	(0.27)
	Conventional	11	$1.03	(0.38)
Per Pound Sweet Potato	Curbside Truck	9	$0.35	(0.12)**
	Conventional	9	$0.86	(0.25)**
Per Granny Smith Apple	Curbside Truck	4	$0.33	(0.12)
	Conventional	6	$0.44	(0.17)
Per Navel Orange	Curbside Truck	10	$0.33	(0.08)**
	Conventional	10	$0.50	(0.21)**
Per Banana	Curbside Truck	11	$0.51	(0.17)*
	Conventional	11	$0.67	(0.18)*
Per Pint Blueberries	Curbside Truck	7	$1.89	(0.67)**
	Conventional	7	$3.71	(1.34)**

* marginally significant at $p < 0.06$ ** significant at $p < 0.05$

potato were significantly lower at the $p < 0.05$ level and marginally significant at the $p < 0.06$ level for bananas (table 4).

Discussion

This study demonstrates that curbside produce vendors successfully supply a range of whole fruits and vegetables in a predominantly low- and middle-income African American section of Philadelphia at prices lower than conventional food outlets. Other commonly cited interventions such as mobile farmers' markets (e.g., Markowitz, 2010) may not offer the same low prices as these naturally emergent produce trucks, which are not a result of specific healthy food policy initiatives. Curbside vendors, unlike regional or national supermarket chains, cater to neighborhood shopping preferences. To this end, curbside produce vendors offer some unusual food items, such as sugar cane and aloe, which are not commonly sold in supermarkets and may be carried in order to match neighborhood cultural culinary tastes. Moreover, because the majority of produce trucks have operated as stable and profitable businesses for decades and survived where neighborhood supermarkets have closed, they may present a viable long-term solution for providing low-income neighborhoods with fresh produce.

This neighborhood-based phenomenon of curbside, immigrant-run, low-cost, fresh whole fruit and vegetable vending in low-income neighborhoods is neither well documented in the literature nor prescribed in policy for improving healthy food access. This research gap may cause public officials, advocates, and researchers to overlook low-cost, sustainable approaches to improve neighborhood health. Some researchers caution that forcing supermarkets into neighborhoods that cannot support viable financial outcomes is not a sustainable development policy and that corporate supermarket chains displace local food retailers (Boarnet, Crane, Chatman, & Manville, 2005; Dixon, Omwega, Friel, Burns, Donati, & Carlisle, 2007; Short et al., 2007). Thus alternative tools for improving access to fresh food should be also explored and developed.

Planning instruments, including municipal-level policies, health regulations, and zoning codes, can all be used to promote healthy food environments (Tester, Stevens, Yen, & Laraia, 2010). In order to reduce the health burden of easy access to cheap, unhealthful foods, some cities have pioneered using zoning ordinances to restrict fast food outlets (Ashe, Jernigan, Kline, & Galaz, 2003; Black, Macinko, Dixon, & Fryer, 2010). Alternatively, New York City has had success with promotion of small, mobile, curbside healthful food vending in "underserved" neighborhoods (Leggat et al., 2012). In many other cities around the world, curbside vendors service a large portion of the urban population and in particular reach the urban poor through the sale of low-cost foods (Bhowmik, 2005). For this reason, planning policies to encourage low-cost healthful food are not without precedent and stand to further encourage sustainable small businesses like curbside produce vendors.

Barriers to Curbside Produce Operations

Curbside produce vendors listed land use regulations and SNAP accessibility as challenges to their business model. Despite the many steps and fees involved in city permitting, none of the vendors we interviewed identified the permitting process as an impediment to their operations. That said, we noticed that one vendor was closed for several weeks during the study period due to a wait for a scheduled health inspection, resulting in a loss of business. Also, the fact that operating vendors seemed comfortable with existing regulations does not account for the fact that the regulations may dissuade others from opening new mobile businesses. The degree to which citywide permitting processes can be streamlined may help vendors even if they do not see permitting as a major obstacle compared to land use rights and SNAP access. Regulations to protect or clarify the rights of curbside vendors within existing zoning districts would provide these small businesses with additional security to compete with bricks-and-mortar retailers.

Vendors without landline telephone access were chiefly concerned with wireless SNAP/EBT access and transaction fees. Past research in the same neighborhood has found that providing farmers' market vendors with individual wireless point-of-sale (POS) terminals and subsidizing EBT

fees increased SNAP/EBT purchases by 38 percent (Buttenheim, Havassy, Fang, Glyn, & Karpyn, 2012). This opportunity, along with outreach, offers an easy policy intervention to make vendors aware of local grants and other options. The newest curbside produce vendor, West Philadelphia's Fresh Food Hub, has made use of these opportunities through its connections to nonprofit groups such as Greensgrow Farms, urban agriculture organizations like the Urban Garden Initiative, and the Philadelphia Health Department (Taurino, 2012).

