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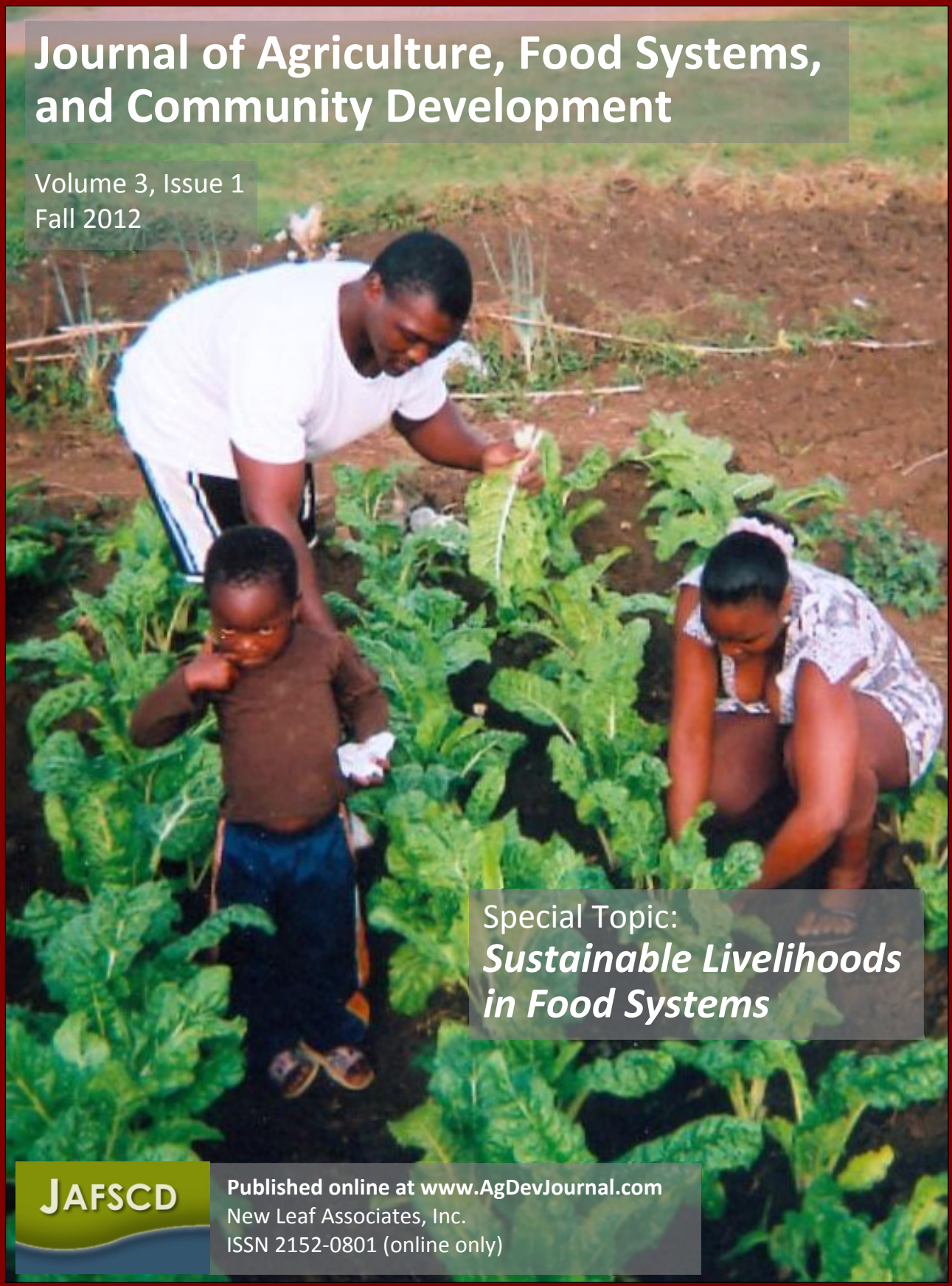

Special Topic:
Sustainable Livelihoods in Food Systems

JAFSCD

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Contents / Volume 3, Issue 1 / Fall 2012

On the cover: A family works together harvesting spinach in a roadside garden plot in KwaMashu, Durban, South Africa, in a photo from the forthcoming paper *Challenges and Strategies Among the Poor: Focus on Urban Agriculture in KwaMashu, Durban, South Africa* by Hangwelani Hope Magidimisha (Human Sciences Research Council, South Africa) and Lovemore Chipungu and Rosemary Awuor-Hayangah (both at the University of KwaZulu-Natal , South Africa). According to the paper, "Crops grown on off-site plots include a variety of vegetables such as tomatoes, spinach, and onions….Unfortunately, urban agriculture on most offsite plots is a risky activity since most products are stolen before reaching proper maturity." See the paper in volume 3, issue 2 (winter 2012–13). *Photo taken by and used by permission of Hangwelani Hope Magidimisha*

In This Issue

Guest Editorial

Columns

Special Topic: Sustainable Livelihoods in Food Systems

Open Call

Book Reviews (both reviews of John Ikerd's *The Essentials of Economic Sustainability*)

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IN THIS ISSUE

DUNCAN HILCHEY

Sustainable livelihoods: An evolving asset-based strategy for food systems development

Published online 20 December 2012

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We are very pleased to announce that noted food systems consultant and researcher **Kate Clancy** has just become a columnist for JAFSCD. Kate is a food systems consultant, visiting scholar at the Center for a Livable Future, Bloomberg School of Public Health Johns Hopkins University, and senior fellow at the Minnesota Institute for Sustainable Agriculture. I first met her in 1987 while she was helping organize the Onondaga County (New York) Food Policy Council — one of the first county-based FPCs in the U.S . Her column, *Digging Deeper: Bringing a Systems Approach to Food Systems,* will focus on regional food systems, food security, agriculture of the middle, and policies at all levels to encourage the development of resilient food systems.

Coincidentally, we bid farewell to columnist **Joseph McIntyre.** His column, *Views from the Food System Frontier,* focused on the leading edges of food systems work. Unfortunately for us, the success and growth of his own program, the Ag Innovations Network, necessitated his leaving JAFSCD as a columnist. Fortunately for us, he remains as a JAFSCD advisor.

Special Topic Focus: Sustainable Livelihoods in Food Systems

This special issue is focused on sustainable livelihoods in food systems. Though it was not our intent, all submissions in response to the call were from our friends in the global South. Sustainable livelihoods is an emerging avenue of research in the social sciences, especially international development. At its core is the simple idea that helping individuals, families, and communities build assets around which they can sustain entrepreneurial activity can ultimately help them overcome poverty.

Stefanie Lemke, Farideh Yousefi, Ana C. Eisermann, and **Anne C. Bellows** offer us an applied tutorial on the sustainable livelihoods framework in *Sustainable Livelihoods Approaches for Exploring Smallholder Agricultural Programs Targeted at Women: Examples from South Africa.* The farming livelihoods of women are

also the subject of *Association Between Duration of Community-based Group Membership and Sustainable Livelihoods for Kenyan Women Dairy Farmers,* by **Colleen Walton, John VanLeeuwen, Fiona Yeudall, and Jennifer Taylor.** In *The Future of Subsistence Agriculture in Rural Communities in Uzanu, Edo State, Nigeria,* **Stephen Onakuse** establishes a rationale for public policy to support subsistence farming for the benefit of the community and the whole nation. Finally, comparing patterns in diversification in two communities in Eastern India, **Chandan Kumar** and **S. P. Singh** argue for more equitable distribution of government resources to support farmers in *Determinants of Agricultural Land Use Diversification in Eastern and Northeastern India.*

Open Call Papers

Leading off our open call papers are three that focus on food systems and higher education. Co-authors **Rebecca Dunning, Nancy Creamer, Joanna Massey Lelekacs, John O'Sullivan, Tes Thraves,** and **Teisha Wymore** challenge the established extension model in *Educator and Institutional Entrepreneur: Cooperative Extension and the Building of Localized Food Systems.* In *Community-Engaged Learning in Food Systems and Public Health,* **Julie L. Self, Becky Handforth, Janelle Hartman, Corey McAuliffe, Elizabeth Noznesky, Rebecca J. Schwei, Laura Whitaker, Amanda J. Wyatt,** and **Amy Webb Girard** describe a student-driven, community-engaged learning course at Emory University for helping students understand the determinants of food choice. And **Maleka P. Hashmi** and **Kitrina M. Carlson** offer case studies of integrating service-learning and research into the science, technology, engineering and math (STEM) curricula in *Interdisciplinary Model for Infusing Food Security into STEM Curriculum.*

Many of the remaining papers in this issue challenge some of the conventional wisdom around food systems. In *Community Food Security via Urban Agriculture: Understanding People, Place, Economy, and Accessibility from a Food Justice Perspective,* **Mahbubur R. Meenar** and **Brandon M. Hoover** identify some of the challenges in addressing food security through urban agriculture. **Shawn A. Trivette** reviews the literature on local food systems and argues that they are not inherent mechanisms of sustainability in *Close to Home: The Drive for Local Food.* In *Economic Viability of Selling Locally Grown Produce to Local Restaurants,* **Amit Sharma, Catherine Strohbehn, Rama Radhakrishna,** and **Allan Ortiz** closely examine the entire value chain in direct wholesaling to restaurants and caution producers to carefully weigh their costs and benefits. Similarly, **Brian J. Schilling, Kevin P. Sullivan,** and **Stephen J. Komar** conducted an economic impact assessment of agritourism and find the majority of farmers engaged in agritourism garner little direct income benefit in *Examining the Economic Benefits of Agritourism: The Case of New Jersey.* In *Surveying Agrifood Stakeholders To Identify Priorities as Part of a Virginia Food System Assessment,* **Matthew C. Benson, Lisa S. Hightower, Eric S. Bendfeldt, Crystal Tyler-Mackey, Kim L. Niewolny,** and **Gordon Groover** find that Virginia food system stakeholders believe government understanding of local food systems issues should be a top priority. The challenge of improving access to high-quality local foods for food-insecure populations is the focus of *Building Capacity Between the Private Emergency Food System and the Local Food Movement: Working Toward Food Justice and Sovereignty in the Global North* by **Jesse C. McEntee and Elena N. Naumova.**

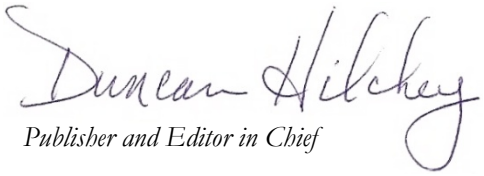
In the last of our accepted papers for this issue, **Nancy K. Karanja, Mary Njenga, G. K Mutua, C. J. Lagerkvist, E. Kutto,** and **J. J. Okello** find high levels of contamination in produce raised in wastewater irrigated fields in *Concentrations of Heavy Metals and Pesticide Residues in Leafy Vegetables and Implications for Peri-urban Farming in Nairobi, Kenya.*

Columns

While papers in response to our special-topic call focused on sustainable livelihoods in the global South, several of our columnists took a crack at applying their own versions of the framework to North America. In his *Economic Pamphleteer* column, **John Ikerd** argues that "the only sustainable alternative to vertical integration and vertical competition is vertical cooperation." In *Metrics from the Field,* **Ken Meter** draws a parallel between the third world of the global South and the third world in the U.S. In *Global Views of Local Food Systems,* **Rami Zurayk** looks at balancing the right to livelihoods with the right to food — and sees one of humankind's greatest challenges. Finally, in *Digging Deeper,* **Kate Clancy** applies systems thinking in the context of food policy councils and how they may foster urban and peri-urban regional collaboration.

Reviews of John Ikerd's Essentials of Economic Sustainability

Because he presents such deeply philosophical arguments, we sought three reviewers — one practitioner, one sociologist, and one economist — to offer their respective takes on John Ikerd's most recent book, *The Essentials of a Economic Sustainability.* Unfortunately, we were only able to find a sociologist and a practitioner to take on the task! Sociologist **Gilbert Gillespie** and farming educator **Antonio Roman-Alcala** find Ikerd's latest treatise on sustainable capitalism extremely thought-provoking but also very challenging.



Publisher and Editor in Chief

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GUEST EDITORIAL

ARDYTH HARRIS GILLESPIE

Balancing multiple perspectives for collaborative food decision-making

Published online 6 December 2012

Citation: Gillespie, A. H. (2012). Balancing multiple perspectives for collaborative food decision-making [Guest editorial]. *Journal of Agriculture, Food Systems, and Community Development, 3*(1), 5–7.
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Recently a co-worker asked me what I thought about Mayor Bloomberg's initiative to limit the size of soft drinks sold in New York City, a topic I had neither followed closely nor analyzed. Although I hadn't formulated an opinion on public policies on drink size, it struck me that this issue presented interesting and fundamental questions about community decisions that potentially affect us all. This particular soft drink policy is an example of how large issues of community concern seem to end up as conflict over single aspects. To me the big question is when differences in views and different interests are involved, how do we honor multiple perspectives in collaborative decision-making? Can we find ways to blend and balance diverse perspectives as we strive to create a world we desire? I think that we must think about what are the *right questions;* that is in this particular case, *what are the most central or transformative questions of our day regarding food systems for health and well-being?*

One way of approaching the central questions is through forming collaborative engaged research (CER) leadership teams that include academics, practitioners, and food systems stakeholders (Gillespie & Gillespie, 2006). The Food CER leadership teams in which I am involved have several characteristics. We seek to pursue shared and complementary goals for improving the sustainability of community food

Ardyth Marie Harris Gillespie is associate professor in the Division of Nutritional Sciences at Cornell University and a co-leader of the Family and Community Food Decision-making Project (www.Familyfood.Human.Cornell.edu), a faculty fellow with the David R. Atkinson Center for a Sustainable Future, and a Collaborator faculty member, Food Science and Human Nutrition, Iowa State University. She is the co-author with Guan-Jen Sung of the forthcoming "Enhancing interdisciplinary communication: Collaborative engaged research on food systems for health and well-being" in *Enhancing Communication & Collaboration in Interdisciplinary Research*, edited by M. O'Rourke, S. Crowley, S. D. Eigenbrode, and J. D. Wulfhorst, to be published by SAGE in 2013.

She is the co-chair of the *Journal of Agriculture, Food Systems, and Community Development* leadership team. She can be contacted at ahg2@cornell.edu.

systems so that we will be able to nourish *and* nurture children, youth, and their families across generations. We reject stereotypes about low-income families, families of color, and gendered food decision-making roles and seek to understand what our families think and do. We avoid privileging "scientific" knowledge over the "experiential" knowledge of family and community food decision-makers, embracing thoughtfully the wisdom generated by combining multiple ways of knowing. We strive to integrate principles and practices from appreciative inquiry (Watkins, Mohr, & Kelly, 2011) and open space technology (Owen, 1997) in creating contexts for transparent communication and transformative learning (Taylor, 2000) as we engage diverse stakeholders in collaborative decision-making. A CER process creates contexts conducive to focusing on opportunities through collaboration and for innovation on the "verge," that is, on the fringe of a particular discipline or perspective. Futurist Joel Barker describes the "verge" as a place "where something and something else meet" (Barker, 2008, p. 155). This notion provides both an opportunity and a dilemma for academics, practitioners, and food systems stakeholders moving out from the center of a discipline; inventing new practices and making opportunities for new subcultural norms to emerge.

While CER approaches may offer great potential for engaging people in efforts that will help them achieve their goals, CER practitioners, especially those in research university settings, face some risks. This approach is at variance with dominant approaches to research, so those who do such work may find themselves isolated, marginalized or excluded from influence on institutional decision-making — with adverse consequences relating to job security, tenure, promotion,, and other rewards of conformity. Many years ago, an experienced and wise community collaborator sent me the following quote from Machiavelli's *The Prince:*

> There is no more delicate matter to take in hand, or more dangerous to conduct, but to be a leader in the introduction of changes. For he [or she] who innovates will have for enemies all those who are well-off under the old order of things, and only lukewarm supporters in those who might be better off under the new. (Chapter VI)

Returning to the transformative questions I alluded to in the first paragraph, I think experimentation with thinking on the "verge" from multiple perspectives in CER has led to new perspectives and more relevant questions. These questions are useful for moving beyond the central traditions and constraints of educational and food systems: *What is already going on? Who's involved? Who should be involved? What more might we do through collaboration?* (Gillespie, Gantner, Craig, Dischner, & Lansing, 2003). As illustrated by the core questions for considering opportunities, CER practitioners prioritize assets, strengths, and opportunities over identifying problems and solutions. They embrace multiple perspectives and roles when building and maintaining CER leadership teams. In addition to identifying opportunities and leadership team members, a CER process includes organizing learning teams, creating communicative exchange strategies, emphasizing inquiring and analyzing, and promoting reflecting and innovating. All these elements of the process are cyclic and bidirectional. Additionally a CER process with participant learners continues to evolve, leading to new initiatives and reflection on respective learning experiences. In the spirit of innovation, equity, and justice, we pause at the "verge" to expand our mindsets and ways of thinking — and create a better world beyond our present individual and collective images.

Thinking again about the issue of regulating the size of soft drinks in New York City, a CER approach could help bring together stakeholders with seemingly conflicting goals and perspectives to consider their common and/or complementary goals — such as the health and well-being of children (Gillespie et al.,

2003) — without sacrificing the integrity of each participating organization. Might bringing the right groups together and working to figure out the right questions and how to address them be a better use of resources for enhancing health and well-being than the too common practice of squabbling about the faults of others, and the minutia of how much is too much, or relying on hard-won policies to fix our problems? 

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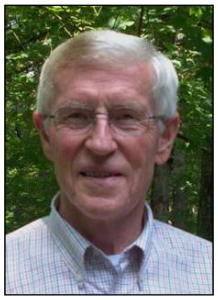

THE ECONOMIC PAMPHLETEER
JOHN IKERD

Cooperation: The key to sustainable livelihoods in food systems

Published online 18 October 2012

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Profits are not sustainable in today's food systems, and most certainly not for farmers. The more efficient producers may be able to survive financially, but their potential to do more beyond survival is inherently limited. The economic livelihoods necessary to incentivize the needed transition to a sustainable food system will require fundamental change in today's food economy.

Historically, market economies have been characterized by competition. We typically think of horizontal competition within food retailing, processing, and farming sectors, but competition also occurs vertically throughout the different sectors of the food economy. Such markets are coordinated vertically, from consumers down to farmers, through vertical competition. For example, when consumers demand more of

John Ikerd *is professor emeritus of agricultural economics, University of Missouri, Columbia. He was raised on a small dairy farm in southwest Missouri and received his BS, MS, and Ph.D. degrees in agricultural economics from the University of Missouri. He worked in private industry for a time and spent 30 years in various professorial positions at North Carolina State University, Oklahoma State University, University of Georgia, and the University of Missouri before retiring in 2000. Since retiring, he spends most of his time writing and speaking on issues related to sustainability with an emphasis on economics and agriculture. Ikerd is author of* Sustainable Capitalism; A Return to Common Sense; Small Farms Are Real Farms; Crisis and Opportunity: Sustainability in American Agriculture; A Revolution of the Middle; *and the just-released* The Essentials of Economic Sustainability. *More background and selected writings are at http://web.missouri.edu/~ikerdj.*

*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.*

something, prices are raised by retailers to ration the available supplies. Higher retail prices provide profit incentives for retailers to offer higher prices to processors, who then offer higher prices to producers, providing incentives to produce more of the higher-priced products. This process is reversed by weaker consumer demand. Vertical competition reallocates productive resources to accommodate changing consumer demand.

These are basically the conditions under which markets for organic, local, and other sustainably produced foods have grown over the past few decades. For example, as consumers' preferences shifted away from industrially produced foods and toward organic foods, price premiums for organic foods provided both the economic incentives and financial means for organic farmers to expand production. However, market growth does not ensure profitability in market economies, as many organic farmers have discovered.

Competition among enterprises within and among the various sectors of the food system has limited the potential for profits from sales of organic foods. If such markets had been "purely competitive," any excess profits would have been passed on to consumers in the form of larger quantities, lower prices, or higher qualities of organic foods. As long as organic markets grow, profits would be possible for at least some participants. Once organic markets stabilize, any further potential for "excess profits" would be gone. The remaining "normal profits" would be just enough to keep enough organic farmers and others in business and keep producing, processing, and distributing a stable supply of organic foods. The economic benefits under pure competition accrue to people as consumers, not as retailers, processors, or producers.

That said, the reality of today's American food system is very different from the purely competitive model of free-market economies. Today, large-scale corporate food processors, distributors, and retailers dominate their respective sectors of the food marketing system. Only the farming sector retains any element of true economic competition. Today, a few large corporate processors and retailers dominate their particular sector of the food market, and in many cases, dominate their entire vertical food supply chains, from retailing to agricultural production. These dominant corporations are in a position to retain all excess profits for their stockholders. Consumers' food choices are limited to those products the corporations find most profitable, and farmers are left with even less profit than they would have had under pure competition. The economic power has shifted from consumers to corporate stockholders.

Lack of economic power forces farmers to accept corporate business strategies that deplete the productivity of their soil, pollute the air and water, exploit their workers, and force their neighbors out of farming — just to survive economically.

The last vestiges of vertical competition are rapidly giving way to vertical integration. Under vertical integration, large corporate food retailers essentially control the other levels in the vertical food supply chain, through outright ownership, formal contractual arrangements, strategic alliances, or through sheer market power, as in the case of Walmart. Whole Foods is gaining a similar position in the organic food system. In such cases, the dominant corporations decide what is to be produced, when it is to be produced, how it will be produced, and who will produce it. Vertical integration is a corporate version of "central planning." Lack of economic power forces farmers to accept corporate business strategies that deplete the productivity of their soil, pollute the air and water, exploit their workers, and force their neighbors out of farming — just to survive economically. Such systems simply are not sustainable — ecologically, socially, or economically.

All economic value is derived from nature and society. These are the only possible sources of anything of use to people. However, there are no economic incentives to invest in maintaining the

fertility of the land or the productivity of people, unless something of greater economic value is expected in return. Thus, there are no economic incentives to invest in anything for the sole benefit of a community, society, or the future of humanity. Most humans don't make purely economic decisions; they respond to non-economic social pressures and ethical values. However, the large publicly owned, for-profit corporations are not humans. They have no human capacity for social or ethical responsibility. As a result, such corporations feel no guilt or regret when farmers are put under relentless economic pressures to exploit their land, their workers, and their neighbors. This is the natural consequence of corporate vertical integration.

The only sustainable alternative to vertical integration and vertical competition is vertical cooperation. Cooperative relationships are neither competitive nor exploitative; instead, they are mutually beneficial. Within a vertically cooperative food chain, economic benefits would be shared fairly and equitably among consumers, retailers, processors, and farmers. The vertical system would be coordinated through cooperation rather than competition or integration. The participants together would decide what to produce, where and when it would be available, how it would be produced and processed, and who would produce and process it. They also would agree on pricing arrangements to ensure that consumers get the products they need and want at prices they are willing and able to pay.

The only sustainable alternative to vertical integration and vertical competition is vertical cooperation.

Everyone in a sustainable vertical cooperative would receive an economic return adequate for a sustainable livelihood, without exploiting the natural and human resources that must sustain the economic viability of the system over the long run. Fair and equitable economic returns would be sustainable for all participants. The legal organizational structure for vertical cooperation can be a cooperative, a collaborative, or an informal alliance. Members of such organizations will always have economic incentives to pursue their individual self-interests rather than to cooperate for economic sustainability. Thus, sustainable profits will depend on cooperative members consistently expressing their shared social and ethical commitments to the long-term sustainability of their common venture. The key to sustainable livelihoods in food systems is for farmers, processors, retailers, and consumers to form vertical cooperatives with like-minded friends or make friends of like-minded people with whom they choose to cooperate.

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METRICS FROM THE FIELD

Blending insights from research with insights from practice

KEN METER

Building a framework for sustainable livelihoods

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Local food networks in North America operate in relatively wealthy societies, yet they hold many concerns that are shared by communities in places such as those featured in this issue of the *Journal of Agriculture, Food Systems, and Community Development*. What could we learn from each other?

When I studied the food systems of Ohio and Indiana, I found that those who were most adept at transforming these food systems had common formative experiences: they had worked for a significant block of time in a so-called "developing" nation. At core, these leaders emphasized patience and inclusive processes. They understood that they were working outside the mainstream paradigm and could not count on significant support to achieve long-term visions. Having worked in settings where resources were limited, they knew how to make significant progress while spending little.

Any region of the globe that strives to feed itself struggles with the same pressures. Each accomplishes great feats simply to survive amidst a political and economic climate that is dedicated to extracting resources from their communities. Each strives for more diverse options than an export-focused, commodity approach to agriculture, and each works to transcend a monocultural vision of life. Each asserts that local resources should be devoted to feeding local people first. Each works consciously to build social connectivity, and often has done so for decades.

Moreover, in both developing and developed settings, local food leaders are currently being criticized by foundations and investors. The complaint runs something like this: "We've been pouring money into your work for years, but we don't see enough tangible return for our investment. Why aren't you making a bigger impact?"

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It may seem odd that those who have great wealth criticize those who have far less. After generations of having their best resources — including their youth — sucked away, marginalized areas are somehow being asked to hold themselves responsible for creating a significant return on investment for those who benefited as wealth was extracted.

This is not to point fingers at individual investors or funders: the issues we wrestle with are structural, and often so integral to our way of life that they are completely invisible to those of us who are privileged. Yet they are far from invisible to those of us who suffer the consequences. Without recognizing these extractive structures for what they are, there is little hope for building frameworks that allow sustainable livelihoods to be created.

That is to say, of course, that we will have limited success in building sustainable livelihoods — our victories must necessarily be small and scattered — until society builds supportive economic and policy infrastructure. The good news is that all of the infrastructure we have built was deeply shaped by public policy, so it can be changed. The bad news is that these structures hold such power that changing them will take time. This is one reason that people with experience in the developing world work at the margins, since it is in this space that people find more freedom to invent.

More good news: Nations such as France, Italy, Norway, Sweden, Austria, Brazil, Tanzania, and Japan (to name only selected cases) have fashioned economic structures that build capacity and wealth at the local level. In large part this was because each correctly perceived it would have little economic clout in a world dominated by superpowers unless it built mechanisms that would strengthen its own capacity. Yet the U.S. has steadfastly refused to learn from these global partners.

Below are some concepts that guide my own work.

1. **Local foods work has been brewing for generations.** We do seem to be in the middle of one of the great periods of emergence for interest in community-based foods, but history also offers us a wealth of prior experience to draw upon. It is interesting to watch investors who suddenly discover the potential for local foods demand a quick return from seasoned practitioners who have worked for little return for decades — often creating, without reward, the very momentum that allows investors to take an interest.

2. **The current crisis is one of capital accumulation.** When capital is accumulated by a few at the expense of the many, massive disparities are created, and the economy stagnates. Yet U.S. policies subsidize further accumulation of capital, as if this were universally a good. Similarly, developing nations often count accumulation of wealth by the elite as "progress."

3. **Worldviews are far more important than money in shaping future outcomes.** Rapid change is forcing us to rethink our dearest habits and our assumptions of privilege. If we think differently, money may flow differently.

4. **Ultimately, infrastructure is the key.** If we build economic structures that support community wealth creation, we will find communities creating wealth. The savings and loan industry is an excellent example from U.S. history. This is a banking system that was created to foster the hope that lower- and middle-income households could build savings accounts and buy homes. When it was dismantled, the concept of savings itself eroded. Similarly in Africa, as Timberlake (1986) showed, foreign aid essentially created structures that fostered greater dependency.

5. **Scale is both the problem and the solution.** Many of the extractive features of the prevailing economy are due to large-scale institutions and business networks. Simply attaching to these structures will not create a solution that builds local capacity. Simply emulating them will re-create the very problems we set out to solve. We certainly need to aggregate, but the

appropriate scale may be far lower than we now imagine (Meter, 2004). Moreover, if scale is built too quickly, or in a top-down manner, little capacity will be built in disadvantaged communities. One participant in a recent Springfield, Illinois, forum on food and health issues re-framed this quite eloquently: "How do we scale up connectivity?"

What ultimately connects food practitioners in the developing world with those in North America is a common understanding of being marginalized. The key difference, it seems to me, for those of us in the developed world is that we have both benefited from extractive economies, and also fallen victim to them. This makes it more difficult for us to see these dynamics clearly. Yet we all have much to gain by breaking the shackles of dependency, for even those who seem to benefit ultimately lose. It seems likely that the richest lessons will emerge from the "Third World" — whether in developing nations, or inside the U.S.

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GLOBAL VIEWS OF LOCAL FOOD SYSTEMS

Reflections on the growing worldwide local food movement

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Asking the right questions

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One of the greatest challenges facing humanity is to make sufficient, nutritious, culturally appropriate food accessible, available, and affordable to a growing urban population with limited purchasing power — while also sustaining the livelihoods of rural producers, who are themselves often poor and net food buyers. The problem is further complicated by conflicts, economic crises, and environmental change, which constantly reshape the geography of the planet. That is why on 3 December 2012, and in parallel with day 5 of the 18th conference of parties on the United Nations Framework Convention on Climate Change (UNFCCC)[1] (CoP 18) taking place in Doha, Qatar, the "Agriculture, Landscapes and Livelihood" session was organized by a group of international agencies to illustrate the organic linkage between people, environment, and food. During that day, hundreds of experts in agriculture, climate change, and livelihoods came together from diverse countries to discuss, among other topics, how to satisfy the growing food needs of the world's population while sustaining the livelihoods of those involved in the production, transformation, and trade of food. The meeting brought together representatives from the private sector and large corporations, along with technocrats. Even a few farmers were sighted on and around the podium. According to the official website, relevant blogs, and thousands of tweets, the event went extremely well; all participants underscored the importance of supporting agriculture and farming livelihoods in order to build resilience and mitigate the impacts of climate change.

Seen from the global South, where Qatar is located, in spite of having one of the world's

[1] See more at http://unfccc.int/2860.php

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highest GDP per capita (International Monetary Fund, 2012) and the world's highest greenhouse gas emissions per capita (World Resources Institute, 2012), the need to adjust the world's food systems to allow food producers to construct a better livelihood is imperative. For small farmers in the South, who produce up to 70 percent of the world's food (FAO, 2011), life is often untenable: while they produce most of the food we eat, they seem to have little or no control over its price, which appears to be determined by trade and retail. And, as most have abandoned subsistence agriculture for specialization in the food system, most have to purchase the majority of the food they consume, which keeps them hostage to retail prices. This is why agrarian movements such as Via Campesina are growing, as they allow farmers to organize for collective bargaining. These organizations are increasingly represented at international forums, such as the negotiations on food security that take place regularly at the UN Food and Agriculture Organization (FAO) in Rome.