Social networks are important for vendor relationships with customers, suppliers, and each other. Many vendors emphasized that their relationships with sellers at the PWPM are key to obtaining low-cost produce. The informal relationships between vendors and neighborhood consumers through informal credit lines may also positively influence customer reliability and loyalty. It is this network of customers that is lost when vendors are forced to relocate, usually harming their business. With the exception of the newest produce truck, all the vendors knew each other and several were related. It is not uncommon for street vendors to rely solely on social networks for raising capital (Bhowmik, 2005; Devlin, 2011), but access to formal credit lines and government programs could greatly aid in scaling up this model. To this end, vendor-to-vendor social networks may play a key role in sustaining these businesses, particularly if vendors pool assets and share costs for produce purchases and delivery. That WPFH garnered public and private financial support where the other vendors did not points to limitations in the established vendor network. Financial backers interested in fresh food may wish to examine whether there is already an established network of produce vending in operation before re-creating a similar, higher cost model (see table 3).

We suggest that the current supply of curbside produce vendors is limited by the ability of vendors to operate. When asked about business constraints, vendors pointed to logistical and facilities issues, not the size of their customer base. Vendors are limited by what equipment they can afford and maintain, as well as permitting and other nuisance regulations. One could speculate that streamlining or easing logistical and regulatory challenges would increase the prevalence of produce trucks across the city, and thus the availability of low-cost fresh fruits and vegetables.

Future Studies

With this study, we would like to issue a national call for cases of curbside whole-produce vending in other cities to ascertain the extent of this model and any case similarities. Collaborating researchers could replicate the methods in this study to ascertain model variance and extent. For example, do central wholesale produce terminals play an important role nationally in supporting these models? Do vendors tend to be related in other cities? Are price differentials between curbside and conventional retailers found in other cases?

In deepening the potential implications of this model, we propose to assess shopping habits and health differentials in the customer base for conventional markets and curbside produce markets. There is already extensive literature that supports the notion that store type can influence shopping habits and subsequent health outcomes in customers. If curbside produce vending is found to increase produce purchases or correlate with lower diet-related disease risk, it would merit policies to fast-track adoption of this model.

Last, we hope to undertake an ethnographic study on the origin of the curbside model in West Philadelphia and modes of business start-up for new vendors. This research would elucidate the importance of familial relationships in sustaining the model and may also give insight into how to scale up or transfer this vending model.

Conclusion

Curbside produce trucks emerged as an immigrant-run, long-standing business model in a low-income area of Philadelphia with poor health outcomes, and they offer lower cost fruits and vegetables when compared to supermarket outlets. Critical success factors for produce truck vendors are supportive city land use codes that allow curbside vending, a central wholesale produce market, and a network of personal relations with vendors, suppliers, and consumers. Because nearly all of the curbside produce vendors buy from the PWPM, a

central market appears to be fundamental in small-scale, low-cost fresh produce wholesale. For policy transferability, policy-makers should consider whether their city has a centralized market for fresh produce and already has a network of vendors operating on this model.

Anecdotal evidence suggests that many cities have similar curbside produce vending models. The methods in this paper lend themselves to a comparative study across cities. Additional follow-up studies should examine the health impacts on consumers of curbside produce vending to see if fruit and vegetable intake is influenced, grocery costs decreased, or overall health improved; the findings of such studies could have implications for future policies affecting produce vendors.

Based on these findings, we offer several policy recommendations. Though they are context-specific to Philadelphia, we believe that the model, and thus the recommendations, may hold relevance beyond our study area.

Policy Recommendations

- Supply vendors with wireless SNAP/EBT access and subsidize transaction fees. The ability to redeem food assistance benefits is a critical factor for many customers; lowering barriers to EBT access will support both vendors and their customer base.
- Review land use controls and ensure protection for curbside produce vendors. Clearly delineated areas where produce vending can occur as-of-right give greater legitimacy to vendors and may decrease the risk of nuisance complaints.
- Conduct outreach to support truck maintenance, insulation or cooling, and facilitate inspection on-site. High capital costs may prevent vendors from upgrading or adequately maintaining their vital equipment, and knowledge of new funding sources and grants, like those made available to the Food Hub truck, could benefit many vendors.