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Analysts studying the livelihood/food systems nexus from a humanist perspective often base their work on two core postulates. One is that the global food system is dominated and controlled by large international corporations at all levels: the production (large capitalist and industrial farms), inputs (seeds, pesticides and fertilizers), trade (international exports), transformation (agro industries), and retail levels (superstore chains) (Corporate Watch UK, 2004). These act in synchronized fashion to exploit farmers and resources by maximizing surplus extraction, leaving to both just enough to survive.

The second postulate is that, under pressure from trade agreements and International Monetary Fund (IMF)–styled economic adjustments, export-oriented production based on comparative advantages now dominates the food systems. This has caused the demise of indigenous farming and food systems and has resulted in the impoverishment of both land and people (McMichael, 2009). A direct result of trade-based agriculture has been an agrarian question that is expressed at the levels of both people and environment.[2] Economy of scale dictates that small farmers will disappear as they are outcompeted by industrial food production units that will re-employ them as exploited farmworkers. By the same token, large capitalist ventures in agriculture and food production are insensitive and unresponsive to environmental sustainability requirements, and operate in dissonance with Mother Nature due to the laws of the market and to the ruthlessness of CEOs who seek to maximize investor profits and inflate their bonuses. Finally, export-oriented production also implies that the food regime is essentially global, and that trade is undesirable as it is immediately associated with economic profiteers and other speculators.

The social response to this state of affairs has been a growth and resurgence of "local food systems" expressed as a mushrooming of farmers' markets and community supported agriculture programs, which are expected to enhance the livelihoods of small farmers. These ventures were once limited to the countries of the North, but they are now firmly taking root in the South, often driven by Northern-educated community leaders or by Northern organizations such as Slow Food. While they certainly have a role to play in the democratization of the food system, such initiatives cannot in and of themselves be the answer to the agrarian question.

While somewhat caricatural, both postulates are essentially true, at least to a certain extent. They adequately serve to illustrate the discontent of "small producers" and their rejection of "Band-Aid solutions" borne from the cogitation of international bureaucrats. Farmers' livelihoods have been

[2] See examples of Egypt and Tunisia in Ayeb (2012).

declining worldwide: most of the world's poverty is rural, especially in countries of the South (IFAD, 2010). Moreover, rural is no longer synonymous with agricultural: small farmers worldwide have adopted diversified livelihood strategies, a blend of agricultural production and other forms of on-farm and off-farm employment. But for the vast majority of those looking for a decent life, migration remains the only option, allowing them to construct their own livelihood in urban centers while contributing to that of their extended families in the villages. In many ways, it is the income earned in urban centers that is contributing to the survival of the rural world.

We do not seem to be drawing nearer to a solution to the sustainable livelihoods/ food system challenge. Perhaps we are not looking in the right place.

In spite of the goodwill and efforts deployed by mainstream organizations as well as by civil society, we do not seem to be drawing nearer to a solution to the sustainable livelihoods/food system challenge. Perhaps we are not looking in the right place. For instance, little is known about the mechanisms by which the food system is controlled by international megacorporations, when it is small farmers who produce most of the food. Understanding this mechanism is imperative to developing a strategy to liberate the food system. Models of midlevel-scale trade through cooperative supply chain are badly needed as viable and fair alternatives to a dehumanized globalized food system.

Sustainable livelihoods must be recognized as a basic human right. Reforming or changing the food system to allow the food producers of the world — most of whom are small and disenfranchised — to engage in decent, sustainable livelihoods must become an international human priority. This endeavor cannot entail raising food prices, as both producers and nonproducers who are net food buyers will suffer. Enhancing livelihoods from within the food system must come from reducing the profits of traders and intermediaries, captains of finance and of industry. Such resolutions were, unfortunately, glaringly absent from the recommendations[3] of the CoP 18 jamboree.

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[3] See "Nations take 'essential' next step in climate change fight," COP 18 (8 December 2012). http://www.cop18.qa/en-us/News/SingleStory.aspx?ID=297

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DIGGING DEEPER

Bringing a systems approach to food systems

KATE CLANCY

Issues of scale

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October 2011 marked the 30th anniversary of the establishment of the first food policy council in the U.S., in Knoxville, Tennessee. In the intervening year I have spent some time thinking about the trajectory of food policy councils (FPCs) over those decades. What's impressive is how active FPCs have been in addressing a wide range of policy topics across all sectors of the food system. The policies fall into different legal categories and funding mechanisms, and range from food production to food waste; from direct markets to large retail; from loans to plans. After three decades of FPC activity I find two things of particular interest about this phenomenon: first, the breadth of issues and the amount of human and economic resources going into the work of not only identifying policy changes but legislating and appropriating funds for them; and second, how much of this work is being done in isolation from similar undertakings around the country and even in the same state. It is the latter phenomenon that got me thinking about how to encourage more collaboration and efficiency in local or municipal FPC work. I decided that a useful way was to employ concepts that come from the world of systems thinking and analysis.

Although we work on and talk about food systems, we rarely apply a systems-level analysis to our projects. Of many useful systems concepts two seem particularly suited for looking at local food policy: one is scale, and the other is feedback loops (which I'll take up in my next column). We know that a system contains nested scales, from the largest (i.e., global) down to local subscales. We also know but don't often act on the fact that all food systems operate across many levels of management and analysis. Experts tell us that

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scales have to be working together to successfully reach resilience in a community or a system of any size. Resilience, in brief, is the ability to survive disruptions without breakdowns in performance. The nested scales structure is what makes resilience of a complex system possible. But here's the kicker: this occurs only if the scales talk to each other! Not only do they have to communicate, but governance of a complex food system won't work without collaboration and people who share goals and a sense of purpose in working together.

I want to describe a few of the ways in which FPCs could address scale, using urban agriculture as my example. There is no argument about the many possible benefits of producing food in cities. And of course cities and towns in different parts of a country have different self-reliance thresholds. But I was concerned when I read a headline on a sustainability blog which trumpeted "cities could produce all their own food"! The authors of the study to which it referred made no such claim, but concluded that Cleveland, depending on the scenario chosen, could meet between 22 and 100 percent of fresh produce needs; 25 to 94 percent of poultry and egg needs; and 100 percent of honey needs. It could attain small levels of self-reliance — between 4 percent and 18 percent by weight, and between 2 and 7 percent by expenditures on total food and beverage consumption — compared to 0.1 percent at present (Grewal & Grewal, 2012). This is impressive, but begs a host of questions including those regarding the rest of the diet. Grewal and Grewal mention that grain production is less feasible in urban areas and much of the supply would have to be imported, but in their publication, and in many others discussions of local food efforts, there is no mention that the preferred diet takes 50 to 60 percent of its kilocalories from complex carbohydrates — mainly from grains. From where will those kilocalories come? Regions have different production capacities, so the answer will vary a lot. A related question is what will be the cost of different urban agriculture scenarios and will it match the benefits? And over what time frame will some significant capacity of urban agriculture be attained? Answers to these research and policy questions are a good way to place some (flexible) boundaries around a local area and to frame discussions of what is a realistic level of self-reliance and at what scale that can be achieved.

I see these types of studies as doing the hard systems/engineering type of calculations. But pretty soon the sociological side needs to be engaged by the research community to answer a number of other questions beyond the calculations. The first is do communities possess the human skills, resources, and especially inclinations to produce significant quantities of food in urban settings, or in smaller rural towns for that matter? (See a recent article in the *New York Times* (2012) that discusses the numbers of community gardens going without gardeners or with too few to be useful.) The second is how to seriously address the constraints on urban agriculture. Papers by Lovell in the August 2010 *Sustainability* and by Reynolds in the *Journal of Agriculture, Food Systems, and Community Development* a year ago catalog these issues in a useful way. Among the barriers are (1) limited access to land; (2) limited availability of suitable land for food production (solar and water access); (3) insufficient infrastructure; (4) seasonal limits; and, probably the biggest problem, (5) intense competition for other viable uses for urban spaces. There is a perception that agriculture is not a legitimate urban activity, although I'm not sure if everyone would agree with Tom Philpott that "nobody wants cows grazing on the Great Meadow in Central Park." I would like to see more systems analyses supporting urban production at different levels of intensity as a viable choice given food systems and food security gaps, and without undercutting peri-urban and rural farms.

I would like to see more systems analyses supporting urban production at different levels of intensity as a viable choice given food systems and food security gaps, and without undercutting peri-urban and rural farms.

This brings up a final set of questions: how do urban and peri-urban agriculture interrelate? Cooperate? Compete with each other? The easy way out of answering this is to conflate them by defining them as the UN Food and Agriculture Organization (FAO) does, as the same thing (Smit, Ratta, & Nasr, 1996). I think that this is not a useful conceit in the United States because the history, economics, and self-definition of long-lived commercial farms outside of cities are quite different from farms situated inside them (especially if the latter are subsidized). In addition there appears to be little direct involvement of urban FPCs in farmland preservation activities. A recent compilation of multiple metropolitan comprehensive plans and food systems plans from all over the U.S. found only 11 that mentioned either farmland preservation or made specific connections to farmers in the region (Neuner, Kelly, & Raja, 2011). FPCs could be leaders in raising and encouraging research and action on these salient systems questions. In doing so they could enhance the possibility that the outcomes of their policy work are sound and more resilient over the long term. They would also benefit from increasing the size, scales, and diversity of their networks.

Food policy councils could be leaders in raising and encouraging research and action on salient systems questions.

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Sustainable livelihoods approaches for exploring smallholder agricultural programs targeted at women: Examples from South Africa

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Abstract

Smallholder farming can play a crucial role in contributing to food supplies and autonomy at the household and community level in rural areas, yet this has been challenging to evaluate. In South Africa, smallholder agriculture faces multiple challenges due to historical injustices regarding access to land and resources and to post-apartheid policies that failed to promote rural development. Drawing on the Sustainable Livelihoods Framework and employing a mixed methods approach, we explore through participant observation and interviews the prospects of smallholder agricultural programs for establishing sustainable livelihoods, facilitated by civil society organizations and targeted at rural black and colored South African women. Participation in these programs enabled women access to various livelihoods assets: education and capacity-building (human assets); land (natural assets); tools and infrastructure (physical assets); stipends and income from selling their produce (financial assets); and networking (social assets). Operational challenges included divergent expectations on the side of project facilitators and participants; lack of communication; participant dependency on the organizations; lack of access to markets; and programs' lack of financial sustainability. Our findings suggest that, while these programs are not yet sustainable, they stimulate an awareness of possibilities, visions, ownership, and rights that can have a long-term effect on the livelihoods of these women. In evaluating program success, especially in the initiation phases, it must be remembered that structural barriers to the improvement of rural women's livelihoods are formidable, and few South

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African models or alternatives are presently available to help civil society organizations formulate new opportunities.

Keywords
civil society organizations, land reform, mixed methods approach, smallholder agricultural programs, South Africa, sustainable livelihoods framework, women

Introduction

In many parts of the world, rural livelihoods are closely linked to agriculture, often performed at a smallholder and subsistence level. Nevertheless, rural food producers are ironically and tragically the most food-insecure demographic group (Windfuhr & Jonsén, 2005). In light of the global food crises and the fact that many people cannot afford adequate food, the present Special Rapporteur on the Right to Food, Olivier de Schutter, has pressed for attention to the rights and voices of small farmers and to agro-ecological approaches employed particularly by them to achieve food security (De Schutter, 2011). As Lahiff (2008a) states and many others underscore, the dramatic rise in food prices serves as a crude reminder of global dependencies on dominant agribusinesses for staple food needs, demonstrating that an alternative vision of diverse agricultural production and more resilient, less costly, and more environmentally sustainable options needs to be developed (Cousins, 2007; Grethe, Dembélé, & Duman, 2011; International Assessment of Agricultural Knowledge, Science and Technology for Development [IAASTD], 2009; Windfuhr & Jonsén, 2005).

The missions to promote smallholder agriculture and develop local food systems, however, face multiple challenges. Rural peoples and food producers across the urban-rural expanse, and women as a particularly marginalized group, are often disconnected and alienated from the land, tools, skills, and knowledge systems that might develop prosperous local food systems and sustainable livelihoods. In many cases, land tenure and rights are insecure and land costs consistently rise, resulting in rural people being displaced by powerful interest groups, including through the recent phenomenon known as "land-grabbing" (FoodFirst Information and Action Network [FIAN] International, 2010, p. 8). In other cases, the goal of land access, in fact, is not particularly or exclusively for agricultural production.

In South Africa, adding to the challenges described above, the history of colonialism and apartheid created racial and political inequities and dispossession, especially of land. South Africa is not immediately associated with hunger and food insecurity, as it represents one of the most stable and wealthy economies in Africa and recently attained the status of *newly industrialized country*. However, despite South Africa being food secure at the national level, large sections of the predominantly black and colored[1] population face poverty, inequality, high unemployment, and food insecurity (Von Grebmer, Torero, Olofinbiyi, Fritschel, Wiesmann, Yohannes, Schofield, & Von Oppeln, 2011; World Bank, 2011). About half of these households are estimated to be food insecure and one out of five children aged 1–9 years is stunted, with children living on farms displaying even higher stunting rates than the national average (Labadarios, Swart, Maunder, Kruger, Gericke, Kuzwayo… & Dannhauser, 2008). Strategies that could make a contribution to increased food supplies are urgently required, with small-scale food production having been associated with enhanced food and nutrition security at the household level (Aliber & Hart, 2009; Faber, Witten, & Drimie, 2011).

In this paper we explore whether agricultural programs targeted at rural black and colored women, orchestrated by two civil society organizations (CSOs) in different parts of the

[1] The apartheid laws intended for "racial classification" designed a social hierarchy, attempting the imposition of "race groups," mainly White, Colored, Black and Indian, on individuals in a single, complex system. Because this categorization has some basis in reality and also in apartheid history, no discussion is fruitful without first referring to these categories and their respective backgrounds. Initially, reference will therefore be made to black women (mostly Xhosa-speaking) and colored women (of a more "mixed" origin, and mostly Afrikaans-speaking), all involved in the agricultural programs described here. For reasons of simplicity we later refer to "women" or "participants."

Western Cape, South Africa[2] can contribute to sustainable livelihoods, and whether the promotion of smallholder farming and local food systems is attractive to marginalized peoples whose relationship to farming and land has been manipulated since the colonial era. Drawing on the Sustainable Livelihoods Approach (SLA) and employing mainly in-depth qualitative methods, we investigate underlying structural conditions of livelihoods at the household and community level, focusing on individuals' and groups' capacities and access to various livelihood assets.

Background

South Africa: Loss of Rural Livelihoods and Challenges of Land Reform

In South Africa, land must be understood in its historical context, which was marked by three main processes: colonial expansion beginning in 1652, the discovery of minerals and subsequent industrialization at the end of the nineteenth century, and the policies of apartheid in the twentieth century (Kepe, Hall, & Cousins, 2008, p. 145). Virtual enslavement first of the indigenous Khoisan inhabitants into the colonial economy and later of the black and colored population into the mining industry and farming enterprises denied them dignity and self-determination. The loss of access to land, especially as initiated by the Natives Land Act of 1913, destroyed land-based livelihoods and the remnants of the agricultural subsistence economy of the majority of the South African population (Van Onselen, 1996). This further resulted in farm workers and their families being trapped on commercial farms, lacking rights and legal redress and further lacking the skills to be involved in the wider economy, facing ongoing poverty as well as income and residential insecurity (Atkinson, 2007). Agriculture increasingly became a task for employment and income, not the centuries-old engagement with the local environment to maintain household nutritional health, community security, and identity. Nevertheless, it is estimated that 2.5 million households are engaged in some crop production, with most households procuring additional food supplies for their own consumption (Altman, Hart, & Jacobs, 2009). These households also depend on formal and informal employment, remittances from migrant household members, welfare transfers, and micro-enterprises, as is the case in many other parts of Southern Africa (Shackleton, Shackleton, & Cousins, 2000). In the particular example of South Africa, multiple livelihoods developed partly as a response to dispossession, overcrowding, and landlessness in the so-called former homelands (Cousins, 2007) and are often more a response to crisis than a coping strategy for stability (Loevinsohn & Gillespie, 2003). The capacity of rural households to contribute to local economic development is questioned, as they have often moved away from agricultural production and employ various other livelihood strategies (Bank, 2005).

South African land-reform policy seeks to redress loss of access to land and thereby social inequalities. Land reform entails three parts:

- Restitution, which seeks to return land or cash payment to people dispossessed after 1913;
- Redistribution, which provides government grants (settlement and land acquisition grants) to help people who do not fall under the restitution regulations to acquire land; and
- Tenure reform, which aims to bring all people occupying land under a unitary, legally validated system of landholding, to provide for secure forms of land tenure, help resolve tenure disputes, and make awards to provide people with secure tenure (Department of Land Affairs, 1997).

According to the latest *Status Report on Land and Agricultural Policy in South Africa, 2010*, by 2009, only 1.4 million acres (5.67 million hectares) or 6.9% of

[2] This research is part of a larger project on food security and the right to adequate food in the context of land and agrarian reform in South Africa (Lemke, 2010). Two masters' thesis projects carried out by Farideh Yousefi and Ana Eisermann in 2010 that were supervised by Stefanie Lemke and Anne Bellows contribute to this paper.

agricultural land had been transferred (Greenberg, 2010, p.4); the overall target to transfer 30 percent of agricultural land by 2014 was shifted to 2025. Land reform has been criticized for a number of issues, such as poor support for emerging new farm owners after transfer settlements have been finalized; lack of government coordination between different spheres (e.g., entitlements, education, agricultural policies, and land reform) and scales (e.g., national and local); and failure to integrate land reform within broader rural development, limiting its potential to promote social equity and revive rural economies (Lahiff, 2008b). While recent efforts to revise land reform and agricultural policies place a renewed focus on a smallholder strategy, according to Greenberg (2010, pp. 41–42), the challenge of building a more racially inclusive and equitable agricultural model has to confront the existing economic power of commercial agriculture and agro-industry with the aim of transforming it. This requires various strategies, such as de-concentration, decentralization of value-adding activities, and the stimulation of local markets, based on the initiative and activities of the producers themselves. Part of this effort must include addressing rural women's and men's dignity, land tenure, personal security, and human rights overall.

Women, Smallholder Farming, and Livelihoods

Although women have been called the key to household food security (Food and Agriculture Organization of the United Nations [FAO], 2011; International Food Policy Research Institute ([IFPRI], 2005; Kent, 2002; Quisumbing, Haddad & Pena, 1995; Quisumbing & Smith, 2007), gender is not yet adequately addressed and integrated into discussions on how to achieve adequate food supplies. Female farmers in all regions have less access to land and livestock and less access to agricultural inputs, credit, education, extension, and other services than do men, due to social norms (FAO, 2011). Further, paid farm labor for women is often limited to part-time and seasonal work, and their wages are characteristically lower than those of men (FAO 2011; cf. World Bank, FAO, International Fund for Agriculture Development [IFAD], 2009). According to the FAO (2011), women in sub-Saharan Africa have the highest average agricultural labor-force participation rates in the world, exceeding 60 percent.[3] In South Africa women represent 61 percent of people involved in farming, and they produce more food for household consumption than men do (Altman et al., 2009). Despite their crucial role in providing household food security, and despite the comprehensive inclusion of women's rights in the South African constitution, women face severe discrimination, with perpetuating social structures such as patriarchy and paternalism reinforcing their disempowered position within the household and community (Reddy & Moletsane, 2009). In the context of large-scale commercial agriculture, employment and housing contracts on farms are mostly linked to men. This results in:

- women having no formal housing contract and depending on their male partner for accommodations;
- impacting resource allocation within the household, which contributes to women's limited decision-making power; and
- dependency on male partners and livelihood insecurity for female farm workers should the men leave the farm or stop working (Lemke, Bellows, & Heumann, 2009).

The FAO's *The State of Food and Agriculture 2010–11* reiterates the call for policy interventions that close the gender gap in agriculture and rural labor markets by: (1) eliminating discrimination against women with regard to access to resources; (2) creating enabling infrastructure and technologies to provide women with more time for productive activities; and (3) facilitating women's participation in flexible, efficient, and fair rural labor markets (FAO, 2011, pp. 5–6). To this end, we recommend the Sustainable Livelihoods Approach as an analysis. It can serve not only to

[3] The agricultural labor force includes people who are working or looking for work in formal or informal jobs and in paid or unpaid employment in agriculture. This includes self-employed women as well as women working on family farms (FAO, 2011, p. 7).

(re-)identify known aspects of discrimination, but also to uncover women's livelihood assets that policy efforts might augment to leverage transformation of individuals and groups through and beyond the context of their vulnerabilities.

Methodology

Sustainable Livelihoods Approach

The Sustainable Livelihoods Framework, as developed by the Department for International Development (DFID, 1999), serves as theoretical framework and analytical structure to explore the agricultural programs observed here and their impact on livelihood options of participating women. Drawing on the earlier definition of Sustainable Livelihoods by Chambers & Conway (1992) and as developed further by Scoones (1998, p. 5), a livelihood "comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintains or enhances its capabilities and assets, while not undermining the natural resource base." At the household and community level, livelihood assets (a combination of physical, natural, financial, social, and human capital) play an essential role for households and individuals in pursuing strategies (livelihood strategies) with the aim of achieving desired goals (livelihood outcomes). Livelihood outcomes in turn impact livelihood assets. National- and provincial-scale institutional and policy structures and processes influence the capability to amass and orchestrate livelihood assets and livelihood strategies, directly shaping the vulnerability context of individuals and groups. Engaging a sustainable livelihoods research approach therefore requires investigating the conditions of access to a full range of resources for insecure populations.

"Sustainable Livelihoods Approaches" (SLA) became increasingly central to international debates about development, poverty reduction, and environmental management in the 1990s. SLA have been criticized for not adequately reflecting power relations, although the initial approach presumed that an understanding of social relationships, their institutions and organizations and their embedded power dynamics is crucial to designing interventions that improve sustainable livelihood outcomes (Scoones, 1998). In line with Scoones (2009) we argue that SLA research continues to offer a valuable and holistic approach for an integrated analysis of complex and highly dynamic research contexts. SLA research is able to bridge academic and policy divides, particularly between the natural and social sciences, and to challenge single-sector development approaches; it emphasizes the importance of local knowledge and the inclusion of participatory research methods as a means to help to understand complex local realities and to facilitate engagement and learning between local people and outsiders. The limitations of SLA can benefit from using complementary tools and frameworks.[4]

Data Collection

Mixed methods were applied with an emphasis on qualitative approaches, but also included quantitative socio-demographic and socio-economic household data. Initial introductory visits to the respective programs and communities in case studies reported here were facilitated through host organizations and served to inform research participants about the aims of research and to request permission to pursue the study. Participant observation was applied with researchers actively engaging in the daily activities of the people studied, enhancing acceptance of researchers and establishing relationships of trust. This further provides in-depth insights into social dynamics, e.g., decision-making processes and power

[4] SLA has for example been integrated with agroecology, with both approaches sharing core concepts but also diverging with regard to certain aspects (Amekawa, 2011). In another study, SLA was applied in combination with the socio-ecological framework that places specific emphasis on the vulnerability context and explains human development and adaptation in the context of the coupled human-environment interactions (Motsholapheko, Kgathi, & Vanderpost, 2011). To address the challenge of discontinuity of scale between different frameworks, Rao & Rogers (2006) suggest aggregating indicators derived at the lowest level of spatial hierarchy, as is the case for SLA with a focus on the household and community level, to larger scales such as agroecosystems and other regional scales using spatial analysis tools like GIS.

relations. All events observed were recorded in a field book. In addition, personal feelings were recorded and reflected upon, so as to reveal possible bias. Interviews were carried out at a later stage of research after the first phase of observation and participation. This enabled us to adapt interview questions to the respective contexts. Interviews were conducted in English[5] and were composed mainly of open-ended questions. Interviews were divided into two phases. The first phase was carried out with participating women at the program sites, addressing perceptions regarding the respective programs and how these affected various livelihood assets and livelihood outcomes. This was followed by a second interview phase that took place mainly within the communities and households of these women, once they felt comfortable about accepting visitors in their homes. Questions in interviews covered issues such as household composition, intrahousehold dynamics, household food situation and resource allocation, social networks, and perceptions of relatives regarding the participation of the women in the project. In addition, information was obtained through semistructured interviews with the directors, project managers or coordinators, and other personnel of both organizations, exploring their aims and perceptions regarding project implementation.

Data Analysis

Notes from the field books were coded to establish emerging themes and categories. As the sample size was small, the coding process was done by hand, instead of using software for qualitative data analysis. Emerging categories were analyzed and interpreted. Answers to open-ended questions were coded following the same steps. Using a variety of research strategies provided comprehensive analysis (Creswell, 2009; Denzin & Lincoln, 2008). For continuous reflection and review, regular supervision meetings in the form of academic colloquia and international workshops were held with academic peers and experts.

[5] All research participants felt comfortable with English, which was either their second or third language.

Agricultural Programs Facilitated by CSOs Toward Realizing Sustainable Livelihoods

The case studies presented here are situated in the Western Cape province of South Africa, known for its deciduous fruit and viticulture. The province has the largest share of agriculture of all provinces and the highest number of farm workers (Statistics South Africa [Stats SA], 2009). Research was carried out in collaboration with two local CSOs that offer agricultural programs specifically targeting women. The purpose here is not to evaluate these programs as such, but rather to explore them as alternative approaches for engaging in smallholder agriculture and to consider whether such programs are able to support and realize livelihood options for marginalized groups in South Africa.

Case Study: Agricultural and Life Skills Training Facilitated by the Grootbos Foundation

Beginnings of the Growing the Future Program

The Grootbos Foundation is a nonprofit organization set within the Grootbos Private Nature Reserve, located in Gansbaai, southeast of Cape Town, in the Western Cape province of South Africa. The foundation was established in 2004 and states as its mission: "The conservation of biodiversity of Grootbos and its surrounds and development of sustainable nature based livelihoods through ecotourism, research, management and education" (Grootbos Foundation, 2010). The owners of the nature reserve established the five-star Grootbos eco-lodge in the 1990s. The Grootbos Foundation is financially supported through funds from this tourism business, donations, and income generated from its diverse programs. The "Growing The Future" (GTF) agricultural and life skills training program that was established in 2009 targets unemployed rural women from two neighboring townships. The economic recession in 2008 had led to loss of employment for large numbers of people in the area, most of whom had migrated to the Western Cape from the provinces of Gauteng and Eastern Cape in search of work (Bhaktawar & Burger, 2009). Each year eight unemployed women receive training on organic vegetable and fruit production,

animal husbandry, and bee keeping, as well as education on literacy, numeracy, basic computer skills, health and safety issues, HIV/AIDS awareness, and business planning. The program's produce is sold to the two restaurants at the Grootbos lodge, surrounding restaurants in the area, and a local market. With graduation, the women receive a certificate[6] that, according to the Grootbos Foundation, will enable them to find employment in various sectors, pursue their education, or establish their own business, either by growing vegetables in the township, contributing to household food supplies, or alternatively, by engaging in commercial food production through co-operative land use in their home areas (Privett & Lutzeyer, 2010).

During the time of this research, six of eight women in the first project year graduated. They ranged in age from 25 to 33. Except for one woman who grew up in this area, the other women had migrated from the Eastern Cape to the Western Cape during the past five to 13 years. None of the women had finished secondary school. They stated that they would have liked to continue their education, but had to work to contribute to their family's livelihood. The households of these women were composed of three members on average, with a range of one to seven members. The women lived in a township at a distance of approximately 9.3 miles (15 kilometers) from the project site, where they rented either small brick houses or corrugated iron shacks composed of only one or two rooms and devoid of sanitation facilities. The township has a health clinic and grocery stores and is adjacent to a major road. As public transport is lacking, people have to make use of expensive private minibus taxis.

Challenges and Sustainability of the Program

This research was carried out during the second half of this program's first year of inception. Naturally, each new program undergoes a start-up phase and adaptations are necessary before it develops into a more sustainable operation. The results presented here should be seen therefore in light of the early stage of this program. Several challenges were experienced during the initial design of the program related to available resources. As the plot of land designated for the program consisted of sandy soil with very poor nutrient content that was not suited for growing vegetables, huge amounts of compost had to be added. This required a large amount of physical labor, time, and financial capital input in the beginning, resulting in lower returns than expected. Further, funds to employ project managing and training staff were limited. This resulted in the manager of the program being responsible for establishing the farming operation and, simultaneously, a teaching program for practical and theoretical agricultural skills, being assisted by one part-time teacher. Especially in the start-up phase this posed considerable challenges and might have led to limitations in the ability to address the specific needs of the participating women. Participatory research revealed that different perceptions existed regarding the aims of the program. While the Grootbos Foundation regarded it as a first step toward establishing smallholder agricultural enterprises in the future, most of the women had joined the program because they were unemployed and had no other prospects for finding work. Interviews with family members of the women's households revealed that there was little knowledge about the contents of the GTF program, and that it was considered a work place rather than a training program. These diverging perceptions resulted in tensions between the GTF management and the participants. There was a lack of agreement regarding, for example, the amount of the stipend that the women received from the Grootbos Foundation; the performance of certain daily tasks that were regarded by the women as agricultural "labor" and not as "training"; and ownership of the program.[7] Regarding the aim of the GTF pro-

[6] This certificate was designed based on the "Adult Basic Education and Training" (ABET) curriculum, a nationally recognized certificate that was established by the South African Department of Education (ABET, 2011). The Grootbos Foundation had tried to register as an ABET training center, but was not successful.

[7] In line with our participatory approach, following requests of the participants, Farideh Yousefi offered a training module on healthy nutrition and food processing. Further, as a result of

gram to become financially viable and sustainable, it recovered only 60 percent of its costs in 2010. Among the challenges were the limited size of the farming operation, comprising about half an acre (2000 m^2) that does not allow for producing sufficient quantities, and limited access to markets in this area for specialized organic products.

Impact of the Program on the Livelihoods of Participating Women

The women received a weekly stipend of 220.00 ZAR from the GTF program, amounting to roughly 900.00 ZAR/month (USD131.38),[8] constituting less than half the average salary (2,000.00 ZAR/month) in the tourism sector where most of the women were previously employed. This weekly stipend contributed to household incomes, but was not sufficient to cover all needs, a concern the women raised frequently, as most of them were the main income earners for their households and had to provide food to their family. Notably, the women had no prior agricultural experience, except for one woman who had worked at a farm previously. The women appreciated the fact that they were given their own small garden plot at the program site, where they planted vegetables, varying according to season. This produce mainly was for their own consumption, but was also sold to neighbors in the township. In summer, the women bought vegetables at a price cheaper than market value from the GTF program and sold them with some profit in the township. This extra income contributed to their ability to buy other foodstuffs, such as rice and meat. However, the possibility of gaining an additional income through the sale of certain products, such as organic eggs and honey, is limited, as people living in the township cannot afford these comparatively expensive products.

As our findings show, the GTF program contributed to enhancing certain livelihood assets of the participating women, providing income from the weekly stipend, even though small, as well as some additional income from selling surplus produce from the project (financial assets); and agricultural knowledge and various other training, e.g, food processing, basic computer skills, and business planning (human assets). Further, the women established social networks among each other (social assets) through this program. For those women who want to pursue farming activities after finishing the program, the Grootbos Foundation assists in the start-up phase by providing tools and seeds (physical assets), and by facilitating access to communal land (natural assets) in the neighboring township, where the women have the option of engaging in an agricultural cooperative, assisted by GTF staff. These combined livelihood assets have a positive effect on the vulnerability context and on the livelihood outcomes of these women. The women unanimously stated that the practical and theoretical skills that they acquired during the program equipped them with better chances to find employment.

Despite these perceived benefits, the chances of establishing sustainable livelihoods in the agricultural sector are very limited, for several reasons. Due to the lack of employment prospects when the program ended, the Grootbos Foundation extended the duration of the program for the first group of women by six months so as to enable a transition phase. One woman was recruited into the GTF program as an assistant trainer. None of the other women pursued agricultural activities, as this was not a livelihood option for them. Among the constraints they experienced were limited access to natural assets such as land and lack of access to financial assets and support structures in the Eastern Cape. Even if the women could start their own small-scale farming operation, this can provide neither sufficient food nor income for them and their families to sustain their lives, and can therefore only complement other livelihood options. Such alternative options, however, do not exist in the Eastern Cape, which is exactly why they migrated to the Western Cape in the first place. The possibility of staying where they currently live and to engage in agriculture for producing food for own consumption and/or selling the surplus

this research a farm stall was established in close proximity to the eco-lodge, and regular meetings between management and other staff of the various programs of the foundation were initiated.

[8] USD1.00 was equal to 6.85750 ZAR (South African Rand) at the time of this research. http://www.xe.com/ucc/convert.cgi?Amount=1&From=USD&To=ZAR&image.x=40&image.y=13

requires a considerable amount of time, which is needed instead for engaging in employment that can generate an adequate income.

Case Study: Agricultural Cooperatives Facilitated by Women on Farms Project

Beginnings of the Cooperative Program

The Women on Farms Project (WFP) is a South African nongovernmental organization (NGO) founded in 1996 and located in Stellenbosch in the Western Cape province, northeast of Cape Town. The main aim of WFP is to help lead to a society that treats women who live and work on farms with dignity and respect in accordance with the constitutional rights guaranteed to all South African citizens (Women on Farms Project, 2009a). WFP works toward strengthening capacity through education and training, research, lobbying, campaigning, and organization-building. In support of these aims, the organization engages programs in health and empowerment, labor rights, land and housing, social security, agricultural cooperatives, and a program tailored specifically to young women (Women on Farms Project, 2009b). The WFP's cooperatives program, which forms the focus of this case study, assists in the formation of rural entrepreneurial cooperatives exclusively for women on remote and isolated farms, who are either unemployed or temporarily employed. Once women decide to form a cooperative, WFP offers assistance in gaining access to land and applying for funds. WFP further offers workshops on cooperative governance, training in various farming activities, business planning, and marketing. Women who are part of the cooperative program are invited to engage in the activities of other programs offered by WFP as well. During the period of field observation from June to October 2010, WFP assisted two cooperatives that had been established in 2006 and 2008. Only one of these cooperatives had, however, started its production activities by 2010 and therefore lends itself to the case study illustrated here.

The idea for the Ceres Cooperative was born in 2008, when four of the current members approached WFP. The women had learned about the cooperative program while participating in other programs offered by WFP. However, it was not until June 2010 that the Ceres Cooperative finally accessed land on the scale of 2.5 acres (1 hectare) and a four-room house that can be used for production and for storage of farming implements and materials. The land and the house are provided by a church located outside the farm where the women live, and one hour's walking distance. It is important to note that no formal contract existed for the lease of this plot of land at the time of the research. An agreement was signed, with WFP ensuring the cooperative mentoring for an 18-month start-up period; cooperative members committed to work toward the development of this cooperative. The women decided to grow Grey Oyster mushrooms (*Pleurotus ostreatus*), although they had neither consumption nor production experience with mushrooms. This decision was based in part on the fact that the other cooperative had earlier decided on producing mushrooms and that this was perceived as a profitable venture.

At the time of this research the Ceres Cooperative was composed of six women, who were 20 to 64 years of age. Five of the cooperative members were unemployed while one woman worked as a seasonal farm worker. None of the women had finished secondary school. Average size of the cooperative members' households was eight, with a minimum of two and a maximum of 11 members. All the women lived on the premises of a white farm owner, with none of them having a housing contract, meaning that they were dependent on male family members for shelter. The houses were made of bricks, usually consisting of two or three rooms, supplied with running water and electricity. Some had sanitation facilities inside the house, or, in other cases, outside pit latrines. There were no public services, such as transportation and health services, or grocery stores in close proximity of the farm, adding to the high-vulnerability context of people living and working on farms. Once per month the cooperative members go to the nearest town at a distance of about 31 miles (50 kilometers) to buy food, clothes, and others necessities, having to make use of expensive private minibus taxis.

Challenges and Sustainability of the Program

The Ceres Cooperative experienced difficulties when preparation for mushroom cultivation started in July 2010. During this time one of the authors stayed at the house of a cooperative member over a period of three weeks.[9] The women expected technical assistance from WFP during this start-up period and felt that a two-day training workshop on mushroom production provided them with insufficient knowledge, having been conducted in an environment different from the conditions they faced. It was further observed that communication between the cooperative management team and cooperative members was strained, with both sides raising concerns about the lack of commitment from the other party. Only at the end of August did production start, with the yield, however, turning out to be much lower than expected. As a result, feelings of frustration and disappointment emerged among the women, questioning whether mushrooms were the best production option for them, as the idea of "quick and easy money" turned out not to be true. Moreover, no marketing strategies were in place at that stage. The women also considered growing vegetables, as this could at least provide food for their families, contrary to mushrooms, which most of them had never eaten. However, due to a lack of funds to buy seeds, fences, and tools, the women were unable to start producing vegetables during the time of this research.[10]

WFP, on the other hand, experienced the challenge of creating self-reliance and independence among cooperative members, and raised concerns about the ongoing dependency of the participants and a perceived lack of initiative. For example, the cooperative members visited the project site far less often than WFP expected or understood based on the program. According to WFP, the women further were relying too heavily on practical assistance. As a strategy to evaluate and reflect on the various programs, WFP held a meeting during the last week of July 2010. In addition to the WFP leadership and program facilitators, participants of the various programs were invited, including the cooperative members.[11] The meeting revealed the challenges experienced by all stakeholders in developing independent and "empowering" structures, and shed light on the factors compromising the participation of women.[12]

Apart from the challenges experienced with project implementation and participation, it is of central importance in the context researched here that all cooperative members are still living on the premises of one farm owner, on whom they depend for housing, occasional income, and benefits through their employed male partners. Although the cooperative members stated that they are not obliged to explain themselves to the farm owner with regard to their cooperative activities, all of them expressed fear of his potential negative reaction, as he might perceive that the women's engagement in the cooperative could, in the medium or long term, deprive him of an easily accessible and available labor force. Among the reactions they feared were potential eviction from the farm, a family member being retrenched, or not being offered seasonal employment anymore. WFP's position on communication with the farm owners regarding the cooperative program is that the women and the program team should not integrate the farmers into the process of cooperative development.[13] In WFP's view this would

[9] In line with our participatory approach, Ana Eisermann collaboratively engaged in production activities and to some extent assisted in the process, while aiming to not dominate or greatly influence it.

[10] Since this research's time period, the cooperative has shifted to producing vegetables and does not engage in mushroom production anymore (Oxfam Canada, n.d.).

[11] Three authors of this paper (Ana Eisermann, Anne Bellows, and Stefanie Lemke) were invited to participate in this meeting while undertaking research in the area. This allowed them access to valuable insights into the debate between the various actors and to reflect on the process. This further demonstrates the openness toward critical reflection from the side of WFP.

[12] The difficulties associated with women leaving their homes, for example to participate in this meeting, were explicit. Living in isolated rural settings, they worry that no one will care for or feed their children in their absence, and worse, they fear for the children's potential exposure to abuse. Additionally, the material goods of their household remain unprotected.

[13] As was communicated to us by WFP, the organization does in fact collaborate with farm owners with regard to WFP's health and safety program and social security program. Farm owners are interested in participating in these programs as they

serve to perpetuate the paternalistic system and contradict the core principle of empowerment WFP declares as its aim. During one informal meeting with the farm owner, he stated that he has nothing against the cooperative, but he emphasized that he would like to be informed if researchers enter the farm premises, something that had not been done due to the approach of WFP as described above. Another power struggle faced by the cooperative members is within their own households, with many of them experiencing domestic violence and abuse. The women reported conflicts arising about how to use the money obtained from the stipend. One cooperative member was physically abused by her husband and her daughter, who wanted to take the money from her. Another cooperative member was threatened with being evicted by her grandmother. For a third woman, the involvement with WFP is a constant source of conflict, as her family members are afraid that the farmer might take negative actions against them.

Impact of the Program on the Livelihoods of Participating Women

The cooperative members receive a monthly stipend of 1,316.69 ZAR (USD174.73), equivalent to the minimum wage of farm workers. The monthly stipend is provided by an international donor and maintained in a bank account held by one cooperative member, who is the only one who has a bank account. Once per month she draws the money when she travels to town and then distributes it to the other cooperative members. WFP was planning to assist the women in establishing a bank account in the name of the cooperative, but this had not materialized by the time of this research. The agreement with WFP is that the stipend is paid to the members until the cooperative is able to generate an income.

Our findings show that participation in organizational development of the cooperative and supportive programming from WFP did make important contributions to enhancing cooperative members' livelihoods. In terms of the capacity to undertake an autonomous agricultural-oriented entrepreneurial project, participation facilitated women's access to land (natural assets), income (financial assets), and agricultural training and technical skills (human assets). Bolstering the specific objective of agricultural cooperatives, WFP introduced more general adult education programs on health, well-being, and human rights, focusing on critical topics that are inadequately available in isolated rural communities, such as HIV/AIDS awareness, alcohol abuse and domestic violence, gender equality, and farm workers' rights as well as raising awareness about the availability of related support structures (relating to institutional structures and processes). Also in this case study, these combined livelihood assets have a positive effect on the vulnerability context and on the livelihood outcomes of the women.

It has to be emphasized that the decision of these women to establish a cooperative represents a confrontation with the patriarchal and paternalistic relationships of dependency, both on their male partners and also the farm owner, for all of their lives, having almost no support networks outside of the farm where they live. This is illustrated by the following statement of one cooperative member: "My father laughed when I told him that we will build a cooperative, that we will be our own boss. The only thing he knows is to be a farm worker and to work for the farmer." Overall, the women perceived the following achievements through joining the cooperative: generating an income through the stipend provided by the cooperatives program and thus improving the overall economic and food situation of their households; mobilizing among themselves; gaining organizational and leadership skills; and experiencing greater self-esteem and self-confidence.

Discussion

Lack of Financial Prospects as Major Challenge for Livelihoods in Smallholder Farming

Most of the women who engaged in the agricultural training program facilitated by GTF do not actually intend to work in agriculture in the long

gain credibility when engaging with certain incentives required by the government.

term, as illustrated in case study one. Given high unemployment rates and the prospect of an educational certificate, the GTF program offers some advantages, although difficult ones for the participants to survive on financially. Even if the communal land that was obtained by the Grootbos Foundation in the neighboring township could provide an opportunity for these women to engage in smallholder farming in the future, this might not be what they would opt for, for several reasons. First, the prospects of establishing one's own farming business currently are not promising. South African agriculture is still characterized by large-scale farming operations, and there is generally very limited access to infrastructure and a lack of support structures for emerging and smallholder farmers (Greenberg, 2010). Especially in the Eastern Cape, where most of the women come from, drought, poor soil quality, and lack of infrastructure place considerable constraints on people who opt for establishing small-scale farming operations or home gardens (Seti, 2003). Even if certain structures are in place, for example in the form of credits or extension services, people often do not know that they exist or how to access them. Second, the lack of financial prospects in smallholder farming forces the women to seek better-paid employment. Third, farm labor and farm workers are regarded as having very low social status, due to the history of farming and ongoing poor working and living conditions on many farms. On the other hand, home gardens have been shown to contribute considerably to household nutrition security (Faber et al., 2011). As Aliber & Hart (2009) and Seti (2003) argue, home gardens have two distinct benefits for the nutrition situation of households. First, the food produced for their own consumption can significantly reduce the households' dependence on purchasing food from the market. Second, this income is fungible and can be spent on other items or on more nutritious foods that the household might not be able to produce. This is in line with our observation that the women's garden plots at the GTF project site provided them with vegetables and thus decreased their purchase of these foods from supermarkets, making considerable contributions to their food supplies and dietary diversity. Further, they were able to sell surplus produce to their neighbors and were thus able to buy other foodstuffs.

Aliber & Hart (2009) point out, however, that home gardens can only make positive contributions to household food security if certain conditions are fulfilled, such as access to input and output markets (relating to institutional structures and livelihood strategies); extension services (relating to institutional structures); and access to adequate natural resources (relating to livelihood assets). In the case presented here, as long as the women were part of the program at Grootbos Foundation, these structures were largely in place. Once the course was completed, despite some support being offered by the Grootbos Foundation beyond the duration of the course, none of the above mentioned conditions was adequately fulfilled. It is beyond the capacity of the Grootbos Foundation to put all of the required structures in place. Further, with the end of the course the women lost the financial support in the form of a stipend and had to find other employment options that could ensure food supplies for their households.

Power Relations as a Major Challenge for Developing Sustainable Cooperative-based Livelihoods

In contrast with the women participating in the program of the Grootbos Foundation, women in the agricultural cooperative facilitated by WFP consciously decided to engage in agriculture as a possible future livelihood strategy. The cooperative enabled these women access to various resources, such as income, land, farming implements, and training; this would not have been in reach if they had tried to approach this individually. The ability to follow new livelihood strategies depends on and is affected by different combinations and components of resources that people possess (Scoones, 1998), and these resources, in turn, are widely reported as crucial for women's empowerment (Hashemi, Schuler, & Riley, 1996; Kabeer, 1999; Malhotra, Schuler, & Boender, 2002; Rao, 2006). Considering that almost two decades after the end of apartheid a significant part of the South African population is still caught in a structural poverty trap, our findings suggest that the

cooperatives may leverage transformation and social change that can lead to reducing the poverty status of participating women. Among the positive livelihood outcomes reported are a sense of ownership and a certain degree of control over land, increased confidence and self-esteem, acquisition of new skills, and increased awareness of rights. However, various structural power relations hamper the cooperative's development:

1. high dependency on farm owners who still provide occasional incomes and some social security;
2. power struggles within households and communities; and
3. reliance on the support of WFP.

In the first of these structural power relations, we must recognize that all WFP cooperative members were living on the premises of the farm owner and were either still working for him themselves occasionally or had relatives who were working for him. This situation of financial dependency places women in the new cooperatives and to some extent their families in a highly vulnerable position and delimits their path to greater economic and social autonomy. Clearly, participation in the cooperative alone does not enable participants to break free from the paternalistic structures prevalent on farms that provide services ranging from schools to transportation in isolated rural areas, services that reinforce highly unequal power dynamics between farm owners and farm workers. This patronizing system that stipulates that women's commercial farm employment and access to benefits like housing and water be tied to male family employment magnifies women's particular dependency (cf. Atkinson, 2007; Orton, Barrientos, & Mcclenaghan, 2001). Our findings illustrate that, because of farm workers' weak position, the women attempt to hide their engagement in the cooperative from farm owners for fear of a backlash, including loss of privileges or even eviction from the farm. This concealment bespeaks the gravity of the unequal power relations and the monumental task of changing them. Secondly, unequal power struggles extend to the patriarchal structure of households. Women are expected to carry out all reproductive work and only work at the farm when labor is needed, creating dire dependency (Orton et al., 2001). Further, exacerbated by the violent inheritance of apartheid and the degrading inequity on many commercial farms, as well as in other contexts, domestic violence is reported at an extraordinarily high rate, compromising the capacity of affected women to pursue their own livelihood strategies (Brown-Luthango, 2006; Shabodien, 2006). Finally, a complex power relationship exists between cooperative members and the organization WFP, which deeply affects members' agency. Research revealed that cooperative members felt pressure to please WFP, as the organization is their best and perhaps only gateway to access resources. WFP, on the other hand, has the challenge of creating self-reliance and independence among the cooperatives. The fact that WFP pays a stipend to cooperative members until they are able to generate an income from their agricultural activities perpetuates their dependency on the organization and might prevent them from investing the time and energy that would be needed to establish their own viable farming business. Kilby (2006) argues that this dynamic of concurrently empowering communities and fostering dependence is common among NGOs and the project groups they support.

Conclusion

The research presented in this paper reveals the impact of two agricultural programs facilitated by CSOs on the livelihood options of women and on their perceptions regarding participating in these programs. The case studies illustrate that women's access to various resources improved through participation, enhancing their livelihood assets and possibly providing them alternative livelihood strategies in the future. However, several challenges inhibit these programs' abilities to become independent, economically viable, and sustainable:

- the difficulty that participating women face when confronting structurally patronizing and patriarchal power inequities, especially within their own households and communities;
- the ongoing unequal power structures and

paternalism experienced by farm workers, both women and men, within their working and living environment at the farm;
- the different expectations on the side of program facilitators and participants, and lack of communication between them;
- the dependency of participants on the organization as a limiting factor in achieving autonomy and fostering self-determination;
- the lack of access to markets for small-scale trade in locally grown foods; and
- the lack of future prospects in the agricultural sector.

Our observations suggest that significant revision is necessary before these two programs will have a measurable impact on the viability of participants' livelihoods in the long term. We argue, however, that while these programs achieve only part of their desired outcomes with regard to providing sustainable future livelihood strategies for these women, both organizations do make crucial contributions to the lives and livelihoods of these women. It has to be acknowledged that currently no alternatives are in place to the type of programs described here, implying that, without these programs, no such opportunities would open up for the women concerned. We argue further that, given the context of historical injustice and ongoing conditions of rural, racial, gender, and class structural power inequities, the "success" of single programs should be viewed in terms of their ability to leverage, as opposed to shoulder, social change and sustainable livelihoods. The most important contribution might be that participation in these programs breaks the vicious cycle of isolation these women find themselves locked into and stimulates an awareness of possibilities, visions, ownership, and rights among them that can have a medium- or long-term, if not immediate, effect, and that they might be able to apply to various other contexts beyond the agricultural sector in the future. The desire to obtain access to land often is not particularly or exclusively for agricultural production, a fact that is sometimes unexpected for organizations facilitating agricultural programs. Under the present conditions in South Africa only few households under ideal conditions might be able to strive for and achieve self-sustaining farming operations. For some households, though, smallholder farming or home gardening might serve the purpose of contributing to household food supplies, creating some level of independence from purchasing food. The widely criticized lack of governmental institutions and support structures calls for urgent attention in future revisions of land and agricultural reform programs, in order to address the multiple demands of:

- access to housing and land;
- monitoring and enforcing labor rights and human rights protections, with a specific focus on measures to end violence and discrimination against women; and
- access to health, educational, and transportation services.

With the goal of strengthening civil society and empowering marginalized groups to engage in sustainable livelihood strategies, we hope that our research will contribute both to the work of our partner organizations and to the awareness of South African policy-makers. The findings of the two case studies informed follow-up research that is being pursued in 2012 in cooperation with both organizations, with a specific focus on institutional structures and transforming processes as crucial components of the Sustainable Livelihoods Framework. Applying the SLF enabled us to shed light on underlying conditions and structural inequity among the women observed, confirming that this detailed exploration of location-specific contexts is critical. We emphasize that this framework is not designed to describe rural livelihoods as "farm livelihoods," but that it can be applied to various other rural contexts. Our results only report on two cases and are not representative of South Africa as a whole. It is expected, however, that our findings will be valid for other rural food-insecure regions in the country and, additionally, beyond the South African context, as the present-day realities of marginalized groups in South Africa are not exclusive to the southern African continent or, indeed, to much of the world.

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Association between duration of community-based group membership and sustainable livelihoods for Kenyan women dairy farmers

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Abstract

Kenyan community leaders called for strengthened sustainable livelihoods for farmers and in 1992 formed a self-help dairy group that was reorganized in 2009 to form the Wakulima Dairy Ltd. (WDL). At WDL, members sell surplus milk to the dairy and, through nongovernmental organization (NGO) partnerships, receive training to enhance dairy farm productivity. As a result, higher milk production has been reported; however, data are lacking on sustainability and livelihood outcomes of dairy training for women farmers. To inform future projects and interventions, our study objectives were to determine the relationships between dairy group membership and duration of membership, sustainable livelihood assets, household income, and food security. We thus conducted a cross-sectional survey of 88 WDL members (among four membership duration groups) and 23 nonmember farmers. Milk production and herd size were higher for greater-than-three-year members compared to nonmembers and one-to-three-year members. The proportion of households with an income from dairy of greater than 5,000 ksh/month (ranging from 0 to 40 percent), food security (ranging from 4 to 30 percent), and number of improved household characteristics

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Disclosures: Author Walton has been a volunteer milk quality advisor with WDL and has provided training for groups of WDL farmers. Author VanLeeuwen has provided animal health training for groups of WDL farmers with Canadian and Kenyan senior veterinary students. Authors Taylor, VanLeeuwen, and Walton are actively involved with Farmers Helping Farmers on a volunteer basis.

(ranging from 1.7 to 3.3), were positively associated with longer membership duration. While the cross-sectional design does not allow attribution of causality, results suggested that WDL membership strengthened the livelihood assets of women farmers, particularly after three years, and that positive outcomes were sustained with longer membership duration. Anecdotally, women indicated that WDL's role in women's control of dairy income, regular payments, and food and services on credit, were important. WDL is a model to strengthen sustainable livelihoods through relevant gendered training, supports, and market access for agricultural products. Research to understand the optimal asset mix to benefit from dairy groups as well as factors limiting per-cow milk production is needed to guide future interventions and enhance the role of dairy farming for sustainable livelihoods.

Keywords
capacity building, cross-sectional survey, family welfare, food security, sustainability

Introduction

Kenya is a developing country of approximately 40 million people, with roughly 80 percent living in rural areas. Nearly one-half the population is poor (unable to meet their daily nutritional requirements) and the majority of the poor live in rural areas (IFAD, 2009). The climate is varied, with 20 percent of the land being conducive to agriculture, particularly in the Central and Rift Valley provinces. These provinces are characterized by bimodal rains, typically occurring in October and March, that support agriculture. Smallholder farmers raise animals and grow staple foods (maize and beans) and other crops on small parcels of land, usually less than 5 acres (2 hectares). Most smallholder households in sub-Saharan Africa rely on agriculture for a significant portion of their income; however, productivity is typically low. Enhancing agricultural productivity of smallholder farmers is one strategy for reducing food insecurity and rural poverty (Matshe, 2009).

Dairy farming potentially offers smallholder farmers higher returns on land and labor than crops such as coffee or tea, as well as the expectation of regular income (Delgado, 1999). In Kenya, as with Tunisia and other countries, the demand for milk and milk products is strong and growing (Ben Salem & Khemeri, 2008; Thorpe, Muriuki, Omore, Owango, & Staal, 2000). Dairy-related technical training and improved livestock breeding have improved milk production and farm income in Kenya (Kisusu, 2000; Mullins, Wahome, Tsangari, & Maarse, 1996), Tanzania (Bayer & Kapunda, 2006), and Ethiopia (Ahmed, Jabbar, & Ehui, 2000). Hildebrand (2008) concluded, however, that measures to improve productivity, such as improved animal health and breeding, remain underexploited in relation to improving food security and rural livelihoods. Factors limiting higher livestock productivity, including time constraints and limited access to extension services, affect women more than men, and may limit the participation and efficiency of women in livestock production (Kristjanson et al., 2010; Yisehak, 2008). In Kenya, women are the dominant dairy operators and, despite an increased workload with dairying, reported being better off due to income increases and stability (Mullins et al., 1996; Tangka, Ouma, & Staal, 1999). In contrast, Ethiopian women generally were not responsible for cattle-keeping, and so intensification of dairying increased men's income with little impact on women's workload or income (Tangka, Emerson, & Jabbar, 2002). Dairy intensification in a village in India increased the workload and stress of the women but without increased income (Sharma & Vanjani, 1993). Women's control over income has been associated with purchases that provide a broader household benefit than purchases made by men. However, it is not uncommon for commercialization efforts to lead to more male control of activities and incomes (Huss-Ashmore, 1996; Kristjanson et al., 2010) in keeping with the traditional African view of cash income being part of the male domain (Gladwin, 2001).

Wakulima Dairy was established by a small group of community leaders in 1992, as a Self-Help Dairy Group, and governed by an elected board of representative farmers. Expansion of the activities and the number of members led to the incorporation of Wakulima Dairy Ltd. (WDL) in 2009. WDL remains governed by an elected board and has

about 6,000 independent member farmers throughout the Mukurwe-ini district, Central province, Kenya. Its primary business is to buy raw milk from its members and transport and sell the milk to various markets. In addition, WDL broadly supports members by providing veterinary services, animal feeds, school fees, and staple household foods on credit. WDL has gained the trust of its member farmers through good overall governance and making monthly milk payments that provide members with a steady income. WDL has succeeded in providing farmers with stable markets for their milk by being a committed supplier of high-quality milk.

WDL has partnered with Farmers Helping Farmers (FHF), a Canadian NGO, since 1996, and with the Atlantic Veterinary College (AVC) since 2004, to strengthen the livelihoods of WDL's women farmers. Joint efforts were made to enhance dairy production through training and other supports and to retain women's control of dairy income. For three weeks each year, FHF volunteers and AVC faculty and students have assisted in practical training for farmers and efforts to improve the quality of animal health services. Four sequential projects with WDL were financed in part by the Canadian International Development Agency (CIDA). Kenyan staff, initially supported by project funds and then hired by WDL, continued the training throughout the year under the guidance of FHF and AVC. Women farmers were the focus of training, although not at the exclusion of men. Women were represented on the board of directors as a requirement of the FHF partnership.

Between 2004 and 2006, milk production and animal reproduction on WDL farms generally improved (VanLeeuwen et al., 2012). However, there is little published on broader sustainable livelihood (DFID, 2001) asset and outcome measures for women farmers belonging to community-based dairy organizations, nor on these measures associated with longer-term semicommercial dairying as a livelihood strategy.

To inform future projects and interventions, our study objectives were to determine relationships between dairy group membership and duration of membership, sustainable livelihood assets, household income, and food security.

Materials and Methods

Study Site

The 6,000 WDL member households located throughout Mukurwe-ini Division represent approximately 29 percent of the district's population (estimated at 84,000 inhabitants in 2009) (Kenya National Bureau of Statistics, 2009). Milk is collected in trucks along four rural routes and from members within walking distance of the milk plant. There are nonmember farmers living among the dairy group members.

Study Design

A cross-sectional survey of 88 WDL member households, evenly distributed over four membership-duration groups (one- to three-, four - to six-, seven- to nine-, and 10-and-more years), and a fifth group of 23 nonmember households, was conducted in August 2009.

Sampling

A sample size of 20 households in each group was established to generate data with reasonable power, balanced with limited resources, to conduct the research. Ten percent oversampling per group was included in case of spoiled or missing data. There was no central list with duration status or contact information for the 6,000 WDL member farmers and no reasonable and efficient manner to establish such a database to allow us to draw a stratified random sample. As a result, study participants in the four membership-duration groups were identified using chain referral sampling. This method is used to access "hard to reach" populations, such as those in developing countries (Heckathorn, 2002; Penrod et al., 2003). With chain referral, the study sample is created by referrals made among people (members) who know others possessing the "character of research interest" (membership-duration) (Biernacki & Waldorf, 1981). Eight WDL members were selected to initiate the referrals. These initiators represented a wide range of age, geographic distribution, and involvement within the dairy group. Each initiator referred farmer members who represented the four membership-duration groups. The research team contacted referred members to confirm membership dura-

tion. This procedure was repeated until sufficient numbers of members in each membership-duration group were identified. Referred WDL members were asked to identify nonmembers to generate a nonmember list (n=50). The nonmember participants (n=23) were randomly selected from this list. Directors and managers of WDL and teachers were excluded from the study to focus the research on households with farming as their primary livelihood strategy.

Questionnaire Design

The survey included open-ended and multiple-choice questions on household demographics and environment, farm characteristics, income, and household food security. Household environment questions, which examined housing (e.g., construction, repair, size), facilities (e.g., fuel, water, sanitation), and consumer assets (e.g., bicycle, radio), were modified from the Kenyan National Household Demographic and Health Survey (Central Bureau of Statistics [Kenya], Ministry of Health [Kenya], and ORC Macro, 2004). In order to develop a count index that represented household environment, housing and facilities were categorized as improved or not and a sum of improved home environment characteristics was computed for each household. For example, the number of buildings on the property and number of rooms in the main building was categorized as improved if the number was equal to or greater than the median number observed within the study. In addition, a vented cook house (i.e., with a chimney to exhaust wood smoke) and concrete or brick walls and floors were classified as improved. An improved latrine was one not shared with other families, as described in the Kenyan Demographic Survey (Kenyan National Bureau of Statistics [KNBS], 2010).