The long-standing tradition of produce trucks in Philadelphia indicates that curbside whole-produce vending is a low-cost, entrepreneurial market-based response for broadening fresh food access in low-income, low-health neighborhoods. This model is unique for its responsiveness to community needs and preferences, flexibility, and economic sustainability. Curbside produce models could be a cost-effective, neighborhood-targeted, bottom-up method of delivering fresh fruits and vegetables in other communities, and may also play an important role in the fight against nutrition-related disease.

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Appendix. Culinary Categories of Fruits and Vegetables

Culinary Category	Item
Squash	Eggplant
	Cauliflower
	Corn
	Yellow Squash
	Zucchini
	Patty Pom (Artisan Squash)
	Jamaican Pumpkin
Green Vegetable	Cucumber
	Broccoli
	Okra
	String Bean
	Avocado
	Asparagus
	Celery
	Chuchu
	Green Peanut
	Peanut, Salted/Roasted
Tomato	Tomato
	Roma Tomato
	Cherry Tomato
	Yellow Tomato
	Grape Tomato
Pepper	Habanera Pepper (Orange)
	Habanera Pepper (Green)
	Jalapeno
	Green Pepper
	Red Pepper
Leafy Green	Mustard Green
	Kale
	Collard
	Lettuce Head
	Spinach
	Mixed Greens
	Romaine Lettuce
	Cabbage Head

Culinary Category	Item
Root Vegetable	Baby Portobello
	White Button Mushrooms
	Garlic Scape
	Garlic Clove
	Garlic Sleeve
	Baby Carrot
	Carrot
	Beets
	Redo
	Iata
	Turnip
	Yellow Yam
	White Yam
	Sweet Potato
	Potato
	Red Potato
	Yucca/Cassava
	Large White Onion
	Small White Onion
	Yellow Onion
	Red Onion
	Scallion Bunch
	Daikon
	Ginger
	Leek
Citrus	Navel Orange
	Grapefruit
	Clementine
	Lemon
	Lime
Tropical	Kiwi
	Plantain
	Banana
	Papaya
	Tomasina Mango
	Champagne Mango
	Mango
	Pineapple
	Coconut

Culinary Category	Item
Tree Fruit	Nectarine
	Apricot
	Peach
	Gala Apple
	Small Golden Apple
	Fuji Apple
	Pink Lady Apple
	Macintosh Apple
	Golden Delicious Apple
	Red Delicious Apple
	Granny Smith Apple
	Bosc Pear
	Plum
	Small Plum
	Cherry
Grape	Green Grape
	Black Grape
	Red Grape
Berry	Strawberry
	Raspberry
	Blackberry
	Blueberry
Melon	Watermelon
	Honeydew
	Cantaloupe
Herb	Thyme
	Basil
	Cilantro
	Rosemary
	Parsley

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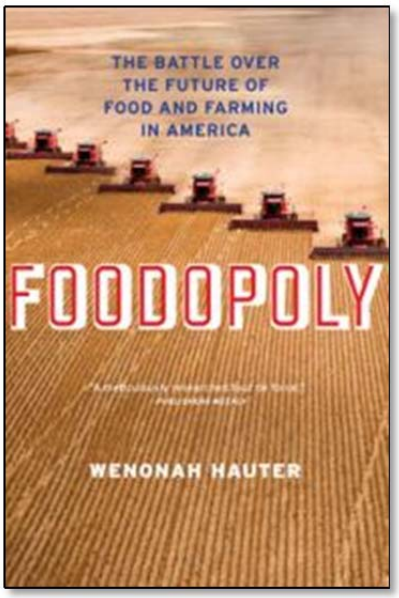
Concentration, consolidation, and control: How big business dominates the food system

Book review by Steven Dukeshire, Dalhousie University



Foodopoly: The Battle Over the Future of Food and Farming in America

Hauter, W. (2013). *Foodopoly: The battle over the future of food and farming in America.* New York: The New Press.

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Foodopoly, a meticulously researched book by Wenonah Hauter, is primarily a case study focused on a single country that traces the historical and political changes that have transformed the food system. The book highlights how business and political elites have altered regulatory and business institutions to create the conditions whereby large food conglomerates can operate unfettered, and with the aid of a government seemingly interested in serving business over public interests. Inevitably, as has happened in so many other countries, and as detailed in *Foodopoly,* the result of this shift to a globalized food system has had many detrimental impacts. These now all-too-familiar negative consequences of globalization include farmers being driven off their land, exploitation of workers in factories with dismal working conditions, environmental degradation due to weakening laws and limited enforcement, and questionable food safety and animal welfare practices. However, what grabs one's attention in *Foodopoly* is that this case study is not based on a small, developing nation, but rather on the United States of America, the bastion of capitalism and champion of globalization. *Foodopoly* effectively points out that the United States is not immune to the negative impacts of globalization and sounds the alarm that the health and sustainability of the country's food system are under threat.