Primary and secondary household water sources were identified and included piped (to compound or neighbor), harvested rainwater, river or stream, public tap, and borehole (unprotected shallow well). The proportion of households using river or stream water as the primary or secondary source in both seasons was computed as an indicator of water access.

A measure of "household crowding" was computed from the number of daily household inhabitants divided by the number of rooms in the main building. Each household was categorized as above or below the median "crowding" for the study group.

Farm characteristics (e.g., acreage, herd size and age distribution, and milk production levels) were recorded. Monthly income (in categories) from milk, other farm product sales, and off-farm earned income were recorded. Milk income was based on the most recent full month of milk sales. Annual coffee income for 2008 was divided by 12 to estimate monthly coffee income. Midpoint values for each income stream were used to estimate household monthly income. Per-capita income was computed by dividing the monthly income estimate by the number of daily inhabitants. Women were asked who in the household controls the dairy income.

Household food insecurity (access) (HFIA) was measured using the validated "Household Food Insecurity Access Scale Version 3" (Coates, Swindale, & Bilinsky, 2007). Briefly, this method captures and quantifies predictable experiences and responses of household food insecurity with reference to the previous four weeks. Nine questions address anxiety and the need to reduce food quality and/or quantity due to food shortages. Questions progress from experiences of mild to severe household food insecurity. For each question the frequency-of-occurrence is assessed as never, rare (one to two times), sometimes (three to 10 times), or often (more than 10 times). HFIA responses were tabulated as per Coates et al., (2007) and summarized by membership duration group to describe (1) the prevalence of households categorized as food secure, mildly food insecure, moderately food insecure, and severely food insecure; (2) the prevalence of households experiencing the conditions of "anxiety," "reduced quality," and "reduced quantity" of food; and (3) the overall HFIA score (as a continuous variable ranging from zero to 27). A "Household Hunger Score" (HHS) was computed for each household using the three most severe HFIA questions based on the HFIA cross-cultural validation study (Deitchler, Ballard, Swindale, & Coates, 2010). The HFIA questions were culturally adapted to include

local examples for prompts, as recommended (Coates et al., 2007).

Prior to use, the questionnaire was revised after review by WDL management and pre-testing on three households.

Survey Administration

Family, farm, and demographic questions were posed to the husband and wife, depending on availability, or only the man or woman in single-parent situations. The person responsible for food preparation in the home, usually the woman, was interviewed alone (when possible) for household food insecurity and income control questions. The interview was conducted in person, using a translator as needed.

Data Handling and Analysis

Data were coded, manually entered using Microsoft Excel 2007 (Microsoft Office, Microsoft Corp. 2007), and checked for accuracy. The distribution of continuous variables was assessed visually and transformed (i.e., natural logarithm) to achieve a normal distribution. The normal distribution of transformed variables was confirmed using the Shapiro-Wilks test. Standard chi-square or Fisher's exact (categorical variables), ANOVA (normally distributed continuous data), and Kruskall-Wallis (not-normally distributed continuous data) tests were used to determine associations among the five membership groups (nonmembers through 10-and-more-year members), and among members and nonmembers for demographic, production, and livelihood outcomes. Statistical analyses were conducted using Stata 10. Significance was assessed at $p \leq 0.05$.

Approval to conduct the study was obtained through FHF, WDL, and the University of Prince Edward Island Research Ethics Board prior to conducting the study. Signed consent was obtained from all participants after the nature of the study had been fully explained.

Results

Human and Social Capital

Men were the predominant heads-of-household (83 percent), while 10 percent of households were headed by widowed women. Overall, 83 percent of participants were married, which ranged from 65 percent in the seven- to nine-year group to 95 percent in the one- to three-year group. One participant was divorced and seven were single. Gender of household head and marital status were not associated with duration of membership.

As expected, the average age of WDL member mothers (range 21–73) and fathers (range 24–78) increased with longer WDL membership duration, although the age of newer member groups were similar (table 1). Comparing all-members to

Table 1. Household Demographics, by Dairy Group Membership Duration[1]

	Nonmembers (n=23)	Members 1–3 yrs. (n= 23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Mother's age mean (SE)	43.9 (3.0)a	35.1 (2.2)ab	34.4 (2.1)ab	43.3 (2.2)ab	52.9 (2.1)ac	41.5 (1.3)
Father's age mean (SE)	52.3 (3.1)a	40.7 (2.4)b	38.8 (2.5)b	48.1. (3.8)ab	62.5 (3.7)ac	46.3 (1.8)
Household size[2] mean (SE)	5.1 (0.4)	4.0 (0.3)	4.3 (0.3)	4.3 (0.4)	3.8 (0.4)	4.1 (0.2)*
Mother's education attended						
% no formal &primary	90.9	81.2	69.6	50.0	63.6	66.7
% secondary	9.1a	18.2ab	30.4abc	50.0bc	36.4bc	33.3*
Father's education attended						
% no formal and primary	81.8	70.0	63.7	25.0	80.0	62.4
% secondary and higher	18.2a	30.0a	36.4a	75.0b	20.0a	37.6*

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
[2] Usual residents who eat at the home >5 days per week
* All member and nonmember measures in the row are significantly different ($p \leq 0.05$)

nonmembers, the average mothers' and fathers' ages were not different. Average household size (daily occupants) was lower for all-members (4.1) compared to nonmembers (5.1) and ranged from one to 10. Fewer nonmember mothers and fathers had secondary education compared to all-members. A significantly greater proportion of the seven- to nine-year group fathers had secondary education compared to other groups.

Fewer nonmember mothers (48 percent) were affiliated with a Women's Self-Help Group (Women's group) compared with all-member mothers (70.5 percent). There was no difference in the women's group member proportions among the groups of WDL members. Overall, 84 percent of women reported belonging to a church, with no difference among membership groups.

Natural and Physical Capital

Almost all (99 percent) participants owned their home and land. The number of household buildings (mean two, a main building and separate kitchen; range one to five) and the number of rooms in the main building (mean three, range one to eight) were not associated with membership duration group. All main buildings had roofs of corrugated steel and were constructed with brick (45 percent) or wood plank/mud (55 percent) walls, with no membership group association. Duration of membership was positively associated with the proportion of households having a pit latrine at home, concrete or tile floors, and a vented cookhouse (table 2). All households cooked with firewood or charcoal, and the majority used light from kerosene lamps. Solar light was used by five households and five others used electricity for lighting. Household crowding ranged from 0.25 to 4.5 persons per room in the main building, with a median of 1.3. More nonmember households had higher-than-median crowding compared to all-members. The number of improved household characteristics (range zero to six) was positively associated with duration of membership, specifically for households with seven or more years of WDL membership.

Fewer member households relied on river water in the dry season compared to nonmembers, and there was evidence of lower river-water reliance with longer membership duration (table 3). More all-members used piped water in the dry season compared with nonmembers. Rainwater, stored in small buckets and large cisterns, was the primary household water source in the wet season. Throughout both seasons, the proportion of

Table 2. Household Environment (% of households) and Number of Improved Home Characteristics by Dairy Group Membership Duration[1]

	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Home construction						
Concrete or tile floor	4.4a	17.4ab	18.2ab	65.0c	52.2c	37.5*
Dirt floor	95.6	82.9	81.8	35.0	47.8	62.5
Facilities and utilities						
Pit latrine at home	65.2a	73.9ab	90.9bc	90.0bc	100.0c	88.6*
Pit latrine at neighbour	34.8	26.1	9.1	10.0	0.0	11.4
Vented cookhouse	8.7a	21.7ab	18.2ab	45.0b	39.1b	30.7*
Household crowding						
% with > 1.3 people/room	78.3a	52.2ab	63.6ab	50.0ab	34.8b	50.0*
Number of improved characteristics						
Mean (SE)	1.7 (0.2)a	2.1 (0.2)a	2.2 (0.3)a	3.3 (0.3)b	3.3 (0.3)b	2.7 (0.1)*

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
* All-members and nonmember measures in the row are significantly different ($p \leq 0.05$)

Table 3. Primary Water Source in the Dry and Wet season, by Dairy Group Membership Duration (% of households)[1]

Dry Season	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
River or stream	91.3a	69.6ab	50.0b	65.0b	52.2b	59.1*
Rainwater	0	0	4.6	10.0	4.4	4.6
Piped[2]	4.4a	21.7ab	27.3b	10.0ab	43.5b	26.1*
Borehole, spring, other	4.4	8.7	18.2	15.0	0	10.2
River as 1^0 or 2^0	91.3a	86.9ab	72.7ab	65.0b	69.6ab	73.9
Wet Season						
River or stream	8.7	17.4	4.4	5.0	4.4	8.0
Rainwater	91.3	69.6	78.3	80.0	65.2	72.7
Piped[2]	0	13.0	13.0	10.0	30.4	17.0
Borehole, spring, other	0	0	4.4	5.0	0	2.3
River as 1^0 or 2^0	78.3a	47.8b	31.8b	35.0b	26.0b	35.2*

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
[2] Water piped to compound, neighbour, public tap
* All-members and nonmember measures in the row are significantly different ($p \leq 0.05$)

households using river water as a primary or secondary source was lower for all-members compared with nonmembers, and was lower with longer duration of membership.

Nonmembers owned fewer consumer assets than all-members (table 4). Mobile phones and radios were the most predominant consumer asset. The proportion of all-member households with mobile phones was significantly higher than nonmembers'. Very few households owned a refrigerator, motorbike, or car/truck which reflected results for rural Kenya in the most recent national survey (KNBS, 2010).

Most households owned two acres (0.8 hectare) of land or less, with no difference among membership duration groups. More WDL members rented additional land than nonmembers (49 percent vs. 26 percent). Of these renters, most (88 percent) rented one acre (0.4 hectare) or less. The proportion of households dedicating their largest land area to napier grass (animal fodder) was higher with longer membership duration and there was a reverse trend for growing maize (figure 1). Members of the one- to three-year group did

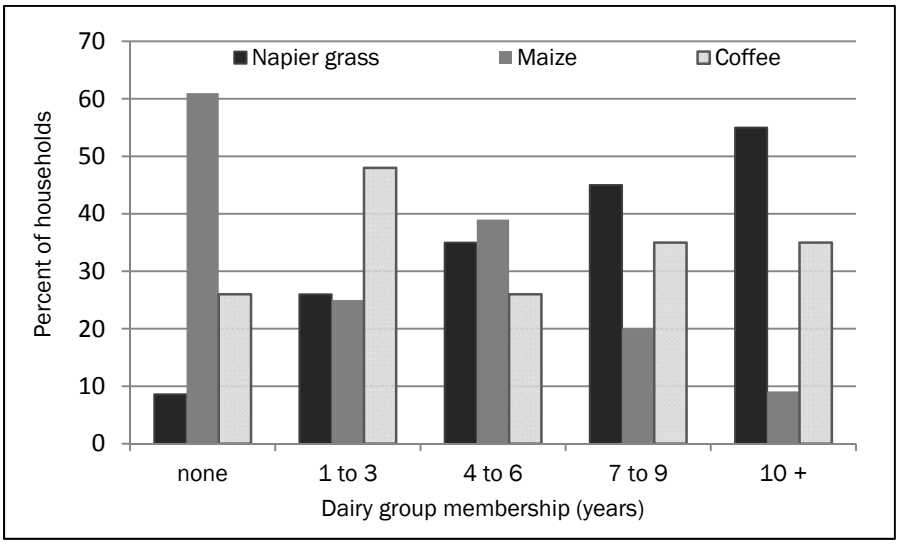
Table 4. Consumer Assets Ownership, by Dairy Group Membership Duration (% of households)[1]

	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)	KNBS[3]
# of consumer assets[2]	1.7 (0.2)a	2.5 (0.2)ab	3.1 (0.3)b	2.6 (0.3)ab	2.3 (0.2)ab	2.6 (0.1)*	
Radio	74	91	91	80	77	85	71
Mobile phone	65	96	96	100	86	94*	53
TV	13	17	43	40	27	33	18
Bicycle	13	26	44	20	18	27	34
Solar energy	4	13	30	15	14	18	6

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
[2] Mean number (SE) of the assets listed
[3] Results for rural Kenya from Kenyan Demographic Household Survey 2008 for context (KNBS, 2010)
* All-members and nonmember measures in the row are significantly different ($p \leq 0.05$)

not follow the trend; many had their largest land area dedicated to growing coffee. Significantly more all-members (40 percent) than nonmembers (9 percent) dedicated the largest land area to napier grass production. Significantly fewer all-members (24 percent) dedicated their largest land area to maize production compared to nonmembers (61 percent). Some members (35 percent) and nonmembers (26 percent) dedicated their largest land area to coffee production.

Figure 1. Crop Occupying the Largest Farm Area, by Membership Group



Dairy Farm Characteristics

Women alone were responsible for dairy work on 51 percent of farms (range 31–70 percent across groups), and jointly with their husband on 45 percent of farms (range 13–70 percent across groups). Men alone were responsible for dairy work on 10–22 percent of farms across groups, and a hired hand was responsible for the dairy work in one household in the seven- to nine-year group and two in the 10-and-more-years group. No differences were observed among membership duration groups.

Herd size ranged from zero to six animals and the number of heifers from zero to four (table 5). Nonmembers with cattle had smaller herds and fewer lactating cows than all-members. No differences were seen in the number of heifers among the membership groups. Daily milk production per farm ranged from 2.2 to 99.2 pounds (one to 45 kg), and per lactating cow

Table 5. Dairy Herd and Production Characteristics, by Dairy Group Membership Duration[1]

	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Herd size (all farms)	0.7 (0.2)	1.8 (0.2)	2.5 (0.2)	2.2 (0.3)	2.3 (0.3)	2.2 (0.1)*
Herd size¶	1.3 (0.1)a	1.8 (0.2)ab	2.5 (0.2)c	2.2 (0.3)bc	2.4 (0.3)bc	2.2 (0.1)*
# lactating cows¶	0.3 (0.1)	1.0 (0.1)	1.2 (0.2)	0.9 (0.2)	1.0 (0.2)	1.0 (0.1)*
# heifers¶	0.5 (0.1)	0.4 (0.2)	0.8 (0.1)	0.7 (0.2)	0.9 (0.2)	0.7 (0.1)
Kg milk produced/day§	3.1 (1.3)a	6.4 (1.0)ab	15.1 (3.5)b	11.5 (1.9)b	11.3 (1.8)b	10.3 (1.1)*
Kg milk produced/cow/day§	3.1 (1.3)a	5.5 (0.6)ab	7.7 (1.2)b	8.9 (1.0)b	8.6 (1.3)b	7.5 (0.5)*
% milk sold/day§	24.4 (16.4)	66.5 (5.4)	73.0 (6.5)	76.7 (2.8)	75.2 (3.4)	72.3 (2.5)*
Kg home milk/capita/day§	0.3 (0.11)	0.5 (0.1)	0.6 (0.1)	0.6 (0.1)	0.6 (0.1)	0.6 (0.0)

[1] Data are expressed as mean (SE) for consistency; values having the same letter within each row are not significantly different ($p < 0.05$)
* All-member vs. nonmember measures in the row are significantly different ($p \leq 0.05$)
¶ Includes only farms with cattle (n=13 for nonmembers, n=22 for 10+ members)
§ Milk production data from farms with lactating cows (n=4 for nonmembers; n=20, 15, 13, 17 for 1–3, 4–6, 7–9, 10+ years, respectively)

Table 6. Monthly Income and Income Control by Dairy Group Membership Duration[1]

	Nonmembers (n[2])	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Total per capita income (Ksh)[3]	278 (58, 729)	1562 (1250, 2770)	2500 (1000, 2667)	2867 (1429, 4500)	2094 (1111, 2850)	2010* (1150, 3055)
Non-dairy per capita income (Ksh)[3]	278a (58, 625)	847ab (417, 1750)	833ab (200, 2006)	1619b (1060, 3423)	570ab (361, 1458)	917* (416, 1979)
Monthly dairy income						
% of farms earning 0–5000 Ksh	100	91	64	60	68	71*
% of farms earning >5000 Ksh	0a	9ab	36c	40c	32bc	29
Dairy income control						
% of farms women sole or joint control control (man&woman)	Na	78	77	80	78	79

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
[2] n=13 for nonmembers' total and nondairy incomes; n=2 for nonmembers' dairy incomes
[3] Median per capita incomes with 25th and 75th percentiles; the Kenyan shilling to U.S. dollar exchange rate was approximately 80 at the time of the study (OANDA Historical Exchange Rates, http://www.oanda.com/currency/historical-rates/)
* Member and nonmember measures in the row are significantly different ($p \leq 0.05$).

ranged from 2.2 to 50.7 pounds (one to 23 kg). These production measures were higher for all-members compared with nonmembers and specifically for longer-term (greater than three-year) members. Short-term (one- to three-year) members had intermediate total and per-cow daily milk production. The proportion of milk sold ranged from zero to 96 percent, and was significantly higher for all-members compared with nonmembers, with no difference among WDL member groups. Milk retained for home use, from households with lactating cows, ranged from 0.3 to 3.3 lbs./capita (0.12 to 1.5kg/capita). One two-member household with four heifer calves retained 8.8 lbs. (4kg) of milk for household use. It was expected that some of the home-use milk was for feeding calves. On average all-members retained twice the per-capita milk compared with the nonmembers (n=4) with lactating cows. This difference was not statistically significant, but represents a potentially nutritionally significant trend depending on intrahousehold allocation.

Household Income and Income Control

Household monthly income, from milk and coffee sales and casual and full-time jobs, ranged from zero to 27,000 Kenyan shillings (Ksh) (USD0 to USD337.50). Per-capita total and nondairy income was higher for all-members compared to nonmembers (table 6). Income figures for nonmembers were of limited value, as many (n=13) nonmembers did not disclose coffee

Table 7. Degree of Household Food Insecurity by Dairy Group Membership Duration (% of households)[1]

	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Secure	4.4a	17.4ab	27.3b	25.0ab	30.4b	25.0*
Mildly insecure	8.7	0	13.6	20.0	26.1	14.8
Moderately insecure	26.1	47.8	22.7	30.0	17.4	29.6
Severely insecure	60.9a	34.8ab	36.4ab	25.0b	26.9b	30.7*

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
* All-members and nonmember measures in the row are significantly different ($p \leq 0.05$)

Table 8. Prevalence of Food Insecurity in Three Domains, by Dairy Group Membership Duration (% of households)[1]

Domain	Nonmembers (n=23)	Members 1–3 yrs. (n=23)	Members 4–6 yrs. (n=22)	Members 7–9 yrs. (n=20)	Members 10+ yrs. (n=23)	All-Members (n=88)
Anxiety[2]	69.6	56.5	59.1	60.0	47.8	55.7
Reduced quality[3]	95.6a	82.6ab	68.2b	70.0b	60.9b	70.4
Reduced intake[4]	73.9a	56.5ab	40.9b	35.0b	34.8b	42.1

[1] Values having the same letter within each row are not significantly different ($p < 0.05$)
[2] Anxiety: having feelings of uncertainty or anxiety over not having enough food
[3] Reduced quality: not eating preferred foods, eating a limited variety of foods, or eating less preferred foods
[4] Reduced intake: eating smaller or fewer meals, having no food stores in the home, going to sleep hungry, or not eating for a full day

income. A greater proportion of households with more than three years of membership had high (more than 5000 Ksh/month or USD62.50) dairy income compared with one- to three-year members and nonmembers. Almost 80 percent of all-member women reported sole or joint control of dairy income. The two nonmembers reporting milk sales were not asked about who controlled dairy income because they did not sell milk to WDL.

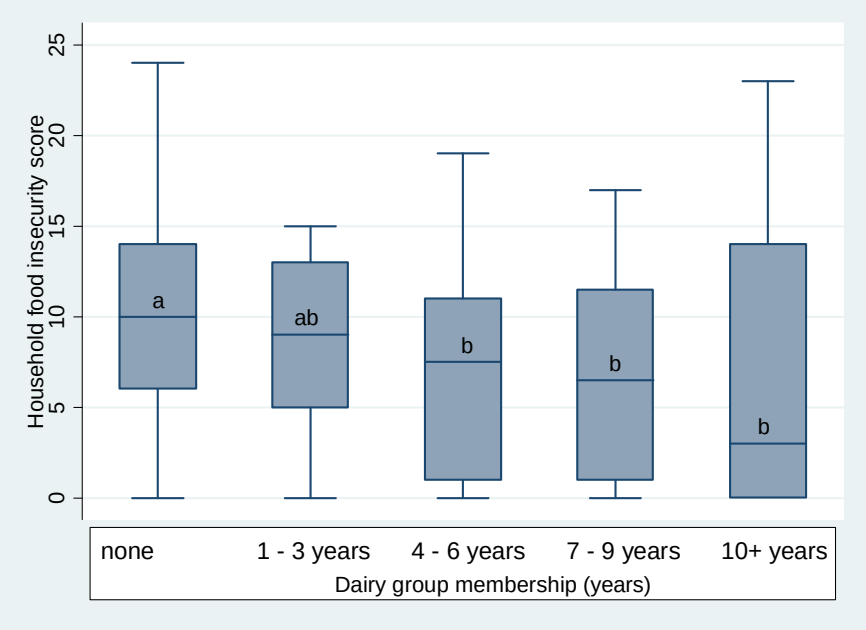
Household Food Security

Among WDL members, 25 percent were food secure. A positive trend in the proportion of households classified as food secure by duration of membership was observed (table 7). An opposite trend was observed for the proportion of severely food insecure households, which was lower as membership duration lengthened. More all-members were categorized as food secure than nonmembers, particularly among members with more than three years of membership.

The proportion of households expressing anxiety over food security (the least severe form of food insecurity) was not different between groups (table 8). Dairy group membership for more than three years was associated with fewer households that needed to reduce quality and quantity of foods consumed in the previous month compared with nonmembers. The proportion of households reporting reduced food quality or quantity among the four- to six-, seven- to nine-, and greater-than-10 year membership groups was not significantly different.

HFIA scores ranged from zero to 24, with a maximum possible score of 27 (figure 2). Longer-term (greater than three-year) dairy group members had better household food

Figure 2. Household Food Insecurity Score (Median, Interquartile Range, and Range) by Dairy Group Membership Duration



[a] Boxes with different letters have significantly different medians ($p \leq 0.05$)

security (lower HFIA score) compared with nonmembers ($p < 0.10$). Nonmember and one- to three-year member HFIA scores were not significantly different. HFIA scores for the three membership groups with more than three years of membership were also not significantly different, although the median HFIA score exhibited a linear trend ($p < 0.01$) toward lower food insecurity with longer membership duration. Household Hunger Scores were not associated with duration of membership.

Discussion

This study clearly demonstrated that belonging to the WDL dairy group in Kenya and the duration of membership were positively associated with women's livelihood assets and outcomes. Strengthened human, financial, and physical capital likely contributed to the increased resilience, capabilities and positive livelihood outcomes seen in WDL members. Rural agro-industries, such as WDL, are recognized as important links between farmers and the market (Moron, 2006) and may help address the many challenges to smallholder farmers entering "semicommercial" agriculture, which include unreliable markets for household food and limited transportation, agricultural support services, and market access for the surplus agricultural products (Bebe, 2003; Jaleta, Gebremedhin & Hoekstra, 2009).

Human and Social Capital

The age of the household adults increased with membership duration, as expected. However, the mean age of all-members compared with nonmembers was not different, and therefore comparisons between these two groups, with similar time to learn, farm, and accumulate assets, are valid.

WDL member men and women had higher formal education levels and more member women participated in womens' groups. Higher education can increase human capital and positively impact capabilities, and may reflect higher overall livelihood assets that enable the investment in dairying; both scenarios making semicommercial farming more achievable. Women's groups often provide microfinance to members, as well as learning opportunities, social security, and assistance in times of crisis (Cubbins, 1991). Members of women's groups may be better positioned to become WDL members and implement dairy production enhancements. However, attributing motivations and enabling factors for joining WDL was beyond the scope of this research.

WDL member women reported full or joint dairy income control in almost 80 percent of households and within the context of longer-term semicommercial production. Tangka et al., (1999) found that 76 percent of Kenyan women in market-oriented smallholder dairying had some or full control of dairy income, although the traditional African view is that cash income is part of the male domain (Gladwin, 2001). Huss-Ashmore (1996) found that men controlled more of the dairy income in larger, more commercial farm households in Uasin Gishu District, Kenya. In Malawi and Uganda, men controlled high-revenue-generating commodities sold in formal markets (Njuki, Kaaira, Chamunorwa, & Chiuri, 2011). From this cross-sectional study we are not able to derive whether the efforts of the WDL-FHF partnership were a factor in the sustained income control. However, it is generally accepted that income in women's hands provides more household benefit than income in men's hands (Mullins, et al., 1996), which may help explain strengthened livelihood assets and more household food security observed for WDL member households.

Natural Capital

Land access is very important to those who derive all or part of their livelihood from agricultural production. WDL members' ability to access additional rented land may be associated with higher income from higher milk production. As a result, member households may have greater capacity for sustainable livelihoods compared to nonmembers.

Land use differences between members and nonmembers (proportion of land used for napier grass as animal fodder versus maize production) are representative of the change typically seen when farmers transition from subsistence to

semicommercial agriculture (Jaleta, et al., 2009). The positive association of land use for napier grass and membership duration suggests that this land use shift occurred gradually and may represent greater commitment to dairy farming as a livelihood strategy over time. This difference also suggests more sustainable land use. Perennial napier grass has a broad leafy canopy and extensive root system that potentiallyreduce the rate of soil erosion compared with maize and coffee, which leave erodible soil exposed to water and wind. In addition, WDL members, who have relatively larger herds after the first three years of membership, have increased manure available from their own livestock, which, when used on crop and pasture plots, can increase crop yields and improve soil quality (Lwelamira, Binamungu, & and Njau, 2010).

The one- to three-year membership group was the exception to the observed land use trend. More farmers allotted their largest land area to coffee production. Higher world coffee prices and Kenyan government-initiated coffee market reforms initiated in 2003 (PKF Consulting Ltd. & International Research Network, 2005) may have impacted land use decisions by these farmers.

Physical Capital

Housing characteristics and asset ownership, rather than measures of current welfare or poverty, are commonly used to measure economic trends in developing countries (Wamani, Tylleskør, Åstrøm, Tumwine, & Peterson, 2004). In general, regular income is used for food and other daily expenses, whereas income received infrequently and in large amounts tends to be spent on large items (Morris, Carletto, Hoddinott, & Christiaensen, 2000). Some Tanzanian households belonging to a well-managed community dairy group were able to improve their homes after three to five years of membership (Bayer & Kapunda, 2006). It is possible that improved household characteristics (latrine, concrete floor, vented cookhouse) and water access may have pre-existed the membership and enabled households to participate in intensified dairying. The differences observed with longer WDL membership duration suggest, however, that these improvements resulted from longer-term, stable dairy income. Although dairy income is received regularly, "building a house" was cited as one of the benefits of WDL membership (Walton, 2012). Improved sources and access (piped and sufficient rainwater) to water may similarly reflect the income benefits of longer WDL membership through investment in community water projects or the purchase of rainwater storage cisterns that are adequate to meet household needs during the wet season. The cross-sectional nature of the study does not, however, allow us to draw conclusions of causal relationships.

The differences observed in household characteristics for those with longer membership duration, suggest the potential for improved health and well-being and, consequently, strengthened human capital, through reduced risk of disease (due to having their own latrine, being less crowded, and having improved water sources) and respiratory problems and eye irritation (due to having a vented cookhouse) as well as, for women and children, a reduced burden of carrying river water.

Farm Production and Financial Capital

WDL farmer training included best practices for breeding, raising, and maintaining healthy, productive animals. WDL also provided veterinary and artificial insemination services on credit to members. These activities are recognized capacity-building and supports needed to reduce reproductive losses and lead to sustained long-term benefits (Bebe, 2003;Walingo, 2006). Herd size, milk production (total and per cow), and dairy income were positively associated with WDL membership duration, particularly after three years of membership. Herd size for nonmembers reflected the median herd size of 1.3 animals reported for smallholders in the Kenyan highlands (Bebe, 2003). Increased milk production and incomes of smallholder farmers resulting from the use of cross-bred cows and better livestock management through farmer training, has been reported after two to four years in Ethiopia (Ahmed et al., 2000) and after three years in Kenya (Walingo, 2009). Sustained higher milk production with longer WDL membership may be attributed to the ability of WDL to market and pay for milk and to women retaining control of dairy income.

Income control may enable women to fulfill their traditional role as food providers (Gladwin, 2001), while devoting their limited resources to dairying as a cash crop. Increased milk production in Tunisia due to similar interventions was not sustained beyond the intervention period, and this was attributed to the lack of common interest groups and leadership development (Ben Salem, 2008), although gender was not addressed in the intervention nor the evaluation. Nonmembers in our study had low milk production despite the potential to learn from WDL members in their communities. This may reflect the importance of belonging to a supportive group for training and implementation of enhanced agricultural practices.

In our study, per-cow milk production varied widely, which may be due to the low number of lactating cows in the study, and the fact that cow age, stage of lactation, and other influential factors were not taken into account. These factors limit interpretation of relationships between duration of WDL membership with milk production levels. The average per-cow milk production was not different for members after three years of membership and was low relative to the maximum observed. With generally low incomes and only 25 percent of households classified as food secure, there is a need to examine the role that higher milk production may play in addressing these issues.

The low number of lactating animals in nonmember farms seemed to contrast with the relatively high number of heifers, as a young heifer can often indicate the presence of a lactating cow. This may be explained by nonmembers purchasing heifers or by low reproductive rates in the Kenyan highlands (Bebe, 2003), leading to older heifers and nonlactating cows. Other WDL intervention supports (e.g., a cow loan program) may explain the higher numbers of dairy animals for WDL members.

The seven- to nine-year member group had a larger proportion of households with high per-capita dairy and other income. A larger proportion of this group had some secondary education. As previously discussed, education can increase human capital and capabilities and make semicommercial farming more achievable. The cross-sectional nature of the study, however, does not allow us to draw conclusions of causal relationships.

Household Food Security

The measurement of household food security as a complex phenomenon that includes psychological stress, coping mechanisms, and hunger, is evolving (Coates, et al., 2006). Previously reported smallholder dairy development projects used proxy measures of food security (farm productivity, income, milk and food consumption, and caloric intake) (Ahmed et al., 2000; Huss-Ashmore, 1996; Lwelamira et al., 2010; Nicholson, Thornton, & Muinga, 2004). Developments in the measurement of household food security led us to reveal the relationship between WDL membership and membership duration and (1) the severity of household food insecurity, and (2) the prevalence of households with anxiety about food access and with the need to reduce food quality and quantity due to limited resources.

August 2009, the time of the survey, was a lean period just prior to the maize harvest. In addition, there was a recent drought resulting in low maize yields; limited national food availability; and soaring world food prices (Wodon, 2010; World Vision, 2012). Anxiety about food access was widespread and not different between members and nonmembers, as expected when rains fail to come (Hadley & Patil, 2008). However, fewer member households, especially beyond three years of membership, reduced food quality and quantity, and consequently, fewer members were categorized as severely food insecure. The one- to three-year member households were intermediate in their degree of food insecurity and need for food quality and quantity reduction. This observation corresponds with their intermediate milk production and milk income, and further supports the argument that the benefits of WDL membership increase with longer duration. This group may have less access to staple food on credit from WDL compared to longer-term members due to lower milk sales to the dairy, further limiting household food security.

The HFIA score is considered a sensitive indicator of program impacts (Coates et al., 2006). In our study, a linear decline of median HFIA

score (representing improving food security) with membership duration occurred *despite* members devoting more land to animal feed production, a recent drought, and high food prices. This situation indicates greater resilience and more sustainable livelihoods and likely reflects the benefits of long-term WDL membership. As well, women retaining control over dairy income is likely associated with these food security results. Dairy income was more often used to buy food on dairy farms where gender relations were addressed compared with farms where women accrued less of the income in proportion to their labor (Mullins et al., 1996). There was, however, a great deal of variation of the HFIA scores within the membership groups, reflecting the many intrahousehold variables and events beyond the scope of this research that can affect household food security.

Members retained twice the milk (per capita) compared to nonmembers (1.3 lbs./capita/d or 0.6 kg/capita/d vs. 0.7 lbs./capita/d or 0.3 kg/capita/d, respectively, $p = 0.10$), even with greater commercialization as reflected by the proportion of milk sold by member households. The lack of statistical differences was due, in part, to low statistical power with a small number of nonmembers owning lactating cows (n=4). In contrast, in an Indian village where a milk-marketing cooperative operated, households consumed less milk compared to households in villages where cooperatives did not operate (Alderman, 1994). The per-capita milk retained by nonmembers (0.27 qt. (US)/capita/d or 0.26 L/capita/d) was similar to the milk consumption for Kenyan highland farm adults without cattle or with local cattle breeds (0.34 qt.(US)./capita/d, or 0.32 L/capita/d) (Nicholson et al., 2003). Higher average household milk consumption was found in dairy intensification programs in central Kenya (0.95 qt.(US) /capita/d or 0.9 L/capita/d) (Nicholson et al., 2003). (Kg and liters are used synonymously here for milk measurement.) In our study, the per-capita milk retained was less than that reported by Nicholson et al. (2003), but was more than the WDL farmer training that promoted "two cups" of milk daily for each household member (Walton, 2012).

By providing general support and its specific efforts to strengthen human capital, WDL likely contributed to higher milk production, leading to both greater income and improved household food security. We hypothesize that these positive outcomes enabled members to strengthen their financial, physical, and natural assets that positively influenced their well-being, vulnerability, and sustainable land use. Most importantly, these positive results appeared to be sustained and some increased, with longer WDL membership duration. "Intermediate" was used to describe the dairy production and livelihood asset and outcome measurements for one- to three-year members. Other studies found higher milk production, average per-capita milk consumption, and income from milk sales among farmers involved in dairying for at least three years (Lwelamira et al., 2010; Walingo, 2009). We assert that this early period is needed to enhance women's capacity and confidence to use their limited resources for enhanced milk production. Most African women consciously plant and tend subsistence crops before most cash crops in order fulfill their traditional role as food providers (Gladwin, 2001). We believe the provision of staple food and other goods and services on credit from WDL are important supports for women to adopt semicommercial dairying.

Limitations of the study include the cross-sectional design, which limits causal statements of the effect of dairy group membership (or duration) on specific outcomes. Members had higher levels of education (men and women) and social capital (women's group membership) that may have enabled them to become WDL members and to adopt enhanced dairying practices. More members had access to additional (rented) farmland, which may further positively impact their livelihood outcomes, and which may, or may not, result from dairy income. Another limitation was the use of chain referral sampling and its potential for selection bias, where an unbiased random stratified sample is preferred. To minimize the potential for this bias, chain referral sampling was carefully conducted and monitored (such as by using eight WDL member chain initiators with wide geographical distribution, and encouraging all

initiators to refer households from all membership strata). Many characteristics of WDL and its partnerships are specific to this context and may limit generalizability of our results. Finally, comparability of food security assessment to other situations is limited, as the tool was not fully cross-culturally validated (Deitchler et al., 2010).

Conclusions

Our results support the statement that WDL membership status and duration are positively associated with income and food security and with strengthened livelihood assets that potentially impact additional outcomes (well-being, vulnerability, and more sustainable land use). We believe these results are strongly linked to the fact that women were the traditional dairy farmers and that efforts were made throughout the WDL-NGO partnership to train women farmers and keep dairy income in their control. This study illustrates a positive example for strengthening sustainable livelihoods of smallholder women dairy farmers; a strong and long-term NGO partnership with resources invested by all partners; a well-governed community-based organization; and gender mainstreaming through women in decision-making, access to training, income control, and credit-based supports.

Movement to commercial production has the potential to paradoxically place a household at risk of food insecurity. Our results showed a positive association of per-capita income with WDL membership and of the prevalence of food secure households with membership duration. However, incomes were generally low and the majority of households were not food secure. Milk production (average per cow) was relatively low, even after the three-year adaptation period. There is a need to identify and address barriers for households to join dairy groups and factors limiting the rate of adaptation and the extent to which enhanced methods for milk production are adopted. Further, this knowledge will help guide interventions to increase income and household food security and to maximize the potential of dairy farming for sustainable livelihoods.

We recognize the limitation of the cross-sectional study design, which does not allow statements on direct causal effects of membership duration to be made. Further research using a longitudinal study design and a randomized sample would help fulfill the criteria for causality needed to confirm these hypothesized "impacts" of dairy group membership.

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The future of subsistence agriculture in the rural community of Uzanu, Edo state, Nigeria

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Abstract

This study examines the current practice of subsistence agriculture in Uzanu, Edo state, Nigeria, and its contribution to the agricultural development and food security of the rural community now and for the future. All the farmers in the region are dependent on subsistence farming based on shifting cultivation and also practice intercropping to an extent. This farming system serves as a livelihood source, providing food, cash, and income as well as serving other social and cultural functions. Subsistence farmers try to manage farming uncertainties based on local knowledge and implemented through community support systems. This article argues that subsistence agricultural practices should be supported as a new approach to both economic and social protection, as it underpins production as well as consumption in resource-poor communities. This study evaluates the role and development of subsistence agricultural development and its adaptations in Uzanu. The results show that rural subsistence agricultural production could be improved if rural farmers had access to training on subsistence farming systems based on indigenous knowledge and skill sets, targeted to enhance and increase farm output.This study concludes that subsistence agriculture is an important element for growth and development in Nigeria despite the low output and income currently generated from it.

Keywords

food security, poverty alleviation, rural farmers, subsistence agriculture

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Introduction

> *We cannot feed over 140 million Nigerians as well as achieving food security by solely depending on hoes and cutlass technology.*
>
> — Dr. Sayyadi Abba Ruma, Nigeria Minister of Agriculture and Water Resources, 2010

Nigeria depends heavily on the oil industry for its revenues. However, the economy is predominantly agrarian (FSDH Securities Limited, 2011). Despite the small size of subsistence plots and the scattered pattern of production, agriculture continues to play an important role in the rural economy and makes up 40.3 percent of the gross domestic product (GDP), compared with the 15.79 percent made from the sale of from petroleum products (African Development Bank Group [AfDB], 2011; FSDH Securities Limited, 2011). Smallholder lots are defined as those between 0.10 and 5.99 hectares (0.25 to 14.8 acres) (AfDB, 2011). The differences in size of land holding by residents is based on history and attitude toward work. If a person had a grandfather or great-grandfather who occupied a large tract of uninhabited land and worked hard, he maintained absolute ownership rights to the land. Agriculture remains the critical strategic sector that addresses the multiple challenges of achieving broad-based economic growth, creating wealth , generating employment, alleviating poverty, and attaining national food security, as well as promoting Nigeria to among the 20 world leading economies by the year 2020 as set out by the federal government of Nigeria (FSDH Securities Limited, 2011).

Uzanu is a small agrarian community of 8,000 people in the midwestern part of Nigeria, located at latitude 7.2, longitude 6.63333, (DMS) latitude 7° 12' 0", and (DMS) longitude 6° 37' 59.99" at an altitude 396 feet above mean sea level. Uzanu shares a border with the Igbira (Kogi State) in the north, Igiode in the south, Ibie in the west and the Niger river in the east. The residents in the region have extended families within the village and speak a common language (Uneme); the staple foods are cassava (*Manihot esculenta*), sweet potatoes (*Ipomoea batatus*) and rice (*Oryza sativa*) (Onakuse & Lenihan, 2008).

Subsistence farming and fishing have remained integral parts of agricultural practices in the study area over the years (Onakuse & Lenihan, 2008). The agriculture is based on the settlement pattern, as the region is prone to regular flooding. Even though market-oriented agriculture provides higher incomes, subsistence agriculture remains prevalent in resource-challenged rural communities (Baiphethi & Jacobs, 2009). Nevertheless, farmers also sell part of their agricultural produce to provide for family needs (Bryceson, 2000; Ellis, 1993; Redman, 2010).

Subsistence farming is the least understood and arguably most neglected form of agriculture. Some academicians and policymakers have a negative view of this form of agriculture because it is characterized by low use of external inputs and low productivity, and thus is synonymous with backwardness and inefficiency and holds back economic growth and performance (Heidhues & Brüntrup, 2003). The common characteristics of practitioners of subsistence agriculture are ownership of small lots and/or of non-irrigated cultivable land; sharecroppers or tenants and their households; landless households dependent on livestock activities and/or casual labor; large farming households (usually consisting of extended families); households with high dependency ratios (e.g., adult unable to work); women-headed households; and young women and men living in extended households (International Fund for Agricultural Development [IFAD], 2011).

Traditional agricultural practices are synonymous with subsistence agriculture in the region. Both involve traditional agricultural knowledge and practices, which have enabled poor farmers in Uzanu to sustainably use their natural resources and learn to conserve it (Onakuse & Lenihan, 2008). On the one hand, traditional farming is an indigenous practice of cultivating the land, aimed toward crop and livestock husbandry and holistic management of natural resources, thereby enabling a continual food supply using locally available resources and contributing to self reliance of the community as a whole. Modern agriculture, on the other hand, is similar to traditional farming but

involves land cultivation at a bigger scale and also rearing of large numbers of livestock.

However, the negative perception of subsistence agriculture has led to inadequate official recognition of its importance in rural development; this is coupled with lack of policies and technical support for sustainable subsistence agricultural development (Heidhues & Brüntrup, 2003). Some see the small size of most farms as an obstacle to progress, complaining that economies of scale cannot be achieved. Kostov and Lingard (2002) observed that subsistence farming uses resources that could be used in market-oriented farming and other rural sectors and may reduce overall efficiency.

According to Collier (2008), small-scale farming in Africa is not able to meet the challenges of contemporary agricultural development because of the reluctance of peasants to change their mode of production, which is currently ill suited to modern agricultural production. However, underdevelopment of subsistence agriculture outputs are clearly rooted in the traditional agricultural practices that the Uzanu community has been engaged in for years. Families practice agriculture on small plots of land and aim to produce enough to feed their families until the next harvest. Often, the yields are not enough to even feed the family, and this leads to seasonal food shortages. While small family farms continue to dominate the agricultural sector in rural communities, not enough attention is paid to subsistence agriculture. It is therefore not recognized by the government of many developing countries and is considered household production for its own final consumption.

Subsistence Agriculture in Nigeria

Subsistence agriculture employs about two-thirds of the total labor force in Nigeria and provides a livelihood for the majority of the rural population – which may account for nearly three-quarters of the resource-challenged population of the country (AfDB, 2011). However, the contribution of the agricultural sector to economic growth and sustained rural development remains to be fully exploited, while the majority of the population remain vulnerable to food insecurity and poverty. The Nigerian agricultural sector suffers from unreliable transport, storage, marketing and pricing policies, as well as inconsistent agricultural policies at both the local and national government levels. In terms of transport, the roads and rail laid in the 1960s and 1970s in an effort to improve rural communities have either disappeared or are in a dilapidated condition due to lack of maintenance (Agboola, 2000; Apata, Folayan, Apata, & Akinlua, 2011).

Agriculture is crucial for the development in sub-Saharan Africa, because 70 percent of the population is involved in agriculture (Apata e al., 2011). In many sub-Saharan Africa countries, growing the agricultural sector remains the most effective strategy for reducing poverty and promoting overall economic growth (Diao, Hazell, Resnick, & Thurlow, 2007). However, subsistence agriculture, which provides and contributes to economic growth and poverty reduction in rural areas of Nigeria, has not been prominent on the national development agenda (Onakuse & Lenihan, 2008). A report from New Partnership for Africa's Development (NEPAD) (2003) stressed that agriculture-led development is fundamental to reducing hunger and poverty and generating economic growth, as well as decreasing the burden of food imports. The report also noted that it can increase exports, thereby earning much-needed foreign income for the nation. Finally recognizing the potential role of subsistence agricultural development, the government of Nigeria's strategic plan, Vision 2020,[1] aims to increase agricultural growth by direct investment and increase budgetary allocation to the sector.

The major challenges to sustaining rural agriculture are the use of inappropriate but traditional farming tools (such as cutlasses and hoes), the lack of finances to procure agricultural inputs, and lack of education on modern agricultural practices and postharvest losses (Apata et al., 2011; Collier, 2008). But Bryceson (2000) included other chal-

[1] The Nigeria Vision 2020 economic transformation blueprint is a 10-year plan for stimulating Nigeria's economic growth and launching the country onto a path of sustained and rapid economic growth to become one of the world's top 20 economies by 2020. The vision is anchored to the Nigerian Economic Empowerment and Development Strategy (NEEDS II) and its seven-point agenda.

lenges which are specific to subsistence farming, which includes low output, low produce quality, no value addition, lack of storage facilities, lack of access to extension services, production bias, and a poor approach to agriculture modernization. Cultivable land is a crucial input factor for agriculture. According to the National Bureau of Statistics (2011), only 32 million hectares (79 million acres) of arable land is presently under cultivation in Nigeria. Seventy percent of rural residents are active farmers engaged in crop production, which accounts for 85 percent of total agricultural production; livestock accounts for 10 percent, with the remaining 5 percent comes from fisheries and forestry (AfDB, 2011; Rondon, & Nzeka, 2011).

Some schools of thought suggest that replacing family farming with larger and more diversified farming systems could enhance efficiency and sustainability. However, the present efforts to modernize agriculture have been met with many hurdles, such as a lack of funding, technological changes, education, and the impact of climate change. These lead to a lack of policy focus on increasing food production to alleviate poverty. Reports from the European Union common agricultural policy reforms in 2010 are based on the "Communication on the Common Agricultural Policy" (CAP) toward 2020, which outlined broad policy goals to respond to future challenges for agriculture in rural areas and to meet the CAP objectives. These policy goals include (1) viable food production; (2) sustainable management of natural resources and climate action; and (3) balanced territorial development. The reform orientations in the communication have since been broadly supported both in the interinstitutional debate and in the stakeholder consultation that took place in the framework of the impact assessment at the European Union.

Agricultural growth and increases in farm productivity are prerequisites to broad-based, sustained food security for economic growth and development (Diao et al., 2007; International Bank for Reconstruction and Development & World Bank, 2007; United Nations Food and Agriculture Organization [FAO], 2002). However, subsistence farmers do not invest in their own farms due to a lack of specific rural agricultural development initiatives. Rather, subsistence farmers constantly organize their production around their family interests in the areas of forestry, livestock, and fishing. It is clear that rural farmers in Uzanu engage in agriculture purely as personal survival strategies rather than as a calculated effort to increase output and generate income.

The goal of a subsistence farmer is not simply to maximize productivity, but to optimize it across far more complex production systems that combine indigenous knowledge and traditional practices. Efficient production emphasizes improved land management and conservation of soil through community-based approaches based on common resources within the community. Community efforts in managing outputs are based on balancing cropping patterns and productive potential to ensure long-term sustainability of current subsistence production levels (IFAD, 2011). Studies based on empirical evidence indicate three main reasons why subsistence agriculture in rural communities (such as that of Uzanu) will continue to survive, although at small scale. First, the lack of proper marketing intelligence and infrastructure are major problems, often deterring farmers from expanding their operations to a commercial scale (Agboola, 2000). Second, increased land scarcity and flooding are major driving forces behind the lack of evolution from subsistence agricultural systems to more intensive production. Third, farmers largely are unaware of the agricultural policies of the government that are supposed to provide strategies to transition traditional agricultural practices to modern forms of agricultural production (Bryceson, 2000; United Nations Development Programme [UNDP], 2000).

Methodology

Uzanu is characterized by a tropical climate dominated by high temperatures, high humidity, and heavy rainfall. The community experiences two distinct seasons: the wet season (March to November) and dry season (November to February). Uzanu has a humid (> 0.65 p/pet) climate with an average annual rainfall ranging from 1,500 mm to 3,000 mm (59 inches to 118 inches). The temperature averages about 25°C (77°F) in the rainy season and about 28°C (82°F)

in the dry season. The soil is loamy in nature and characteristics, which is considered ideal for agricultural uses. Loamy soil is composed of sand, silt, and clay in relatively even concentrations and generally contains more nutrients and humus than sandy soils, with better drainage and filtration.

This study encompassed both qualitative and quantitative traits. It sought to document, evaluate, and gain insight into subsistence farming currently and its future, and the livelihoods of the agrarian community where agriculture and allied activities are the major source of family income.

Data relating to the activities of the production system of subsistence farmers in Uzanu were generated through a field survey and analyzed using SPSS version 20. Rural household heads were selected as the sampling unit. A purposive selection technique was used to access a particular subset of farmers actively practicing subsistence farming. One hundred and forty (140) farmers were identified as practicing subsistence farming, out of which 100 responded to the survey. These questionnaires were pretested through a pilot survey to establish and examine key subsistence farmers. The semi-structured questionnaires asked questions related to farmers' incomes, farm size, production techniques, harvesting systems, utilization of farm produce, and the roles of family members in agricultural operations. There was no discrimination based on gender or age as the sample size represented almost the entire population of the community.

The survey was conducted between July 2010 and July 2011. The period coincides with both early and late planting seasons. A total of 100 questionnaires were completed through the help of trained enumerators. Trained research assistants helped illiterate heads of households to complete the questionnaires and also addressed any issues that were raised.

Results and Discussion

The Existing Farm Situation

Analysis of the existing subsistence rural farm situation in Uzanu focused on production patterns, resource use, and productivity, with the main goal of evaluating the performance for the future of subsistence farming. The study examined farmers' land holdings, yield, and available resources that produced subsistence levels of agricultural production. In spite of the small size of holdings, no farmer was found to be landless in Uzanu. The average land holding of the sample of farmers in Uzanu was 3.6 ha (8.9 acres) per farmer. Eighty-three men (83) and seventeen (17) women participated in the survey. Subsistence farmers in the community are older than the population as a whole. Among the study participants, those aged under 30 years were 4.9 percent, those aged 31 to 40 were 24 percent, those aged 41 to 50 were 37.6 percent, those aged 51 to 60 were 27.5 percent, and those aged 61 to 70 were 5.7 percent. The respondents said that the decline in participation in subsistence agriculture among the younger generation is due to their traveling out of the community to acquire modern education outside the community, and to their search for off-farm employment in urban areas.

Farmers in Uzanu cultivate biennial and perennial crops such as cassava (*Manihot esculenta*), maize (*Zea mays*), rice (*Oryza sativa*), and tomatoes (*Lycopersicum esculenus*), as well as vegetables such as spinach (*Spinacia oleracea*), amaranth (*Amaranthus tricolor*), *Alefo (Celosia spicata),* and fluted pumpkin (*Telfairia occidentalis*), which are used either as a source of additional food or income for the family. The vegetables represent a small proportion of crops grown, as they are usually intercropped. Citrus trees such as sweet orange (*Citrus sinensis*) are planted along the farm boundaries, serving both for consumption locally and land demarcation. The average cultivated area per family is about 0.6 hectare (1.5 acres) whereas the national averages are classified as follows: Small-scale farms range from 0.10 to 5.99 hectares (0.25 to 14.8 acres), medium scale from 6.0 to 9.99 hectares (14.8 to 24.7 acres) and large scale are 10 hectares and above (24.7 acres) (AfDB, 2011). With the practice of shifting cultivation, mixed farming, and intercropping systems, the average output is low due to lack of access to improved pre- and postplanting operations, such as improved land preparation, seeds and seedlings, fertilizer, and plant protection measures. Also, the additional labor required during postplanting operations such

Photo 1. Rain Water Storage Facility in Uzanu

Source: Stephen Onakuse, 2010.

as weeding is not readily available, and so family labor plays an important role. In terms of income, the maximum income is generated by farms with large families and diversified cropping patterns, indicating that the larger the family, the more land is cultivated and the greater output is generated. But the income usually is not enough for large families, and it is usually distributed based on the urgency of need.

The gender distribution shows that 89.2 percent of the respondents were male. All of the female respondents (10.8 percent of the sample) were widows. As far as education, the data analysis indicates that the largest proportion of respondents (42 percent) had no formal education, while 10 percent had completed their secondary education. It may be inferred that the literacy levels among farmers in the area was very low and this may affect the adoption of new farming methods. The majority of farmers had more than 30 years' subsistence farming experience within the community. The distribution by age of the respondents ranged from 4.9 percent who are 30 or less years old; 24.3 percent who are aged 31 to 40; 37.6 percent who are 41 to 50; 27.5 percent who are 51 to 60; and 5.7 percent who are 61 to 70. The overall average household size in Nigeria is 5.82 (AfDB, 2011), but poor rural households in Uzanu tend to be larger, with an average household size of 8.0.

The community has no access to safe drinking water; the only source of drinking water is a stream called Edigah that provides water for both for drinking and domestic use. Rain water is also collected and stored in earthen pots that usually lie outside houses. Due to poor sanitary systems across the community, anecdotal evidence shows that most children in the community suffer from water-borne diseases like trachoma and scabies.

Existing Production Patterns

The subsistence farmers in Uzanu are engaged in traditional farming, which has remained more or less untouched by modern methods. Due to high levels of illiteracy, most farmers are unaware of alternative methods for agricultural production.

On average, perennial and biennial crops cover 67 percent of the land cultivated yearly, and cassava covers nearly 80 percent of the land under cultivation. Cassava (local cultivars and a mix of IITA hybrid TMS 30555) is the stable food, which is processed into Garri, Fufu (a product locally processed through fermentation for local consumption), pounded cassava, starch (a product from fermented cassava, prepared wet), and is roasted and unprocessed. Cassava has the ability to grow on marginal land where cereals and other crops do not grow well; it can tolerate drought and can grow in low-nutrient soils. Traditionally, only women are involved in the harvesting and processing of staple foods in the village. Table 1 shows the actual average production (in kilograms/ha and pounds/acre), household consumption and product sold (in percentages). Average output per hectare at subsistence level is lower when compared with

Table 1. Average Production in Kilograms per Hectare and Acre, and Percentage of Consumption and Sales (N=100)

Major activity — Crops	Average output (kg/ha)	Average output (pounds/acre)	Household consumption (%)	Percentage sold
Cassava	4,050	3,617	67.5%	32.5%
Sweet Potato	1,020	911	30.5%	69.5%
Tomatoes	540	482	11.1%	88.9%
Maize	270	241	56.3%	43.7%
Vegetables[a]	124	111	29.5%	70.5%

[a] Vegetables include spinach (*Spinacia oleracea*), amaranth (*Amaranthus tricolor*), *Alefo* (*Celosia spicata*), and fluted pumpkin (*Telfairia occidentalis*).

mechanized and improved cultural practices in cassava crop production. For example, world average cassava yield is about 10,000 kg/ha (10 metric tonne/ha) or 8,930 pounds/acre.

Other annual crops such as rice, sweet potatoes, and tomatoes are also grown widely for limited cash income and as well as personal consumption. These crops are sold exclusively at the local market in Agenebode, situated 8 miles (13 km) away from the community. The sale of surplus produce is the main source of cash for the farmers. These products are sold unprocessed since the farmers have no means to add value and thus to increase prices. Production of these crops depends on how flooding affects land fertility after the rainy season (Onakuse & Lenihan, 2008). Subsistence farmers in Uzanu generate relatively low incomes after harvesting because of the higher perishability of tomatoes and potatoes compared to other crops, such as rice (which itself requires high labor for planting and weeding).

Although rice has lower perishability, it tends to be low-yielding, which leads farmers to not produce it. In addition, rice production suffers from additional challenges, enumerated by respondents as those involving pests (e.g., weaver birds), rodents (e.g., rats, grass cutters, etc.), and diseases (e.g., rice blast, rice smut, narrow brown leaf spot, leaf blight, etc.).

Sweet potato is another crop that generates cash income for farmers. It is cultivated twice a year, planted first in March and again in July or August. A small amount of cash income is gained during these two periods. Other crops, such as vegetables, which are not sold but are consumed by the household, are cultivated on the same land. Cassava and sweet potatoes are consumed to increase the energy intake of the family. In interviews, farmers recognized that low soil fertility and the pattern of planting small-scale crops are responsible for the low yield of their traditional farming system.

More than 90 percent of surveyed farmers were involved in intercropping and mixed agriculture, together with raising of livestock (goats, sheep, and chicken), which provide an important source of meat (protein) and manure. These livestock are kept mainly for consumption or for immediate sale during times of severe shortage. The livestock is kept close to the household and fed mainly with byproducts of cassava, sweet potatoes, and maize.

Consumption drives the interest in subsistence farming system in rural villages. However, there is no reliable, official statistical information gathered across the country to show patterns in terms of the volume of production at subsistence levels in different communities. For example, 65 percent of the respondents who practice mixed cropping have reduced the cultivation of crops such as tomatoes and potatoes because of the lack of market opportunities and the high perishability of products. But they continue to cultivate these same crops because they see no alternative and the crops are easy to grow and resilient under the region's climatic conditions.

Our study data indicates that both men and women practice mixed farming. However, the

traditional gender division of labor remains operational in all the surveyed households. The preplanting operation such as clearing, which requires heavy physical work, is carried out by men; the women respondents hire laborers to do this work. The planting of root crops is a joint activity, although in many places yams are strictly cultivated by men. After planting, the subsequent agronomic tasks are the responsibility of the men. For cultural reasons, women sell the various farm surpluses and use the resulting income to buy essential commodities such as cloth, salt, medicines, kerosene, cutlasses, and hoes, while the surplus income is used to support other household needs as well as children's education. The farmers rely mostly on seeds saved from the previous season, so generally do not have the expense of purchasing seed.

Table 2. Total of Household Income over a Five-Year Recall Period, 2006–2010, by Seasonal Planting (N=100)

Year	Total Household Income	First Planting (% of total)	Second Planting (% of total)
2006	$16.66	$5.83 (35%)	$10.83 (65%)
2007	17.77	6.06 (34%)	11.70 (66%)
2008	9.24	4.22 (45%)	5.02 (55%)
2009	33.33	10.00 (30%)	23.33 (70%)
2010	26.66	8.96 (33%)	17.70 (67%)
Total	$103.68	$35.08	$68.60

Note: The exchange rate between U.S. dollars and Nigeria naira is USD1 = N150.
Source: July 2010–July 2011, Survey 2011.

Household Income of Subsistence Farmers

Table 2 shows actual net average household income of survey respondents over five seasons (2006 to 2010). Given the focus of this research on the future of subsistence agriculture for the rural livelihoods of Uzanu residents, the income is based on subsistence farming only, and excludes any off-farm income. There are no industries in the community that provide off-farm employment opportunities, although households participate in other off-farm activities that provide additional income such collecting firewood and forest fruits. However, most farmers indicated that they receive remittances from their children who have migrated to the cities; this supplements their income but is not included in table 2.

The distribution of income among households who participated in the survey showed that their incomes tend to vary due to differences in the amount of land they cultivate and the availability of family labor during pre- and postplanting operations. This is a common practice among subsistence farmers who plant less with limited land and who have little or no means to hire extra labor (Baiphethi & Jacobs, 2009).

It can be observed from table 2 that income levels differ between the two planting times — first and second seasonal planting. When compared to the national average wage income per annum in Nigeria, these earnings are low. The low income earning are indicative of the characteristics of subsistence rural farming in the Uzanu community. Subsistence production as practiced by the respondents was not valued at market prices but by its contribution to the household food safety net. Despite the critical importance of subsistence production for household food security of Uzanu farmers, a majority of the households' income as shown in table 2 are below the poverty line.

Most interviewed farmers attributed their low income to postharvest loss. There was a consensus among the respondents that a large percentage of the harvest was left to rot due to lack of storage facilities and conservation methods, and few or no market outlets at which to sell the products. Farmers are prevented from accessing high market prices in the agricultural commodity chain because of the lack of skills and means for processing and packaging.

The general income from subsistence production is low, likely due to factors such as low capital input into production, low level of education, and the low prices received for farm products. The interviewed farmers revealed that they had no access to loans, and this also accounts for the subsistence nature of the farm holdings.

Table 3. Land Holdings and Cropping Patterns of Households (Acres) (N=100)

Description	Mean	SD	t-value
Cultivated area	1.43	0.74	3.521***
Cassava tubers	1.30	0.62	2.331**
Rice	0.33	0.14	0.233
Potatoes	0.32	0.20	2.365**
Maize	0.19	0.08	0.011

*** (P<0.01) ** (P<0.05)

These factors stand as major constraints to agricultural development.

The relationship between land size and income could not be measured over time as some of the farms surveyed were too small to do more in-depth analysis. The farmers, however, strongly agreed with the notion that land holding is directly related to income. Additional factors such as the availability of family labor, and age and gender of the farmer, are significant to both farm output and income.