It is clear from the beginning of the book what Hauter's position is on the current food system. She believes that consolidation and concentration has undermined food policy, fostered an unsafe and unsustainable production and distribution system, and led to the demise of the family farm.

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The body of the book is a riveting account of how business and political forces combined to use their power to reshape the food system to favor a few corporate elites at the expense of both the social and physical environments. The final chapters suggest a way forward, but lack the intensity of the main narrative. For although Hauter correctly asserts that change needs to happen at the policy level, the reader is left wondering what role she or he can play to effect the required policy reforms.

The first three chapters of *Foodopoly* describe how a disorganized and fractured food production and distribution system became organized and (seemingly) far more efficient. These chapters provide a fascinating study of how the largest food retailers, led by Walmart, have created conditions to force increased food efficiency throughout the entire food chain. If one stopped reading after just the first three chapters, one would come away with the impression that but for a few minor problems, we now have a much improved food system with far-reaching benefits to the consumer.

Any impressions that consolidation of the food system has been largely beneficial to individual consumers and society as a whole are quickly dispelled in subsequent chapters. In general, the best chapters of *Foodopoly* are those that compare practices in the current food system to practices that had existed previously. These contrasts bring to the foreground the problems of an agri-food model based on concentration and consolidation. In chapter 5, Hauter presents the contradictions and consequences that emerge from the principles and philosophies of a highly capitalistic mode of food production subsuming the higher ideals characteristic of organic farming. In short, the introduction of national organic standards in 1997 meant that large companies could essentially take over the organic industry by meeting these minimum production standards while ignoring all the other ideals and values of the organic movement. The absurdity of the paradox of huge corporations meeting the principles and ideals of organic food production is perhaps best captured by Hauter's description of the goals and activities of the Organic Trade Association (OTA). The OTA is controlled not by small organic farmers, but by multimillion-dollar food companies actively lobbying to (further) reduce organic standards. Fifteen years after the introduction of national organic standards, the U.S. is now left with an organic food industry that is being led and formed mainly by capitalist principles rather than the promotion of socially, economically, and ecologically just food production.

Hauter also meticulously documents how industry has effectively altered rules, regulations, and enforcement to create an environment friendly to food businesses. In a thoroughly compelling manner, Hauter brings to the fore the immense political power of the food industry and how that political power is wielded within the neoliberal ideology of the U.S. government to minimize any regulations that may inhibit business or the acquisition of profit. For example, chapter 6 describes in detail the implementation of the Hazard Analysis and Critical Control Points system (HACCP), a system and philosophy that essentially allowed the meat processing industry to become self-regulatory and do away with government inspectors regulating the production line. As a result, food that previously would have been removed by inspectors is now allowed to continue through the processing line. This change has resulted in the processing rather than removal of meat with feces contamination, oozing wounds, tumors, and other undesirable features. Such processing is justified through the use of the HACCP system that supposedly addresses these safety and quality issues through various technological means to remove sources of contamination, including the routine use of ammonia, chlorine, trisodium phosphate, and irradiation as the meat progresses through the processing line. The result of HACCP, according to Hauter, has been the removal of virtually all oversight by government inspectors, less humane treatment of animals, increasingly dangerous working conditions, the loss of smaller meat processors, and a lowered quality and safety of food.

Hauter does much more than just point out the problems and issues presented by a globalized food system in the United States. In essence, *Foodopoly* lays out the case that American democracy is being subverted by powerful corporate interests that control important government decisions. What makes *Foodopoly* so powerful is that

Hauter clearly and concisely demonstrates the mechanisms by which this corporate influence is wielded. Further, by revealing the contradictions of a food system that promotes itself as vastly superior in every respect, Hauter raises the specter that the current globalized food system is actually inefficient and in many ways harmful to people, animals, environment, and society as a whole. She not only lifts a veil of secrecy regarding business practices of actors in the food industry, but also places food system consolidation and its impacts in historical and political context. As a result, *Foodopoly* is not just a captivating read, but also a potential tool in the arsenal of those who wish to create a more sustainable and humane food system.