Most farms in our study are small in size and scattered because they practice shifting cultivation (see table 3). The farmers indicated that they owned their own piece of farmland. All the farmers interviewed indicated that the main reason for practicing shifting cultivation was to allow for soil rejuvenation over a three-year period, depending on whether the land was needed by particular farmer. The farmers also indicated that depending on farm inputs and rainfall patterns, the production from their farms was sufficient to meet home consumption needs and would like to be able to sell instead of having it rot.

As a farmer revealed during an interview,

> We would prefer to remain small-scale farmers and become successful, growing quality products for sale and consumption and being able to build a decent house on our land. We seek to live a descent lifestyle, equal to my counterparts in the cities, while remaining on our land in the village. (Field interview, 2011)

Agricultural development relies on linkages and networks. All the farmers interviewed said that they had never had any contact with an external agricultural extension agent, and that extension services were not available in the study area. This lack of contact results in the farmers' exclusion from direct extension services as well as from extension services that link farmers to research institutions such as the International Institute of Tropical Agriculture and other service providers. These institutions could help to improve subsistence agricultural activities in rural areas.

Conclusions and Recommendations

This study shows that subsistence agriculture is an important part of rural livelihoods in Nigeria. Subsistence agriculture contributes not just to the agricultural development of rural communities, but to Nigeria as a whole. Therefore, sustainable agriculture requires tackling the numerous problems that militate against subsistence agriculture in rural communities. This suggests that it is important to focus on developing interventions that would have a positive impact on subsistence agricultural practices. These interventions might work to rejuvenate subsistence agricultural practices through education, agricultural research, and microcredit; to reduce postharvest loss; to develop markets; and even to provide subsidies directly to farmers.

Subsistence agriculture remains the major contributor to the growth and development of the rural economy. Even though subsistence agriculture is declining in rural areas as youth migrate to urban centers for white-collar jobs, both federal and state governments should develop context-specific programs targeted at improving subsistence agriculture and its contribution to livelihood security in rural communities such as Uzanu. The policy focus should be on advancing subsistence farming methods while reducing the risks associated with postharvest losses. Furthermore, specific policies need to be directed at creating access to markets and technical means for food processing. This will enhance the capacity and sustainability necessary to increase subsistence farming improvements over the long term.

In addition, policies that encompass a clear vision of sustainable farming activities can increase the efficiency of subsistence agricultural practices in rural areas. To achieve this, subsistence farmers would need to work together as cooperatives, community-based organizations, and household production units in order to access farm inputs at affordable prices, and also to provide an outlet for the sale of goods produced as a group. 

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Determinants of agricultural land use diversification in eastern and northeastern India

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Abstract
This paper examines factors influencing land use under specific types of crops (e.g., cereals, cash crops including vegetables, horticulture, etc.) as well as the land devoted to livestock activities (dairy, piggery, poultry/duckery, fishery, apiary, etc.) in the eastern and northeastern regions of India comparing the same with the national pattern. We utilize farm-level information collected in the 59th round of the National Sample Survey (January–December 2003). Using multivariate multinomial logistic regression models, we examine the adjusted effect of selected background factors on the diversified use of agricultural plots at the national level, and for the eastern and northeastern regions separately. The level of diversification was significantly different across level of urbanization, occupational status (as a surrogate variable for household income), educational level of household head, household or family size, farm size, soil type, status of land possession, and waterlogging even after adjusting for religious and social/caste status of the household. The northeastern region reported a higher level of farm diversification compared to the eastern region, while both these regions had lower farm diversification compared to the rest of India. The study results could be used to argue for better and more equitable provision of economic security in terms of credit supply, subsidies, etc., for farmers belonging to Scheduled Castes/Scheduled Tribes in eastern India, and for appropriate land development toward settled cultivation in the northeastern region to augment the agricultural diversification. Some of the prudent steps to boost agricultural diversification in the eastern and northeastern regions of India include enhancing awareness of government-

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sponsored advisory services, and providing economic security to landless farmers and small landholders.

Keywords
agricultural diversification, agricultural land use, eastern India, multinomial logistic regression, National Sample Survey, India, northeastern India

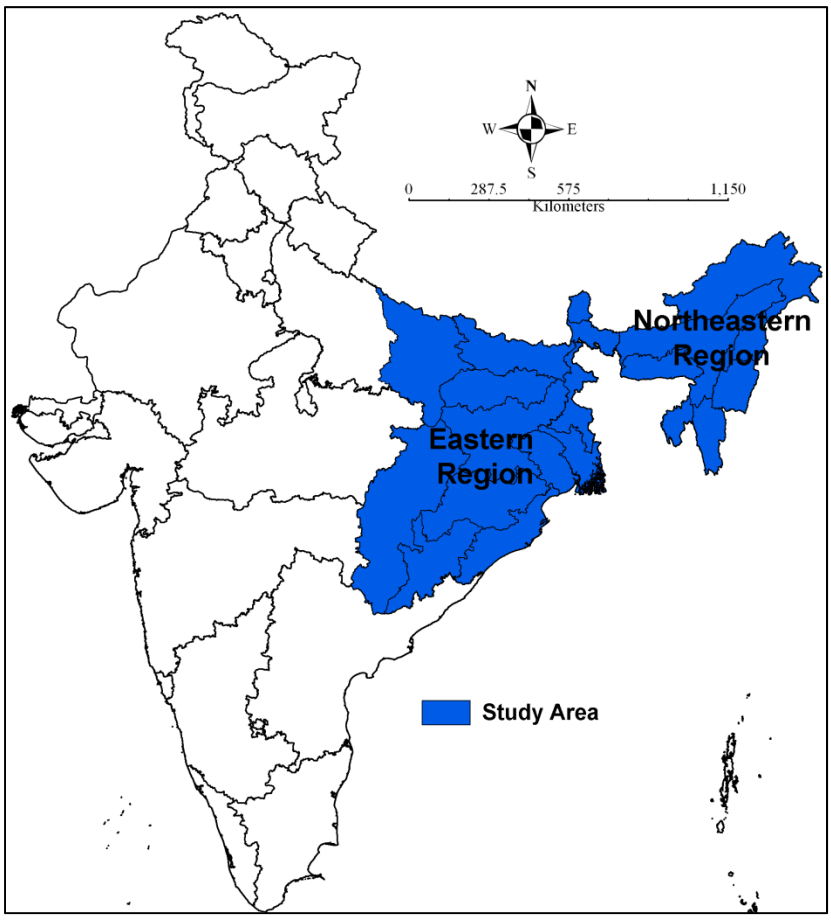
Introduction

In India, agriculture is a tradition that has shaped the thoughts, the outlook, the culture, and the economic life of the people for centuries. Agriculture is and will continue to be central to all strategies for planning socioeconomic development of the country (Dhandapani & Rath, 2004). Although its share in the national GDP is declining, its importance to the economy is best understood in terms of its share of employment and its importance for macroeconomic stability (Government of India [GoI], 2012). Rapid growth of agriculture is essential to achieve not only self-reliance at the national level, but also household food security and equity in distribution of income and wealth, and, consequently, the rapid reduction of poverty levels, development of the rural economy, and enhancement of farm incomes (GoI, 2012; Department of Agriculture & Cooperation, Ministry of Agriculture [DAC-MOA], 2000a, 2000b).

In terms of poverty and deprivation, the eastern and northeastern regions (Figure 1) of India are in a category of their own. The eastern region comprises Bihar, Jharkhand, West Bengal, Orissa, Chhattisgarh, and the eastern part of Uttar Pradesh (GoI, 2001). The northeastern region includes eight states of the Federal Indian Union, namely Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura (GoI, 2001). As the S. P. Shukla Commission Report (Shukla, 1997) points out in the context of the northeast, the region is confronted by four deficits: a basic need deficit, an infrastructural deficit, a resource deficit, and a two-way deficit of understanding with the rest of the country. The eastern region too faces at least the first three of these deficits. The deficits in eastern and northeastern India have existed for far too long; allowing them to persist any longer would be perilous for the further growth of the region. Enhancing the human development capacity in the region can be achieved only by addressing the key issues of agriculture and allied sectors.

The eastern and northeastern regions have largely been bypassed in the planning process during the last several years. The potential of the east-

Figure 1. Location of Study Area (Eastern and Northeastern Regions of India)



ern and northeastern regions in the spheres of agriculture, horticulture,[1] animal husbandry, and fisheries is hindered by their low levels of productivity and entrepreneurship (Chatterjee, Saikia, Dutta, Ghosh, Pangging & Goswami, 2006; GoI, 2001). Due to increasing human population, lack of state land reforms, oral traditions of land ownership, *Jhum*[2] cultivation, migrant population, and intensive cultivation, the pressure on land for food and livelihood is on the rise in the northeastern states (Goswami, 2010). States in the eastern region have experienced a marginal decline in the share of cereals' production in the gross cropped area (GCA) from 1970–71 to 2007–08. The levels of crop diversification in Bihar and Jharkhand were much lower than other eastern states (Haque, Bhattacharya, Sinha, Kalra, & Thomas, 2010). Despite getting low and unstable yield due to erratic southwest monsoons, moisture stress during the crop growth period (although parts of the region also often get flooded), light-textured soils with low water retention and fertility, biological constraints (e.g. weeds, diseases, and pests), farmers in this region grow rice on such land due to their lack of knowledge of alternate sustainable cropping systems (Kar & Verma, 2002). Crop diversification is identified as a good alternative to deal with persistent challenges and to increase the overall yield in these regions (Haque et al., 2010; Kar, Singh, & Verma, 2004; National Academy of Agriculture Sciences [NAAS], 2001).

Diversification has been pursued in many countries as a way to improve the long-term viability of agriculture by enhancing the profitability and overall stability of the sector (Guvele, 2001; Van den Berg, Hengsdijk, Wolf, Ittersum, Guanghuo, & Roetter, 2007; Joshi, P. K., 2004; Kasem & Thapa, 2011; Papademetriou & Dent, 2001). Although concerns about food security have led to a policy emphasis on grain self-sufficiency, the potential returns from re-energizing the traditional crop sector alone are now limited, and it would be prudent to identify and promote alternative sources of farm income (GoI, 2008; Gulati & Ganguli, 2008). Experiences from various countries indicate that a shift in type of production favoring high-value food commodities often creates growth opportunities that can augment income, generate employment opportunities, alleviate poverty, and improve the sustainability of agricultural systems (Chand, 1996; Joshi, P. K., Gulati, & Cummings, 2007; Pingali, 2004; Rahman, 2009; Ryan & Spencer, 2001; von Braun, 1995). Relative to cereals, horticulture boosts immense returns to land and generates more farm jobs (Joshi, Gulati, Birthal, & Tiwari, 2004) as well as off-farm jobs in processing, packaging, and marketing (World Bank, 2007). High-value commodities, particularly horticulture, livestock, and marine products are highly expenditure-elastic when compared with cereals (Kumar, Mruthyunjaya, & Birthal, 2007). It is also encouraging to note that vegetables, almost without exception, use more organic manure than chemical fertilizers when compared to cereals and other crops. Apart from its income-enhancing ability, vegetable growing thus helps preserve and manage soil fertility, promoting sustainability by protecting soils against degradation through continuous application of higher doses of chemical fertilizers (Bhattacharyya, 2008).

The issue on what influences people's attitude toward the adoption of any new practices or technologies, such as crop diversification, has long been a matter of discussion in literature. Studies from Asia, Africa, and Latin America suggest that no single factor alone leads to change in land use. Several biophysical, socioeconomic, and institutional factors interact and interplay to facilitate the change. Economic status or farmer's risk vulnerability (Anderson, 2003; Benziger, 1996; Dorjee, Broca, & Pingali, 2003; Pingali, Khwaja, & Meijer, 2005; Rogers, 1995), educational status and/or knowledge/information of farmer (Aneani, Anchirinah, Owusu-Ansah, & Asamoah, 2011; Kasem & Thapa, 2011; Lipton, 1968; Pingali et al., 2005), household size, farm size (Aneani et al., 2011; Kasem & Thapa, 2011; McNamara & Weiss, 2005; Singh, Kumar, & Woodhead, 2002), suitability of soil (Kasem & Thapa, 2011), structural con-

[1] Horticulture in India refers to the gardening and cultivation of fruits, vegetables, flowers, and ornamental plants.
[2] Jhum or Jhoom cultivation is a local name for slash-and-burn agriculture practiced by the tribal groups in parts of the northeastern region of India like Arunachal Pradesh, Meghalaya, Mizoram, and Nagaland.

straints imposed by institutions and policies on the productive resource base (Binswanger & McIntire, 1987; Lipton, 1968; Rasul, Thapa, & Zoebisch, 2004), suitable land-use systems (Danish International Development Agency [DANIDA], 2000; Faminow, Klein, & Project Operation Unit, 2001; Knudsen & Khan, 2002;Nagaland Environmental Protection and Economic Development [NEPED] & International Institute of Rural Reconstruction [IIRR], 1999), and tenurial security (Bugri, 2008; Feder, Onchan, & Chalamwong, 1988; Thapa, 1998) are among some of the documented factors of agricultural land-use diversification. Studies (Allan, 1986; Reardon, Barret, Kelly, & Savadogo, 2001; Turkelboom, Van, Ongprasert, Sutigoolabud, & Pelletier, 1996) have also emphasized the equally important role of infrastructure, including transportation facilities, and access to market centers as they broaden the scope of new crops and technologies facilitating land-use change. However, when information on new technologies becomes available, the socioeconomic characteristics of the target population tend to have a significant effect on their decision to adopt such new technologies (Knowler & Bradshaw, 2007; Rasul et al., 2004).

With the backdrop of the above inquiries, this paper assesses agricultural land use in India, with special focus on eastern and northeastern regions of the country. The paper examines the impact of the socioeconomic characteristics of farm operators on farm diversification in both regions, which are little understood in the available literature. The paper has no intention of comparing factors influencing agricultural diversification in eastern and northeastern regions, as their agricultural practices and geographical conditions are quite different. However, socioeconomic indicators influencing the level of diversification in both regions may help illuminate different approaches required to deal with the low level of agricultural diversification in the two underdeveloped regions of India.

Data and Methods

Data

National Sample Survey Organization (NSSO) is a pioneer institution in India that provides data based on nationally representative samples on a range of socioeconomic issues. However, comprehensive information on farms, livestock farming, and other allied activities are not recorded very frequently in India. NSSO initially organized a regular assessment of agricultural conditions in the 1950s. After a long gap, it was repeated in 1982 (37th round of the National Sample Survey, or NSS), 1992 (48th round), and 2003 (59th round). In the absence of comprehensive information on agriculture in India for the most recent period, this paper explores the unit-level data of the 59th round of the NSS conducted in 2003. The analysis and implications presented in this paper are not obsolete, as few changes occurred during this short span of time. Appendix A compares selected demographic, socioeconomic, and agricultural indicators of the eastern and northeastern regions of India for 2003 and 2009–10 (that are based on estimates from the Ministry of Agriculture, Government of India and the 66th round of the NSS), and the figures validate our assumption. In addition, Kumar, Kumar, Singh, & Shivjee (2011) show the trend and patterns of rural employment within the agriculture sector across major states in India in 1983 and 2009–10, which confirms the stable employment levels in the crops sector compared to animal husbandry, forestry, and fishery.

The 59th round of the NSS provides ample information on land and livestock holdings of households as well as the main use of the unit-level operational holdings[3] during the two agricultural seasons (i.e., *Kharif* and *Rabi*). Schedule 18.1 of this round collects information on land and livestock holdings of households. Particulars of the land, irrespective of whether it is owned, leased-in, otherwise possessed, or leased-out, were collected separately for each agricultural plot[4] operated by

[3] An operational holding is a techno-economic unit consisting of all land that is used wholly or partly for agricultural production and is operated (directed and/or managed) by one person alone or with the assistance of others irrespective of title, size, or location. In the context of agricultural operations, a technical unit is understood as unit with more or less independent technical resources, including land, agricultural implements and machinery, draught animals, etc.

[4] The holding may consist of one or more parcels of land or agricultural plots. A household can possess 3 or 4 acres of agricultural area as its operational holding, but this total land

the household. The particulars also include area, form of tenure, agricultural use, irrigation practices, drainage facilities, etc. Data collected in this schedule relate to the calendar year January–December 2003. In order to reduce the recall error, the total information relating to each sample household was collected in two visits. The first visit (January to August) broadly covered the *Kharif* season, and the second (September to December) included the *Rabi* season.

A stratified multistage design was adopted for the 59th round survey. The first stage unit (FSU) was the census village (*Panchayat* wards for Kerala) in the rural sector and UFS (Urban Frame Survey) block in the urban sector. The ultimate stage units (USUs) were households in both sectors. Hamlet-group or sub-block constituted the intermediate stage if these were formed in the selected area. To make the estimates representative and comparable across states/union territories and to account for the multistage sampling design adopted in the survey, we used appropriate weights in the analysis recommended by the NSS. The details of the sampling weights as well as the extensive information on survey design, data collection, and management procedures are described in the 59th round NSS report (NSSO, 2006) and supplementary documents provided with the electronic data disk.

Measures

The main analysis in this paper has been done using information collected in the fifth block of schedule 18.1 of the 59th round NSS, detailing the main use of each of the agricultural plots operated by households. The unit of analysis is the number of agricultural plots operated by households. The total number of operated agricultural plots was classified into three categories based on their main use. These categories are: cereals (such as paddy, wheat, maize, etc.); cash crops, including pulses, oilseeds, sugarcane, vegetables, orchard products, fiber crops, and fodder; and livestock farming, including dairy, piggery, poultry, duckery, fishery, apiary, and farming of other animals. The diversification in land use was defined in terms of higher proportion of plots under the second and third categories.

The total sample of agricultural plots in India analyzed at all levels was 178,310 (168,340 rural, and 9,970 urban). For the eastern region, the sample included 65,694 (63,534 rural and 2,160 urban) agricultural plots, and 18,560 for the northeastern region (16,856 rural and 1,704 urban). The multivariate analysis excluded the sample agricultural plots of Andaman & Nicobar and Lakshadweep islands in order to assess the level of land use diversification across the main geographical regions of India. These broad geographical regions are formed based on homogeneity and contiguity of states in different parts of the country. The name of the states and their parts included in different geographical regions are listed in Appendix B.

The extent of diversification in the main use of the agricultural plots was assessed using a set of selected background variables directly related to agricultural land and the process of production, as well as with the socioeconomic conditions of the land operators (e.g., cultivators, farmers, etc.). Hence, the agricultural land use classified in three groups (cereals, cash crops, and livestock farming) was considered a dependent variable in the multivariate analysis, the variation of which was predicted by a set of independent variables. The independent variables were the place of residence (rural or urban), religion, social group, level of education of the household head, main occupational status of the household, household size, farm size (area of the agricultural plot), type of soil, kind of land possession, and the waterlogging status of land during the agricultural season.

Most of the independent variables were grouped into categories. Place of residence separates the agricultural and allied activities operated by households in rural and urban areas. The census of India definition of urban/rural is used to classify a household as urban or not (Bhagat, 2005). The religion variable includes three categories: Hindu, Muslim, and "Other." The social group (caste) variable was categorized as Scheduled Castes (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), and "Other." Based on the terminology adopted by the government of India, this classifi-

holding can be divided among several large and small agricultural plots.

cation of social group focuses more on the socially disadvantaged castes/groups, and all privileged caste groups are represented in the "Others" group (Chitnis, 1997). The level of education of the household head was grouped in two categories: illiterate and below primary, and primary and above. Based on the household principal occupation (as per the National Classification of Occupation 1968), the main occupation of the household was classified as Cultivator (including dairy or vegetable grower or farmer in share), Agricultural laborer, Public services (government/local bodies), and Other occupation. The size of the sample household, i.e., the total number of persons normally residing together, was categorized into three groups (<5 members, 5–9 members, and ≥10 members). Similarly, farm size was divided into three groups based on the area of agricultural plots (<2.5 acres (<1 hectare), 2.5–3.7 acres (1–1.5 hectare(s)), and >3.7 acres (>1.5 hectares)). An agricultural plot of under one hectare is termed as a marginal land holding in agricultural literature (Chand, Prasanna, & Singh, 2011; Haque et al., 2010). Soil type indicates texture of the soil; three factors that determine the soil texture are sand, silt, and clay. Depending on their proportions, the soil can be divided into five groups: sand, loam, silt, clay, and clay-loam. However, in the present analysis, this variable is grouped into four categories based on their proportion in the selected area: loam, light clay, heavy clay, and other (including sand, silt, etc.). The type of land tenure is classified into two categories: owned or possessed (irrespective of the lease status, but possessed during the survey); and operated, but not possessed (during the survey). Information on availability of drainage facility was ascertained for agricultural plots by recording their waterlogging status during the agricultural season. If 50 percent or more of the plot was waterlogged, the plot was considered waterlogged.

Statistical Procedure

The bivariate association between the outcome variable and the independent predictors were assessed using the chi-squared test (Warner, 2008). Since the nature of the outcome or the response variable was nominal and classified into three categories (i.e., polytomous), the analysis used the multinomial logit regression model (Chan, 2005; Kumar et al., 2011; Salasya, Mwangi, Mwabu, & Diallo, 2007). However, to avoid any complexity in the interpretation and for easier dissemination of results obtained from the regression model, we report the model-based predicted probabilities (PP). These predicted probabilities can be easily converted to percentage form and are well understood. The general formulation of the model in probability form may be specified as follows (Hosmer & Lemeshow, 1989; Retherford & Choe, 1993):

$$P_j = \frac{e^{\Sigma_k b_{jk} X_k}}{1+\Sigma_i e^{\Sigma_k b_{jk} X_k}}, \qquad j = 1, 2, \ldots\ldots, J$$

where P_j denotes the response variable with J mutually exclusive and exhaustive categories, denoting $j = 1, 2, .., J$ (i.e., 3). The three probability categories of the response variable are: P_1 = estimated probability of using land for cultivation of cereals, P_2 = estimated probability of using land for cultivation of cash crops, and P_3 = estimated probability of using land for livestock farming. $X_0 = 1$, the summation Σ_k ranges from $k = 0$ to $k = K$, the summation Σ_i ranges from $i = 1$ to $i = J - 1$, and $b_{j0}, b_{j1}, \ldots, b_{jK}$ are all defined to be zero. The latter definition implies that

$e^{\Sigma_k b_{jk} x_k} = e^0 = 1$, when $j = J$.

The statistical analysis also accounted for the sampling design used in the NSS by employing survey analysis methods. All analyses were conducted using STATA version 10 (Statacorp, 2007).

Results

Regional Variation in Land Use

More than half the agricultural plots (about 53 percent) were reported as being used for the cultivation of cereals, compared to 21 percent for cash crops and about 26 percent for livestock farming in India (Table 1) in 2003. Eleven out of 28 states and group of union territories listed in Table 1 reported a higher proportion of their total agricultural plots being used for the cultivation of cereals compared to the national average. Seven out of these 11

states also reported a comparatively lower proportion of agricultural plots under cash crops, and all 11 states had a lower proportion of plots used for livestock farming. The majority of these states (Arunachal Pradesh, Bihar, Chhattisgarh, Jharkhand, Mizoram, Nagaland, Orissa, West Bengal, and Uttar Pradesh) are part of eastern and northeastern regions of India. Punjab reported the highest proportion (48.9 percent) of agricultural plots for the operation of livestock farming; this was followed by Haryana (48.8 percent), Tamil Nadu (45.9 percent), Karnataka (45.2 percent),

Table 1. Land Use (%) Under Agriculture and Allied Activities by States/Union Territories, India, 2003

	Agricultural land use (% and sample size N (unweighted))		
State/Union Territory (UT)	Cereals	Cash crops[a]	Livestock farming[b]
Andhra Pradesh	36.3 (2919)	29.9 (2282)	33.8 (2269)
Arunachal Pradesh	70.3 (838)	20.1 (299)	9.6 (145)
Assam	48.1 (2917)	32.8 (1982)	19.1 (1038)
Bihar	74.6 (13640)	10.6 (2046)	14.8 (2482)
Chhattisgarh	66.4 (2568)	17.2 (640)	16.4 (610)
Goa	51.0 (67)	15.0 (28)	34.0 (29)
Gujarat	33.8 (1543)	24.1 (1125)	42.1 (1376)
Haryana	34.3 (1493)	16.9 (747)	48.8 (1581)
Himachal Pradesh	73.6 (5342)	23.9 (1966)	2.5 (214)
Jammu & Kashmir	51.1 (2326)	25.6 (1713)	23.3 (1019)
Jharkhand	67.2 (3204)	16.0 (795)	16.8 (801)
Karnataka	40.0 (2001)	14.8 (887)	45.2 (1894)
Kerala	21.9 (556)	54.6 (1047)	23.5 (446)
Madhya Pradesh	45.5 (4193)	32.6 (3096)	21.9 (1722)
Maharashtra	43.7 (3770)	27.6 (2849)	28.5 (2098)
Manipur	38.5 (1311)	47.3 (1572)	14.2 (504)
Meghalaya	29.8 (613)	50.1 (982)	20.0 (414)
Mizoram	53.8 (590)	25.7 (309)	20.5 (340)
Nagaland	55.7 (642)	31.6 (396)	12.8 (143)
Orissa	64.8 (4367)	16.1 (1094)	19.1 (1155)
Punjab	37.7 (1842)	13.5 (557)	48.9 (1839)
Rajasthan	45.4 (4564)	12.9 (1634)	41.8 (4052)
Sikkim	47.5 (768)	27.2 (433)	25.3 (393)
Tamil Nadu	32.6 (2028)	21.5 (1433)	45.9 (2339)
Tripura	35.4 (716)	35.0 (643)	29.6 (572)
Uttaranchal	65.1 (1688)	19.0 (580)	15.9 (381)
Uttar Pradesh	53.6 (17570)	21.3 (7839)	25.1 (7914)
West Bengal	61.7 (10300)	19.7 (3172)	18.6 (2871)
Union Territories incld. Delhi	32.4 (488)	17.2 (182)	50.4 (477)
India	**52.9 (94864)**	**21.0 (42328)**	**26.2 (41118)**

[a] Include pulses, oilseeds, sugarcane, vegetables, orchards, fiber crop, and fodder.
[b] Include dairy, piggery, poultry/duckery, fishery, apiary, and farming of other animals
Note: Proportions are in percent (weighted). Figures in parentheses are sample size 'N' (unweighted).

Gujarat (42.1 percent), and Rajasthan (41.8 percent). Majority of these states (names mentioned ahead) have a growing economy (Kapoor, 2011).

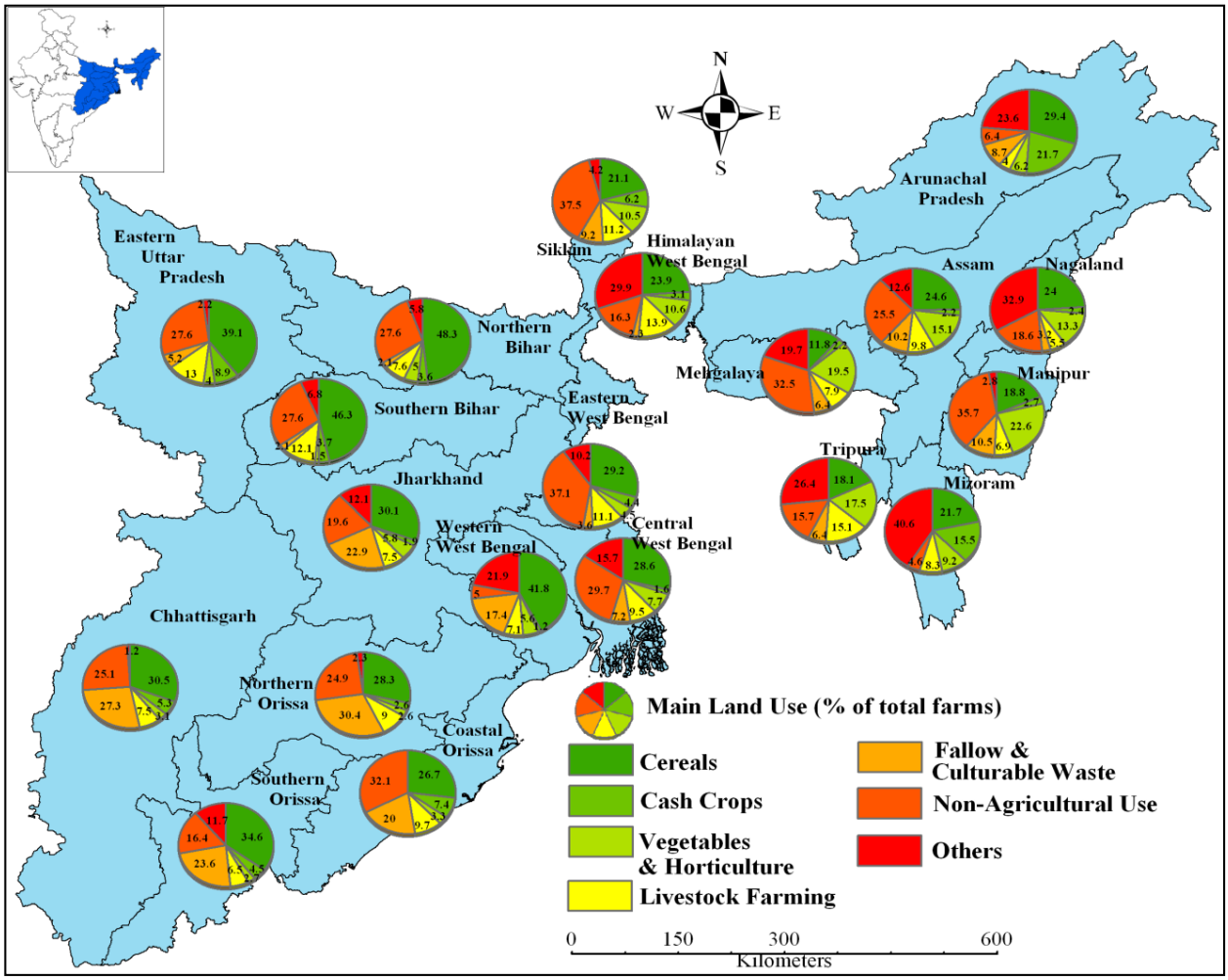
Figure 2 shows the regional variation in the land use pattern (out of total land area) in the eastern and the northeastern regions of India. Arunachal Pradesh, Bihar, and Eastern Uttar Pradesh reported more than half of the total land devoted to agricultural operations. Bihar and Western West Bengal reported more than two-fifth of their total land under cereals, while Arunachal Pradesh and Mizoram reported considerably higher proportion of land under cash crops. Similarly, Manipur (22.6 percent), Meghalaya (19.5 percent), Tripura (17.5 percent), and Assam (15.1 percent) had relatively larger proportion of land under vegetables and horticulture. Tripura (15.1 percent), Himalayan West Bengal (13.9 percent), and Eastern Uttar Pradesh (13 percent) were the top three regions in terms of land used for livestock farming.

Agricultural Land Use by Selected Background Characteristics

The eastern region of India recorded 66 percent of agricultural plots under cereals, 16 percent under cash crops, and about 18 percent for livestock farming (Table 2). The corresponding figures for the northeastern region were 46.1 percent, 34.4 percent, and 19.4 percent respectively.

Table 2 presents the proportion (%) of agricultural plots used under cereals, cash crops and for livestock farming by selected background charac-

Figure 2. Land Use (%) Pattern Across Regions of Eastern and Northeastern India, 2003



Note: Estimates calculated by authors using 59th Round NSS data.

teristics of land and its operators. The proportion of agricultural plots used for cultivation of cereals was higher in rural areas compared to urban areas. However, a higher proportion of agricultural plots in urban areas was used for livestock farming compared to rural areas. In the northeastern region, the proportion of agricultural plots under cash crops was higher in urban areas, as compared to the pattern observed in the eastern region and at the national level.

At the national level, households belonging to religions other than Hindu and Islam/Muslim used higher proportion of plots under cash crops (22.3 percent) and for livestock farming (35.7 percent). However, such a distinct pattern is not evident in the eastern and northeastern regions. At the national level, households belonging to "other" social group (non-SC/ST and OBC) used a higher proportion of plots for cash crops (24 percent), while the proportion for livestock farming was higher among SC/ST households (31 percent). The pattern was similar in the eastern and the northeastern regions, except in the northeastern region where the OBC households reported a higher proportion of plots under cash crops. Households with heads educated up to primary level or above reported a higher proportion of plots used for cash crops, while a lower proportion for livestock farming compared to households with their heads not educated up to primary level or illiterate. At the national level, cultivators or farmers had a substantial proportion (23 percent) of land under cash crops, while those who were from "other" occupation, reported a higher proportion (43 percent) of plots used for livestock farming. In contrast, in the northeastern region, households where the main occupation was public services used a higher proportion (41 percent) of plots for cash crops. Moreover, the households with 10 or more members used a higher proportion of plots for cash crops, while households with fewer than five members reported using a higher proportion of plots for livestock farming.

The eastern and northeastern regions of India had a higher proportion of small agricultural plots used for the cultivation of cash crops and livestock farming. At the national level, a higher proportion of agricultural plots having light clay soil were primarily used for the cultivation of cash crops, while agricultural plots with "other" soil type were used for livestock farming. However, in the eastern region, a higher proportion of agricultural plots with loam soil was used for cash crops. The proportion of agricultural plots that were owned or possessed by households was higher for the cultivation of cash crops and livestock farming, compared to the plots that were not possessed. Similarly, a lower proportion of agricultural plots that were waterlogged during the season was used for the cultivation of cash crops and livestock farming.

Result of Multivariate Analysis

Table 3 presents predicted probabilities for agricultural plots used under cereals, cash crops, and for livestock farming, adjusting selected socioeconomic characteristics of operator households as well as the nature of agricultural land. The result of multivariate multinomial logistic regression confirms the urban advantage in cultivation of cash crops and for livestock farming in eastern and northeastern regions of India, although at the national level the probability of using plots for cash crops was relatively higher in rural areas (PP=0.202) compared to urban areas (PP=0.197). In eastern regions, Muslim households had a higher probability of using plots for cash crops and livestock farming, while SC/ST households had a lower probability of using agricultural plots for cash crops (PP=0.087) and for livestock farming (PP=0.148) compared to households belonging to OBC and others. In contrast, the probability of using plots under three categories was not statistically different across religious and social groups in the northeastern region. In the eastern region (compared to the northeastern region), the educational level of the head of the household tends to influence the chances of using agricultural plots for cash crops; however, the probability of using plots for livestock farming was lower among households with their heads educated up to primary or above level. The adjusted result also confirms that the households belonging to public-service employees had a higher probability of using agricultural plots for cash crops in the eastern and northeastern regions. In contrast to the national-level pattern,

Table 2. Proportion (%) of Agricultural Plots (N) Used for Cereals, Cash Crops, and Livestock Farming, by Selected Background Characteristics, for Eastern and Northeastern Regions and All of India, 2003

	Agricultural Land Use								
	Eastern Region			Northeastern Region			India		
Background Characteristics of Land and its Operators	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]
Place of Residence									
Rural	66.5 (42589)	16.1 (10763)	17.4 (10182)	46.9 (7961)	34.4 (5888)	18.7 (3007)	53.6 (91532)	21.0 (39675)	25.4 (37133)
Urban	44.5 (1028)	14.5 (313)	41.1 (819)	22.5 (434)	36.8 (728)	40.7 (542)	33.3 (3332)	20.6 (2653)	46.1 (3985)
Religion									
Hinduism	66.4 (38110)	16.2 (9662)	17.4 (9406)	45.6 (3645)	33.9 (3072)	20.5 (1700)	53.5 (79677)	20.8 (33233)	25.7 (33558)
Islam	63.2 (4966)	16.2 (1318)	20.6 (1404)	48.3 (1242)	34.2 (959)	17.5 (457)	50.9 (8785)	22.5 (5065)	26.6 (3875)
Other	65.5 (538)	11.2 (96)	23.3 (191)	44.7 (3508)	36.6 (2585)	18.6 (1388)	42.1 (6397)	22.3 (4030)	35.6 (3681)
Social Group[c]									
SC/ST	63.1 (9928)	14.3 (2308)	22.6 (3443)	45.4 (4416)	34.5 (3296)	20.0 (1908)	51.9 (23302)	17.1 (9808)	31.0 (12177)
OBC	67.7 (18941)	15.3 (4504)	17.1 (4449)	44.7 (1474)	35.8 (1480)	19.5 (647)	52.6 (36613)	20.9 (16152)	26.6 (16719)
Other	66.4 (14745)	19.0 (4264)	14.7 (3109)	47.4 (2502)	33.8 (1838)	18.9 (987)	54.1 (34943)	24.1 (16366)	21.7 (12215)
Education of Household Head									
Illiterate or below primary	65.0 (22115)	15.0 (5380)	20.0 (6518)	44.8 (3915)	33.2 (3078)	22.0 (1705)	52.3 (47697)	19.1 (19809)	28.6 (23305)
Primary and above	67.5 (21492)	17.5 (5691)	15.0 (4483)	47.2 (4480)	35.5 (3536)	17.2 (1842)	53.6 (47156)	23.4 (22511)	23.0 (17807)
Occupational Status									
Cultivator (including dairy/veg. growers & farmers in share)	71.1 (33319)	16.8 (8375)	12.1 (5215)	57.2 (6583)	35.2 (4148)	7.6 (1291)	58.5 (71556)	23.1 (30649)	18.4 (20098)
Agricultural laborer	57.9 (3897)	13.9 (901)	28.2 (2260)	22.8 (203)	29.2 (344)	47.9 (396)	43.8 (6730)	16.4 (2720)	39.8 (6760)
Public services (govt. or local bodies)	65.0 (1326)	15.8 (323)	19.2 (316)	35.2 (478)	40.8 (561)	24.0 (384)	50.4 (3525)	21.2 (1945)	28.4 (1726)
Others	53.1 (4720)	15.4 (1384)	31.5 (2968)	30.1 (1048)	32.9 (1456)	36.9 (1377)	40.5 (12468)	17.0 (6688)	42.5 (11811)
Household Size									
< 5	65.0 (11421)	16.4 (2950)	18.6 (3399)	42.8 (2742)	35.1 (2383)	22.2 (1372)	51.4 (26902)	21.3 (12549)	27.2 (13356)
5–9	66.3 (24320)	15.6 (5924)	18.1 (6129)	47.8 (5063)	33.9 (3846)	18.3 (2008)	53.1 (53995)	20.4 (23690)	26.4 (23484)
≥ 10	67.6 (7872)	17.5 (2201)	14.9 (1471)	51.1 (590)	36.3 (387)	12.7 (169)	56.2 (13949)	22.8 (6069)	21.0 (4272)

continued

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Background Characteristics of Land and its Operators	Agricultural Land Use								
	Eastern Region			Northeastern Region			India		
	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]
Farm Size (in hectare (acre))									
< 1 ha (< 2.5 acres)	65.6 (41269)	16.3 (10771)	18.1 (10754)	43.3 (7117)	36.4 (6447)	20.3 (3397)	52.2 (81726)	20.0 (36554)	27.9 (39558)
1–1.5 ha (2.5–3.7 acres)	87.6 (1388)	11.7 (180)	0.7 (20)	90.6 (813)	7.7 (110)	1.6 (29)	67.5 (5979)	32.1 (2496)	0.4 (75)
> 1.5 ha (> 3.7 acres)	88.3 (935)	10.8 (124)	0.9 (11)	94.8 (461)	4.3 (56)	0.8 (14)	64.6 (7114)	34.9 (3249)	0.5 (75)
Type of Soil									
Loam	74.7 (9727)	11.3 (1548)	14.0 (1700)	63.2 (2321)	23.4 (935)	13.4 (479)	63.1 (18159)	18.2 (5722)	18.6 (4562)
Light clay	79.4 (9759)	9.8 (1242)	10.8 (1293)	61.0 (2516)	25.6 (1211)	13.5 (560)	62.6 (22715)	21.2 (8127)	16.2 (5354)
Heavy clay	79.7 (3387)	7.5 (311)	12.8 (513)	69.6 (246)	9.2 (61)	21.2 (100)	63.1 (5797)	19.9 (1902)	17.0 (1479)
Other (including sand & silt)	75.9 (5242)	10.4 (817)	13.7 (989)	54.0 (754)	23.8 (476)	23.8 (350)	50.6 (12023)	17.9 (4869)	31.5 (6770)
Type of Land Tenure									
Owned or possessed	64.7 (39244)	16.2 (10272)	19.1 (10636)	45.3 (7631)	35.4 (6290)	19.3 (3287)	51.7 (86691)	20.9 (39625)	27.4 (39850)
Operated, but not possessed	81.2 (4341)	14.9 (779)	3.9 (330)	60.5 (755)	20.3 (305)	19.2 (224)	70.4 (8123)	21.5 (2645)	8.1 (1150)
Whether Waterlogged During the Season									
Yes	81.2 (4707)	10.1 (580)	8.7 (537)	70.1 (1136)	17.6 (199)	12.3 (159)	73.5 (7472)	16.9 (1664)	9.6 (990)
No	64.9 (38664)	16.6 (10381)	18.6 (10300)	44.3 (7209)	36.3 (6363)	19.3 (3145)	51.8 (87014)	21.2 (40441)	27.0 (39606)
Total (N)	66.0 (43617)	16.1 (11076)	17.9 (11001)	46.1 (8395)	34.4 (6616)	19.4 (3549)	52.9 (94864)	21.0 (42328)	26.2 (41118)

[a] Include pulses, oilseeds, sugarcane, vegetables, orchard fruits, fiber crops, and fodder. [b] Include dairy, piggery, poultry/duckery, fishery, apiary, and farming of other animals.
[c] The Indian census social group (caste) variable includes Scheduled Castes (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), and Other.
Note: Proportions are in percent (weighted). Figures in parentheses are sample size N (unweighted). All bivariate associations are statistically significant (at $p<0.001$ or $p<0.05$) based on chi squared test.

Table 3. Predicted Probabilities for Agricultural Plots Used for Cereals, Cash Crops, and Livestock Farming by Selected Background Characteristics, for Eastern and Northeastern Regions and All of India, 2003

	Agricultural Land Use								
	Eastern Region			Northeastern Region			India		
Background Characteristics	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]
Place of Residence		*p*<.001			*p*<.001			*p*<.001	
Rural	0.781	0.102	0.118	0.620	0.227	0.153	0.586	0.202	0.212
Urban	0.525	0.138	0.337	0.232	0.247	0.520	0.349	0.197	0.454
Religion		*p*=.002			*p*=.105			*p*<.001	
Hinduism	0.741	0.106	0.153	0.564	0.226	0.210	0.560	0.198	0.242
Islam	0.644	0.122	0.234	0.516	0.225	0.259	0.493	0.198	0.309
Other	0.793	0.109	0.098	0.480	0.280	0.239	0.461	0.230	0.308
Social Group[c]		*p*<.001			*p*=.796			*p*<.001	
SC/ST	0.765	0.087	0.148	0.498	0.245	0.257	0.584	0.164	0.252
OBC	0.732	0.102	0.166	0.579	0.221	0.199	0.531	0.203	0.266
Other	0.718	0.129	0.153	0.562	0.230	0.208	0.530	0.226	0.244
Education of Household Head		*p*<.001			*p*=.105			*p*<.001	
Illiterate or below primary	0.739	0.101	0.161	0.558	0.221	0.221	0.561	0.180	0.258
Primary and above	0.733	0.114	0.153	0.547	0.239	0.215	0.529	0.220	0.251
Occupational Status		*p*<.001			*p*<.001			*p*<.001	
Cultivator (including dairy/veg. growers & farmers in share)	0.822	0.103	0.075	0.739	0.227	0.034	0.629	0.224	0.147
Agricultural laborer	0.699	0.099	0.202	0.291	0.225	0.484	0.510	0.160	0.330
Public services (govt. or local bodies)	0.698	0.139	0.163	0.391	0.303	0.307	0.499	0.221	0.280
Other	0.599	0.112	0.288	0.337	0.223	0.440	0.412	0.169	0.419
Household Size		*p=.066*			*p*=.092			*p*<.001	
< 5	0.721	0.115	0.163	0.468	0.250	0.282	0.522	0.206	0.272
5–9	0.740	0.102	0.158	0.585	0.218	0.197	0.552	0.194	0.254
≥ 10	0.762	0.112	0.125	0.673	0.223	0.104	0.583	0.218	0.200

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Background Characteristics	Agricultural Land Use								
	Eastern Region			Northeastern Region			India		
	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]	Cereals	Cash Crops[a]	Livestock Farming[b]
Farm Size (in hectare (acre))		*p*<.001			*p*<.001			*p*<.001	
< 1 ha (< 2.5 acres)	0.717	0.113	0.170	0.516	0.249	0.235	0.536	0.188	0.277
1–1.5 ha (2.5–3.7 acres)	0.937	0.060	0.003	0.961	0.024	0.015	0.669	0.328	0.002
> 1.5 ha (> 3.7 acres)	0.953	0.040	0.007	0.976	0.011	0.012	0.624	0.373	0.002
Type of soil		*p*<.001			*p*<.001			*p*<.001	
Loam	0.723	0.118	0.159	0.583	0.247	0.169	0.596	0.189	0.215
Light clay	0.771	0.103	0.126	0.570	0.253	0.177	0.593	0.224	0.183
Heavy clay	0.764	0.080	0.156	0.692	0.086	0.222	0.586	0.205	0.209
Other (including sand & silt)	0.699	0.113	0.188	0.466	0.232	0.303	0.435	0.184	0.380
Type of Land Tenure		*p*<.001			*p*<.001			*p*<.001	
Owned or possessed	0.729	0.107	0.164	0.558	0.243	0.199	0.538	0.199	0.263
Operated, but not possessed	0.801	0.117	0.082	0.495	0.114	0.391	0.602	0.224	0.174
Whether Waterlogged During the Season		*p*<.001			*p*<.001			*p*<.001	
Yes	0.861	0.065	0.074	0.750	0.106	0.144	0.754	0.161	0.085
No	0.728	0.110	0.161	0.540	0.238	0.222	0.532	0.203	0.265
Regions of India								*p*<.001	
Northern							0.497	0.161	0.342
Western							0.400	0.290	0.310
Southern							0.395	0.245	0.360
Central							0.404	0.321	0.275
Eastern							0.755	0.104	0.141
Northeast							0.581	0.240	0.179

[a] Includes pulses, oilseeds, sugarcane, vegetables, orchard fruits, fiber crops, and fodder. [b] Includes dairy, piggery, poultry/duckery, fishery, apiary, and farming of other animals.
[c] The Indian census social group (caste) variable includes Scheduled Castes (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), and Other.
p value denotes the level of significance obtained from the adjusted Wald test.

small households (<5 members) had a higher probability of using plots for cash crops in the eastern and northeastern regions. The probability of opting for livestock farming was higher among small households across all of India.

The marginal farms (<2.5 acres or <1 ha) recorded the highest probability of being used for the cultivation of cash crops and livestock farming. In the eastern and northeastern regions, the agricultural farms with loam soil had a higher probability of being used for the cultivation of cash crops even after controlling for other factors,[5] while it was plots with light clay soil at the national level. In contrast to the bivariate result, nonpossessed agricultural plots had a higher probability of being used for the cultivation of cash crops, although this was not the case in the northeastern region. However, the probability of livestock farming was higher for nonpossessed agricultural plots in the northeastern region. The plots that were not waterlogged during the season had a higher probability for the cultivation of cash crops and livestock farming.

The result also confirms that the eastern region had the lowest probability for using the agricultural plots for cash crops and livestock farming compared to other regions in the country. The northeastern region also registered a comparatively lower probability for land use diversification. However, the probability of using plots for cash crops in the northeastern region was relatively higher compared to the eastern and the northern region, if compared across all regions in the country, while for livestock farming it was only higher than the eastern region.

Discussion

The result of the multivariate multinomial logistic regression model brings to light certain relationships between households' socioeconomic characteristics and the nature of agricultural land, and the diversification of land use toward high-value commodities (HVCs) and allied activities. Results show that urbanization has a positive and significant influence on the diversification of agricultural plots. It seems to be an obvious outcome, as the capital investment capacity of the household and the use of new technology and knowledge are more prominent in urban areas. Rao, Birthal, Joshi, & Kar (2004) have found that a majority of the districts in urban India were in the high and medium diversification zones. The cost advantage in transportation of HVCs and their quick sale are the principal reasons that farmers close to urban centers are more competitive than far-off farmers. With the development of roads and other infrastructure facilities, districts surrounding urban centers tend to supply HVCs to urban districts. The demand for HVCs is rising in urban districts much faster than other areas due to rising per-capita income and changes in tastes and preferences. To meet the demand for HVCs in urban areas, agriculture is transforming from food grain–based to high-value agriculture. The structural shifts (urbanization) have a positive impact on demand for vegetables, fruits, meat, fish, and eggs as well (Kumar & Mathur, 1996).

Several studies have shown that the urbanization, infrastructure development (especially markets and roads), price policy, and technological improvements strongly influence the level of agricultural diversification (Barghouti, Kane, Sorby, & Ali, 2004; Chand et al., 2011; De & Chattopadhyay, 2010; Joshi et al., 2004; Rao et al., 2004, 2006; Singh & Sahoo, 2007). The level of urbanization here does not mean merely the shifting of population toward the non-agricultural activities; it also indicates the optimum infrastructure development to combat the modern globalized agriculture sector. In India's eastern and northeastern states, agriculture is struggling to achieve even a satisfactory status of infrastructure development in comparison to the other states in the country. The main constraints to agricultural diversification in these regions appear to be an inadequate supply and/or erratic availability of electricity, hindering the use

[5] The loam soil is characterized as moist, loose and full of biomaterial such as decaying worms and microbes that can be recycled as food for plant life. Because of this, loam soil is considered as the best soil to grow vegetables, garden fruits and flowers such as roses. The soil gets its nutritious qualities from decaying insects and other animals and plants. The pH level of loam ranges as different ingredients are present in different proportions due to variations in the soil composition, but the standard loam pH is between 5 and 7, which is optimum range to grow a variety of vegetables and fruits (Walworth, 2009).

of modern agricultural equipment such as cold storage and food processing industries; poor condition of roads; inadequate linkages to the market; lack of marketing facilities, including storage and processing of farm outputs; lack of or poor quality agriculture extension facilities; poor diagnostic laboratories for both crops and livestock; and the unprofessional attitude of authorities. The loss of horticultural produce due to the lack of post-harvest and food-processing facilities in Bihar and Uttar Pradesh were well documented in a study conducted by the Association for Social and Economic Transformation (ASET) and administered by the Planning Commission (GoI, 2004).

We also examined whether the religious and caste affiliation of a household had any influence in determining the use of agricultural plots for high-value crops and livestock farming. Muslim households were relatively advantageous in diversifying their land use compared to Hindu households in India, including the eastern region, due to the fact that a majority of the Muslim population in India is concentrated in urban areas (Joshi et. al., 2003; Prasad, 2004). Although, as we estimated from NSS data, some border states like West Bengal, Assam, Meghalaya, and Tripura had relatively low proportions of Muslim population living in urban areas, they are nevertheless closer to urban surroundings. Studies of the border belt of West Bengal found that 20 to 40 percent of villages in the border districts were said to be predominantly Muslim, including Bangladesh immigrants. Several towns in the border districts are surrounded by villages that are mostly dominated by the minority community. A similar situation has been observed in the border districts of northeastern states (Singh, 2009). Moreover, a relatively higher proportion of the Muslim population in these regions has marginal holdings, which may also trigger them to diversify their agricultural and allied activities. On the other hand, the religious and social (caste) groups did not have statistically significant influence in the northeastern region, in contrast to the eastern region and India as a whole.

In the eastern region, the farms belonging to "other" social group (non-SC/ST and OBC) were more likely to be used for high-value crops compared to SC/ST and OBC groups, while they had a lower probability of being used for livestock farming. This may have an economic as well as a sociopsychological explanation that hinders the diversification of land use across different social groups. An economic explanation can be presented while arguing why households in the SC/ST and OBC groups were slow to diversify their land toward high-value crops. Studies argue their deprivation in terms of inadequate capital, knowledge, skill, social ascription, and sponsorship. However, the government has initiated and implemented several plans related to credit provision through loans, agricultural debt waiver and debt relief, agricultural insurance (e.g., the National Agricultural Insurance Scheme, 1999–2000 and 2010), and others, in order to ease the capital impediments in the agriculture sector. Under the *Kisan* Credit Card (KCC) plan introduced in 1998–99, there were almost 100.93 million credit cards issued in the country as at the end of March 2011 (National Bank for Agriculture and Rural Development [NABARD], 2011). Uttar Pradesh accounted for nearly 18 percent of the total cards issued, followed by Andhra Pradesh (16.9 percent), Maharashtra (9 percent), Tamil Nadu (6.5 percent), Karnataka and Madhya Pradesh (6 percent each). These statistics also reveal the unsatisfactory participation of eastern and northeastern states in order to utilize mainstream national initiatives.

On the other hand, the lower probability to operate livestock farming among the "other" social group may have a sociopsychological basis. In the eastern region, the non-SC/ST and OBC group hesitates to take up animal husbandry as a job, reflecting an age-old traditional mindset irrespective of the level of education. The data suggest that household heads with education up to primary or above were less likely to operate livestock farming. The majority in the "other" social group in the eastern region perceives animal husbandry as a low-skilled job and not of good social repute. However, the fact that 15 percent of agricultural plots belonging to "other" social groups and educated household heads was likely to be used for livestock farming in the eastern region suggests other possibilities. The alternate prospect suggests that the "other" social group and educated people in the eastern region might opt for livestock farm-

ing at a large-scale professional level instead of low-scale household level. However, such a trend needs to be an avenue of further research and exploration.

A positive relationship between economic status (or income) and level of agricultural diversification is well indicated in the literature (Anderson, 2003; Ellis, 1989; Rogers, 1995). The surplus money enables the households to acquire assets and equipment necessary to cultivate high-value crops and other such allied activities. In the absence of an income indicator, this paper used the main occupational status of the household as a proxy of household economic standard and hypothesized that if households had a permanent income source (having a public services employee in the household), they would be likely to grow high-value crops. The result confirms the hypothesis in the case of the eastern and northeastern regions. However, this does not stand true in the case of livestock farming; as discussed above, the operation of animal husbandry has encumbrances beyond economic solution.

The result shows that with an increase in household size, the probability of using agricultural plots for HVCs and for livestock farming decreases in the eastern and northeastern regions. This suggests that the traditional cereal-based agriculture in these regions is not able to subsume or benefit excess involving labors and it results in the loss of farmers from the agricultural sector to the life of unhealthy city slums. Several studies on rural employment diversification in India (Basant & Kumar, 1989; Chadha & Sahu, 2002; Kumar, 2009; Mukhopadhyay & Rajaraman, 2007; Visaria, 1995) have concluded that the share of rural nonfarm employment has grown significantly over time, and the capacity of the farm sector to absorb additional labor has almost reached a plateau.

Studies show that the small size of holdings positively affects agricultural diversification (Aneani et al., 2011; Chand et al., 2011; Kasem & Thapa, 2011; Kumar et al., 2011; Pingali, 2006; Singh & Sahoo, 2007). The households having small-sized agricultural plots or holdings tend to exploit as many returns as they can. The cultivation of traditional crops would not prove profitable for them, so they embark on the cultivation of HVCs or livestock farming in order to generate more household income. However, the development of infrastructure and market-friendly environment also affects the agricultural diversification in marginal holdings (De & Chhattopadhyay, 2010). Thus, a relatively higher proportion of small-size agricultural plots in urban areas were observed growing HVCs compared to rural areas. Kasem & Thapa (2011) argue in the case of Thailand, "Considering the significantly smaller landholdings of the diversified farmers, they have considerably more household labor available for crop cultivation" (p. 623). This enables the farmers with a relatively large labor force to adopt crop diversification. Empirical evidence on commercialization trends in smallholder agriculture are provided by Dyck, Huang, and Wailes (1993) for East Asia; Huang & Rozelle (1994) for China; Koppel & Zurick (1988) and Naylor (1991) for Southeast Asia; and Rasul & Thapa (2003) for Bangladesh.

The study also appraises that the agricultural plots that were not possessed or taken on lease by the households for agricultural operation during the season, were more likely to be used for HVCs. The pattern supports the hypothesis of maximum remunerative returns from the agricultural land taken on lease. Our estimate from the NSS data suggests that more than 55 percent of agricultural plots that were not possessed but were operated by households, were taken on lease against a fixed price, 8 percent against a fixed produce, and about 19 percent against share of produce in India in 2003. However, the pattern of using such agricultural plots varies in the eastern and northeastern regions. While the returns from nonpossessed plots were obtained using HVCs in the eastern region, households in the northeastern region appeared to operate livestock farming on such nonpossessed plots for high remunerative returns.

Policy Implications

The significant impact of social structure on farm diversification, especially in the eastern region, indirectly reflects that there is gap in providing policy benefits equitably to all strata of Indian society. Credit supply to the agriculture sector has greatly increased, with an estimated growth rate of 14.3 percent per year between 1996–97 and 2003–

04. However, further investigation on who are the beneficiaries and which region they belong would be of value. Are the farmers of lower strata aware of or do they have access to these facilities? The data suggest that farmers belonging to SC/ST group in Bihar operated almost 12 percent of nonpossessed (or taken on lease) agricultural plots in 2003. The corresponding figures for farmers belonging to OBC and the "other" social group were recorded as 8 percent and 6 percent respectively. West Bengal (10 percent) and Orissa (9.5 percent) had also a considerable proportion of such agricultural plots operated by farmers in the SC/ST group. This suggests that landless farming is attached to greater risk, especially in lack of adequate infrastructure and other facilities. Farmers belonging to SC/ST group tend to cultivate nonpossessed or leased-in land, proportionally more than the other social groups. Therefore, they avoid taking risks in cultivation of nontraditional crops, mostly the early perishable crops, in order to be assured of no loss in output. In such situations, farmers of the eastern region, mainly in Bihar, West Bengal, and Orissa, need to be provided special support and consideration by the government. The credit deposit ratio of commercial banks in Bihar is lower than that of most other states in the country.

In order to make credit a powerful aid for agricultural development, the steering group report (Government of Bihar [GoB], 2010) advocates for several efforts: fulfilling the inclusive banking targets given by the Reserve Bank of India in all districts of Bihar by the next five years; at least half the cultivators should be members of reformed cooperatives or bank-linked Self-Help Groups (SHGs); and other credit disposal measures. The steering group report has also proposed a "credit plus" approach to be adopted by the Regional Rural Banks in order to accomplish the above objectives, which involve (a) a holistic view of the credit requirements of poor households; (b) formation of SHGs and their linkages with banks; (c) establishment of rapport with the civil society institutions in the area; (d) decentralization and greater autonomy for the regional offices and local branches; (e) review of the personnel policy in the light of the commitment to "inclusive banking"; and (f) ensuring commitment, involvement and accountability at the top level. All the state governments in the eastern region need to follow these suggestions. The Planning Commission (GoI, 2001) report also asserts that micro-credit, promotion of SHGs, and provision of sharing capital assistance should be stepped up in these regions. Haque and colleagues (2010) also identify lack of timely irrigation, nonavailability of credit, nonavailability of land, lack of information and knowledge, and lack of institutional support as some of the constraints greatly influencing the low level of crop diversification in the eastern region.

In the northeastern states, having a substantial proportion of agricultural land remain fallow during the season certainly affects the agricultural production. In addition, productivity of crops under *Jhum* is very low because of rain-fed conditions, lack of proper inputs, and production technologies. Based on observations in Mizoram, India, Lianzela (1997) claimed that if the *Jhum* cycle were below 10 to 12 years, it would no longer be an economic form of agriculture compared to possible types of settled agriculture. The frequent return of farmers to the same land not only results in a decline in yield, but also reduces biomass production per unit area. To have a productive shifting cultivation, the length of the fallow period should not be less than 10 years, but this is practically impossible under the existing socioeconomic conditions, where the land-to-person ratio is too low (Lianzela, 1997). In order to facilitate settled cultivation in these areas, attention should be given to appropriate land development. However, innovations developed by integrating the merits of traditional and modern farming systems could offer more effective means of addressing the problems of mountain (slash-and-burn) farming system (Tangjang, 2009).

Level of education is positively associated with agricultural diversification. Educated farmers can quickly transfer knowledge and innovation to the field, as required for the integrated intensive farming system. The lower level of literacy and education in the eastern and northeastern regions hinders the extension of agricultural diversification. The Government of India is now providing mass media support to farmers through *Doordarshan* infrastructure and All India Radio (AIR) broad-

casting of agriculture-related information. *Kisan* (Farmer) Call Centers (KCC) provide agricultural information to the farming community through toll-free telephone lines. In addition, agri-clinic and agri-business centers by agriculture graduates provide extension services to farmers on a fee basis by setting up economically viable self-employment ventures, and disseminating information through agri-fairs. However, the impact evaluation of KCC by Administrative Staff College of India [ASCI] (2006) shows that the average value of benefit realized by farmers through counseling varied from state to state. The five states with the highest number of callers were Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat, and Tamil Nadu (Pastakia & Oza, 2011). The extension and awareness of these services need to be more broadly disseminated to the majority of farmers in the eastern and northeastern regions. There is also a need to explore and address the lack of agricultural consulting services sought by the people in these regions. Complacency and a skeptical attitude about the stringent procedures required for government programs, as well as the lack of other required infrastructure and credit, might be some of the factors responsible for people not striving for better alternatives. After a day of work in the field or hunting for their livelihood, people tend to rest or switch to entertaining programs on the radio or television rather than government-sponsored programs on agricultural issues.

An evaluation study on Rural Infrastructure Development Fund (RIDF) projects carried out in Chhattisgarh and Uttar Pradesh showed that the infrastructure index (e.g., irrigation, connectivity, social sectors) as an independent variable explained 54–78 percent of variation in agricultural productivity in the two states (NABARD, 2010). However, the states in the eastern and northeastern regions could only utilize 72 percent and 66 percent under RIDF (I to XVI), compared to other regions where more than 80 percent fund under RIDF were utilized as of 31 March, 2011 (NABARD, 2011). Thus, rural investment—on roads, transport, water impoundment, market, information, and communication infrastructures—is desperately needed in the eastern and northeastern regions in order to augment the growth of the rural farm and nonfarm sectors.

Conclusion

Based on farm-level information, this study assessed the proportionate use of agricultural farms or plots in order to determine the level of farm diversification toward high-value crops and livestock farming across states in India. Identifying a low level of farm diversification across states in the eastern and northeastern regions of India, the study manifested the land-use pattern across geographical regions in both of the low-diversified areas. The use of agricultural plots by selected background characteristics of the land and agricultural operators was described at length. Finally, using multivariate multinomial logistic regression models, the paper examined the adjusted effect of selected background characteristics on the diversified use of agricultural plots at the national level, and for the eastern and northeastern regions separately. Although the differential impact of selected variables on land-use diversification was assessed in different regions, the level of diversification was significantly different with the level of urbanization, occupational status (as a surrogate variable for household income), educational level of household head, household/family size, farm size, soil type, and status of land possession and waterlogging, even adjusting for religious and social/caste status of the household. After adjusting a number of household and land characteristics, the level of farm diversification was assessed lower in the northeastern region and the lowest of all in the eastern region, compared to other regions of India. We also acknowledge a few limitations of this study; the analysis did not take into account several important factors due to unavailability of information at farm level, including the role of infrastructure in terms of road length or market access, irrigation facilities, use of fertilizer, and other farm equipment like tractors. Moreover, the outcome variable included livestock farming as a category, which also prevented the use of a few agriculture-related variables such as irrigation facilities, for which data was available.

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Appendix A

Demographic, Socioeconomic, and Agricultural Indicators of India's Eastern and Northeastern States, 2003 and 2009–10

Variables	2003		2009–10	
	Eastern Region	Northeastern Region	Eastern Region	Northeastern Region
	Demographic and Socioeconomic Indicators (%)[a]			
Area of Residence				
Rural	83.1	86.1	82.7	84.4
Urban	16.9	13.9	17.3	15.6
Religion				
Hinduism	85.1	62.0	83.7	61.3
Islam	13.0	21.5	14.7	22.3
Other	1.9	16.5	1.6	16.5
Social Group[b]				
SC/ST	33.5	31.7	33.3	38.3
OBC	36.1	22.1	36.5	25.4
Other	30.4	46.2	30.2	36.3
Household Size				
< 5	43.7	44.8	53.1	47.9
5–9	50.0	52.0	43.7	50.8
≥ 10	6.4	3.2	3.2	1.4
Rural Household Type				
Self-employed in nonagriculture position	16.2	15.8	19.0	19.3
Agricultural laborer	28.3	15.0	27.2	12.3
Other labor	6.7	11.6	12.8	10.4
Self-employed in agriculture	40.0	43.7	30.1	44.4
Other	8.8	13.9	11.0	13.6
	Agricultural Indicators[c] *('000 ha ('000 acre))*			
Area under crops				
Kharif cereals	3,252.5 (8,037.1)	222.7 (550.3)	2,668.3 (6,593.5)	243.7 (602.2)
Rabi cereals	17,819.9 (44,033.9)	624.2 (1,542.4)	18,163.0 (44,881.8)	679.0 (1,677.8)
Fruits & vegetables[d]	3,917.0 (9,679.1)	505.0 (1,247.9)	4,142.0 (10,235.1)	476.0 (1,176.2)
Food grains	46,408.6 (114,678.1)	3,746.8 (9,258.5)	44,086.6 (108,940.4)	3,646.2 (9,010.0)

Note: Demographic and socioeconomic indicators for year 2003 and 2009–10 are estimated from the 59th Round (Sch. 18.1: Land and Livestock Holdings) and 66th Round (Sch. 10: Employment and Unemployment) National Sample Survey (NSS) data, respectively. Agricultural indicators represent the year 2003-04 and 2009–10, which were collected by the Ministry of Agriculture, Government of India. *Kharif* season is observed January–August and *Rabi* season September–December.

[a] Figures are based on household-level data.

[b] The Indian census social group (caste) variable includes Scheduled Castes (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), and Other.

[c] Figures are based on state-level estimates provided by Ministry of Agriculture, Government of India.

[d] Area under fruits and vegetables are for 2002–03 and 2006–07.

Appendix B

Major Geographical Regions of India

Regions	States or Part of States Included
Northern	Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttarakhand
Western	Dadra & Nagar Haveli, Daman & Diu, Goa, Gujarat, Maharashtra
Southern	Andhra Pradesh, Karnataka, Kerala, Pondicherry, Tamil Nadu
Central	Madhya Pradesh, rest of Uttar Pradesh
Eastern	Bihar, Chhattisgarh, Eastern Uttar Pradesh, Jharkhand, Orissa, West Bengal
Northeast	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura

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Educator and institutional entrepreneur: Cooperative Extension and the building of localized food systems

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Abstract

Cooperative Extension Service educators work within an established network of offices throughout the United States and have the potential to tap both structural and relationship networks to foster collaboration and catalyze institutional change in food systems. The prerequisites and processes to generate systemic change, however, challenge the established logic of information transfer that has dominated Extension Service practice. This paper considers the nature of Extension's engagement in food systems both conceptually and in practice, based on a two-year train-the-trainer professional development project in North Carolina designed to support the emergence of local food systems. Extension initiatives are examined in light of two social change models: diffusion of innovations, based on knowledge transfer and spatial diffusion; and institutional change, based on inter-organizational relationships and mutually held cultural understandings. We suggest that the work of food systems change is more usefully viewed through an institutional lens, with extension educators serving as "institutional entrepreneurs" to address and leverage the concerns of the communities in which they are embedded into lasting food system change.

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community engagement, community food systems, cooperative extension service, diffusion, institutional change, institutional entrepreneur, interviews, local food systems, networks, North Carolina

Introduction

One measure of American agricultural success over the prior 100 years, rapid increases in yields per acre, is largely attributed to the unique partnership and networked linkages that exist between land-grant research institutions, farmers, and agricultural extension agents and specialists in the Cooperative Extension Service (CES) (Huffman & Evenson, 2006). Ideally, CES agricultural educators act as a conduit along which information flows among these entities, with educators assessing needs through their close interaction with farmers and relaying feedback to land-grant university researchers, and researchers responding through basic and applied research. Behavioral change among target populations is assumed to occur via knowledge transfer, with innovations passed on to agricultural adopters via educational programs, and information spreading through networks composed of university-based extension specialists, extension field agents, and farmer-adopters. The CES thus operates on a model of innovation diffusion (Rogers, 1983, 2005), whereby information is channeled to initial adopters through educational programming and is then disseminated to others in the same geographical area (Boone, Safrit, & Jones, 2002; Seevers, Graham, & Conklin, 2007). A visual analogy sometimes invoked is that of "an oil drop on water," with information spreading rapidly across relationship networks from the initial introduction via extension programming.

This article discusses the challenges to the diffusion logic of behavioral change posed by the burgeoning local food systems (LFS) movement, and the opportunities the movement presents for the CES to respond to community calls to alter the way in which food is produced and distributed. LFS components are not easily conceived of as separable innovations to be packaged and delivered in distinct educational programs to end users. Both the nature of the innovation and the potential set of adopters are very different than that imagined by the diffusion logic of knowledge transfer. We begin this paper with a discussion of LFS as a new arena of extension practice and programming. We then discuss two models of behavioral change: the diffusion model that has guided extension practice, and a model of systemic change grounded in institutional theory. We then use the findings from a 2009–2011 U.S. Department of Agriculture (USDA) Southern Sustainable Agriculture, Research and Extension Professional Development Program project in North Carolina to illustrate the institutional approach and the powerful potential role that CES educators can play in creating more localized food systems. The paper concludes with suggestions to enhance Cooperative Extension capabilities to maximum effect for food system change.

Building Local Food Systems

The local foods movement continues to grow in both the popular imagination, from *Omnivore's Dilemma* to parodies in the TV series *Portlandia*, and in policies with potentially significant consequences (e.g., USDA's rhetorical and funding support for the development of food hubs[1]). "Local foods" functions as a flexible rhetorical and organizational term under which various constituencies can operate and collaborate, with advocacy positions as diverse as sustainable farming, food justice, economic development, and children's health. Although there are dangers in putting too much faith in "local" to solve all food-related problems (Born & Purcell, 2006), the term has provided an entry point for more broad-based discussions of food systems and their multiple dimensions.

Meeting just two of the objectives of localizing a food system — increasing the supply of and increasing the demand for locally produced foods — requires long-term changes to make food available, accessible, and utilized over nonlocal choices. Advocates must address multiple interconnected elements, filling in gaps in processing and distribution, encouraging shopping and eating patterns to match local seasonality, and extending off-season production. Grocery stores accustomed to national

[1] See http://www.ams.usda.gov/AMSv1.0/foodhubs

and global distribution channels and meat producers tied into multiple-year contracts are bound by structural position (i.e., the relative location and pattern of contact among entities) and personal relationship ties that take time and concerted effort to alter. Transforming structures, relationships, and mindsets is more than a matter of making the multiple benefits of local food systems known or providing subsidies to increase the volume of seasonal foods in groceries or corner markets. The transformation is a long-term endeavor that requires coordinated efforts among multiple partners and an understanding of how change in one part of the food system creates change in another.

As such, reshaping food production, consumption, and waste re-use requires a systems approach to problem solving (Koc & Dahlberg, 1999; Meter, 2006, 2010). This approach assumes that viable solutions arise by addressing concerns within the context of the overall system, with equal attention given to the interlinked system elements (e.g., farms, wholesalers, grocers, consumers) and the interactions among these elements. Systems approaches also consider the influence of the social, economic, and regulatory and political context in which the system is embedded. Similar elements or types of relationships may function well in some contexts, and fail in others. A produce aggregation co-op may operate spectacularly in one city or county, operating smoothly to link producers and buyers, and fail just as spectacularly in another location.

Accomplishing localization of production and supply entails paying adequate attention to the elements (e.g., facilities to aggregate local product for consumers), the relationships between these elements (e.g., personal relationships between grower and consumer, legal relationships such as contracts) and context (e.g., consumers' preferences for local foods). Attention to relationships means fostering ongoing mechanisms of communication and collaboration across entities to generate feedback and create self-sustaining systems that extend beyond single projects (Feenstra, 2002; Sundkvist, Milestad, & Jansson, 2005).

An effective means to challenge and alter established practices is the use of an "institutional entrepreneur," an individual or organizational entity that holds legitimacy among stakeholders and has widely networked connections that can be used to leverage resources to create new practices or transform existing ones (DiMaggio, 1988; Fligstein, 1997; Maguire, 2007; Rao, Morrill, & Zald, 2000). As suggested in the following sections of this paper, state Cooperative Extension Services have the capacity to be major drivers of food system change. CES educators are embedded in local communities and can forge links among the entities that, in collaboration, can build localized food systems. For example, agents could connect school nutritionists who may be unaware of local produce seasonality, PTAs looking for healthier cafeteria options, producers holding required food safety certifications, and procurement officers in the school system. Encouraging food system transformation through extension institutional entrepreneurship is somewhat restrained, however, by the innovation-diffusion logic that continues to dominate extension practice. Below we discuss the innovation-diffusion perspective on change and compare it to one grounded in institutional theory.

The Logic of Diffusion and Extension Practice

The *diffusion of innovation* model refers to the spread of practices, technical information, and abstract ideas and concepts within a social system, with the information flowing from sources to adopters via channels of communication and influence (Rogers, 1983). The source or adopter may be any social actor, including an individual, group, organization, community, state, or nation. Diffusion as a model of social change derives from the work of rural sociologists Ryan and Gross (1943), who analyzed the spread in planting of hybrid corn across Iowa producers in the 1930s. Rogers (1983, 2005) elaborated upon and systematized the model of diffusion, identifying the characteristics of an innovation and of a targeted adopting audience that are associated with more rapid and widespread diffusion. The diffusion model works well, and can be evaluated as working well, when innovations have particular characteristics: an observable *relative advantage* over existing practices; high *compatibility* with existing practices; a low level of *complexity;* a high degree of *observability* so that others may see

the innovation in use; and a high degree of *trialability* that allows the potential user to try the innovation before full adoption (Bohlen, 1961; Rogers, 2005). The diffusion paradigm itself has been studied as a case of diffusion, with use of the model spreading across the social sciences in the years since Ryan and Gross's publication (Valente & Rogers, 1995). Diffusion processes continue to be used to explain the adoption of practices, from welfare policy adoption across the American states (Arsneault, 2000) to ordination of women across religious organizations (Chaves, 1996).

The organizational structure of the CES aligns with the innovation-diffusion model of social and behavioral change. With offices embedded in local communities, extension educators provide the relational channels along which innovative practices, technologies, and information flow. Innovations are delivered via educational programs in the form of trainings, classes, and demonstration workshops. The evaluation of extension programming effectiveness, which has come under greater scrutiny as government budgets tighten, is based largely on measures of knowledge transfer. The degree of transfer is measured by the increase in self-perceived or actual knowledge gained during a training, as ascertained by pre- and post-training surveys, and by estimates of the degree to which the innovation was adopted by producers and led to actual production increases (Boone et al., 2002; Seevers et al., 2007).

By virtue of being a complex set of practices and beliefs, LFS are not easily transferred to potential adopters as innovations. Rather than a single practice or even set of practices, LFS are conglomerations of multiple elements and relationships embedded in complex contexts, with multiple end goals that may not be easily quantified. How do we "transfer" LFS through extension channels and using conventional training practices to an audience of potential adopters? How can we evaluate that a local food system has been successfully "changed," and thus make conclusions about extension efficacy? Although select elements of building LFS can be packaged and delivered effectively via training programs — for example, the methodology of Rapid Market Assessments (Lev, Brewer, & Stephenson, 2008) — it is difficult to imagine a set of training packages and innovation-diffusion delivery methods that could create holistic system change adapted to individual contexts.

Local Food Systems and Institutional Change

An "institution" refers to beliefs, behaviors, and the formal and informal rules that emerge to perpetuate these beliefs and behaviors over time (North, 1991). An institutional perspective assumes that changes in beliefs and behaviors occur slowly over time within social, economic, and political contexts and webs of relationships that exist between social actors (e.g., individuals, organizations). Rules include formal laws, such as zoning regulations, as well as informal conventions and norms of behavior, such as consuming food while walking or driving. Institutional change is tracked through time by measuring change in beliefs and behaviors. The direction and speed of change depends crucially on the existence and nature of the ties between social actors and the commonality among cultural frames of reference. Relationships and frames of reference are often self-reinforcing. For example, a sustainable farmer can find common ground with a nutritionist on the importance of advocating for fresh local produce to be served in elementary schools, these common views strengthen the relationship ties yielding increased interaction, and this interaction further bolsters the actors' beliefs in the value of local foods.

Diffusion and institutional models of change are similar in that both assume that relational channels among actors speed the rate of adoption to the degree that the new practices (patterned behaviors) and beliefs are "rendered salient, familiar, and compelling" to potential adopters (Strang & Soule, 1998, p. 276). Institutional models of change, however, assume a greater degree of embeddedness of beliefs and behaviors in social contexts. The context includes both the relational structures — the network ties linking individuals and organizations — and cultural understandings that create consensus around the types of actions that "make sense."

Theorizing that institutions are *fields* of social life can help us visualize this contextual and spatial dimension, creating an image that links behaviors,

beliefs, and resulting rules and practices into a defined *institutional field*. An institutional field is composed of a set of institutions and a network of organizations and relationships that perpetuate the institutional beliefs, behaviors, and rules (DiMaggio & Powell, 1983; Tolbert & Zucker, 1983). Food system institutional fields are the combinations of practices, cultural understandings, and formal and informal rules related to the production and distribution of food that are embedded in a network of individual and organizational relationships. Dominant ideas and practices are reproduced through time via these ongoing relationships, but can be challenged by the formation of new relationship networks and the entrance of new beliefs and practices (Barley & Tolbert, 1997; Sewell, 1992). Institutionalized relationships and practices are resistant to change because they have been engrained in habit and tradition. Change in the field results when new relational connections are forged, these interactions become integrated into structures that define patterns of coalitions, and actors in the emerging institutional field develop a mutual awareness of being involved in a common enterprise (DiMaggio & Powell, 1983; Colyvas & Powell, 2006).

LFS can be characterized as an institutional field still under development, with normative beliefs, concrete practices, organizations, and networks of relationships not yet solidified. Local food system components and relationships might emerge through transformation of the existing dominant, conventional means of producing and consuming food. Or, the emerging system may proceed on a parallel track, with an alternative system arising alongside the conventional one. Most likely is the emergence of some combination of these two models, dependent on local and regional contexts and on the particular configuration of social actors engaged in the localization process.

To what extent individual communities are able to institutionalize practices that localize food systems — such as school menus designed around local seasonality, land use rules that encourage the use of vacant municipal lands for community gardening, or representation by small sustainable farmers on local government advisory boards — depends in large part on the degree to which change agents are able to connect with like-minded actors and institutionalize these connections into ongoing collaborations. An effective way to enact institutional change is to link advocacy projects (e.g., increasing demand for sustainably grown produce from local small and medium-sized farmers) to pre-existing organizational routines (e.g., sourcing routines as currently used by broadline wholesalers, or procurement policies of public institutions such as schools) (Barley & Tolbert, 1997; Ramasawmy & Fort, 2011).

Change that occurred in the institutional field of solid waste disposal provides an instructive analogy for the current localization of food systems. The environmental movement of the late 1960s and 1970s put solid waste recycling on the debate agenda as a possible means to deal with waste, and was driven by grassroots nonprofit buy-back centers (Lounsbury, Ventresca, & Hirsch, 2002), much in the same way that early organic cooperatives constituted some of the original local food networks. Heightened social anxiety in the 1980s regarding landfill space and opposition to locating new incinerators and landfills near communities propelled the emergence of recycling as a reasonable, legitimate solution to what had become a widely recognized social problem, and spurred the emergence of the modern recycling industry (Lounsbury et al., 2002). This parallels current anxieties concerning food health and safety, particularly related to growing adult and childhood obesity rates and diet-related diseases.

Recycling as a new institutional field included a set of distinct practices and innovations, but these could not simply be transferred via educational programming to public works departments. Changes in waste disposal required collaboration and coordination among networks of individuals and organizations, changes in individual consumer behavior (cleaning and sorting of containers), and creation of a chain of new organizations and businesses to handle waste. Early adoption of recycling practices in communities depended on change agents who mobilized government officials to support the use of public resources, residents to incorporate recycling as a part of everyday life, and businesses to use waste products as a production input. In much the same way, the nature of and

speed with which elements of LFS are adopted depends upon change agents' ability to harness community resources, identify opportunities, and connect with stakeholders. As discussed in the following section, Cooperative Extension educators are positioned to act as these local change agents or "institutional entrepreneurs."

Extension Educators as Institutional Entrepreneurs

Institutional entrepreneurship refers to the activities of social actors "who leverage resources to create new institutions or transform existing ones" (Maguire, Hardy, & Lawrence, 2004, p. 667; see also Dimaggio, 1988; Dorado, 2005, Lawrence & Phillips, 2004). Extension educators' ability to act as institutional entrepreneurs hinges on the degree to which they harness resources and opportunities that exist in the relational communities in which they are embedded, catalyze collaboration across actor networks, and thus spur action that otherwise would not have occurred. Extension educators are in prime structural and relational positions to convene a diverse array of partners who can collaborate on LFS initiatives. The initiatives can be decided upon communally by stakeholders convened by the extension educator to discuss community issues (Raison, 2010; Thomson, Radhakrishna, & Bagdonis, 2011). The instigation of collaboration prompts change in the institutional field.

Extension educators are trained to ascertain community needs and respond to these needs through educational programming (Safrit, 2011; see also Boone, et al., 2002). Educators investigate community needs through forums, focus groups, surveys, personal contacts, and formalized advisory boards. Needs are considered through the lens of the four Extension Service program areas (Agriculture and Natural Resources, Family and Consumer Sciences, 4-H Youth Development, and Community Development), around which educational programs are designed for targeted audiences. This cycle of assessment, educational program development, and then delivery to identified audience is a process crafted from "diffusion of innovations" thinking, but is arguably less suited to the collaborative approach needed for food systems transformation.

In the following section of this paper we describe a grant-based program used in North Carolina in 2009–2011 as a means to facilitate food systems transformation. The program sought to work within the organizational framework of Extension, taking advantage of its structural and relationship features, but empowered agents to take on more active roles as institutional entrepreneurs in their communities. The study provides an example of bridging the two models of behavioral change to transform food systems, and offers evidence of the types of outcomes that can result.

Institutional Entrepreneurship in North Carolina

Between 2009 and 2011, the North Carolina Cooperative Extension Service (NCCES) and the Center for Environmental Farming Systems (CEFS), a joint partnership between North Carolina State University, North Carolina Agriculture and Technical State University, and the North Carolina Department of Agriculture and Consumer Services, led a "train-the-trainer" project intended to catalyze the spread of local food systems knowledge and activities across the state. In year one of the two-year project, six county-based teams led by Extension agents and including community members were trained in the conceptual framework of community-based food systems and project development and realization. Subsequently, each of the six teams chose a second county-based team to mentor over year two of the grant.[2]

The North Carolina training project was funded by the USDA's Southern Region Sustainable Agriculture Research and Education (SARE) program. SARE has emerged as a major source of funding for efforts to support sustainable agricultural practices and, more recently, local food system development.[3] SARE provides funds for

[2] The final report and training materials generated for the project, *Training the Trainers in Community Based Food Systems: A Project-Oriented Case Study Approach,* can be accessed at http://go.ncsu.edu/sarepdpcbfs

[3] Between its founding in 1988 and 2008, SARE provided funding for over 3,700 projects and its annual budget grew to USD19 million. In April 2012, the Senate Appropriations Committee approved an increase of 18 percent in annual funding and gave support to a Sustainable Agriculture Federal-

research and community sustainable development projects and, through its Professional Development Program initiative, funds training programs for agricultural professionals and educators (SARE, 2012). Since 1988, SARE has awarded a total of USD27.4 million for 430 Professional Development Program (PDP) grants.

The North Carolina PDP project was designed to build on the structural and relational capabilities of the Extension Service in the state. NCCES agents in Agriculture & Natural Resources, Family & Consumer Sciences, and 4-H Youth Development had been engaged in a host of local foods activities, ranging from farmers' markets and community and school gardens to farm tours and county and municipal food policy councils. The number and variety of activities across counties in North Carolina varied widely, however, with a few counties having numerous local foods projects and others having few to none. CEFS and the NCCES envisioned the PDP project as a means to jump-start food system transformation in counties where agents had not been engaged in local food systems work, or had been working on LFS but without the active engagement of community partners. Thus, the PDP utilized the Extension diffusion-of-innovations structure to reach agents and community members, with trainers transmitting information to these individuals who would then disseminate information on local food system benefits in their home counties. As part of the project, however, county Extension leaders were directed to convene teams of community members who would collaborate in defining and bringing to fruition a LFS initiative that made sense in their own communities. In this way, the PDP empowered Extension educators to act as institutional entrepreneurs.

Throughout the two-year period, CEFS provided informational resources, organizational support, and seed funding to each team. Informational resources took the form of an initial two-day training for year one partners in the first months of the project and a resource notebook and resource website for all teams; participatory workshops on goal-setting and community engagement (in-person site visits with CEFS staff and a community-engagement contractor, and a webinar held on these topics); and support for some Extension partners to attend the Southern Sustainable Agriculture Working Group conference midway through the project. Scheduled conference calls during the two years facilitated the sharing of experiences and feedback among all teams. Four of the bimonthly conference calls highlighted particular topics (e.g., measuring impacts of local food projects) for discussion. Teams were also required to provide initial project logic models and quantitative and qualitative information on actual project outcomes.

The program had "top-down" elements of information transfer, with CEFS personnel and invited speakers giving instructional presentations. The PDP also had "bottom-up" elements, with teams brainstorming to define the goals, needs, and assets in their communities with regard to local foods, and defining the specific processes needed to bring a LFS project to fruition. The exact nature of the LFS project depended upon the context in which the networked community members were embedded. Under these circumstances, the importance of having a skilled Extension educator to lead and organize, acting as a convener of various constituencies who then generated a successful local foods project within one year, cannot be underestimated. Of the 12 projects, five focused on revitalizing existing or creating new farmers' markets; four projects provided support for existing or created new school or community gardens; one focused on creating a new farm tour; one created presentation materials to highlight the benefits of local food systems for various audiences; and one focused on working with existing community organizations to support local food events, including community meetings and meals.

As part of the final evaluation process, 11 of the 12 Extension team leaders were interviewed on their experiences during the project term. Interviews were semistructured and lasted from 30 minutes to one hour. One topic addressed during the interview prompted Extension educators to reflect on how the projects worked vis-à-vis community partners. This question was phrased to each

State Matching Grant Program as a new component of SARE (National Sustainable Agriculture Coalition, 2012a, 2012b).

interviewee as follows: "Did this particular project work any differently than others that you've been involved in, with regard to community partners?" Responses to this question illuminated the characteristics of LFS as a developing institutional field, and Extension educators' role in system change. Two major themes emerged from an analysis of the responses.

The first theme was that the PDP *generated new communication and relationship networks around local foods*. Extension agents noted that the collaboration brought together organizations having a general interest in "doing something" related to food, and functioned to inform all participants, including the agents themselves, of activities in the local community and in the state. As one agent explained:

> Having the nontraditional partners (hospitals, restaurants, and tourism) was the biggest thing, and now those folks are really good partners, and they likely didn't have a clue as to what we (Extension agents) did before this project. This is an audience we don't usually reach, it is not part of our traditional audience.

The connections were structural and relational, bringing together a variety of entities and building concrete organizational and personal linkages; they were also cultural, with a diverse array of community members willing to associate under the cultural frame of "local foods." By stitching together new and unusual alliances, Extension educators set the stage for stable, preferential relationships, interorganizational linkages, and feedback loops upon which localized food systems could be built (Gulati & Gargiulo, 1999; Ramasawmey & Fort, 2011; Sundkvist et al., 2005). As one Extension educator noted:

> We've worked to get the community used to local foods. When the Art Council has its gala, or the Chamber has its Evening of Stars, we work with them to source local foods.

One agent alluded to the cultural framing of local food as a means to bridge organizational and interest divides:

> The neat thing about this local food culture [is that] we are beginning to find out what other people are doing and to collaborate. We partnered with [a county tourism office initiative], which is part of the Chamber (of Commerce), and they helped us organize and had some funding to help restaurateurs and chefs come (on our farm tour).

The PDP also helped educators meet new small farmers in their counties with whom they had not come into contact previously. This supplied the opportunity for Extension educators to contribute to rural revitalization by connecting the new generation of young farmers and food entrepreneurs with others interested in local food systems. A county horticultural agent who led one of the county-based projects noted:

> There were a lot of people out there that I didn't know about — lots of farmers. This was a way for me to get to know them. And we've had a lot of new people move here, so this is a way to connect everyone.

A second dominant theme that emerged from a review of the responses was that the project *leveraged resources through a cooperative project that bridged diverse communities*. Having a distinct project goal around which partners could coalesce, along with modest seed funding (USD1,000 per county), were seen as key factors in building support and leveraging resources. As two agents explained:

> Being part of this project was helpful in initially drawing community partners into the discussion. We could say "We have been selected" and I think saying that and saying we have a bit of resource money helped bring people to the table.

> We approached [a local sustainable food nonprofit] and they cost-shared the advertising (for the farmers' market). We also approached Farm Bureau, and between those two we paid for all the marketing. Then we spent our USD1000 (in project funds) on the [farmers' market] billboard and rack card….

> The money was really pivotal, it was a main building block and everything really fell into place.

Extension educators reported that the PDP acted as a catalyst to ground ideas that had been "floating" among various community groups, and focus these efforts on a common project. As a result, potential community resources — time, expertise, and funds — were leveraged by Extension institutional entrepreneurs. The following statements are emblematic of Extension educator responses related to collaboration and idea generation:

> The PDP was an incentive for us to begin thinking creatively about how to start the conversation — no real plans had been there, the ideas had just been floating around in people's heads. [The PDP] gave us an incentive to get some action started.

> Participating in the (PDP) process was beneficial, making us aware of resources across the state and getting us to focus on local foods as a central part of our work here. And that has happened. It was on our radar screen, but having this as a project and being accountable for it makes it a higher priority….This project has helped us focus on local foods as a core program.

By virtue of their structural position in and deep knowledge of their communities, educators were able to recruit collaborators, leverage resources, and link initiatives to ongoing community practices. This is illustrated by the experience of one PDP Extension leader. The agent found multiple ways to bring local food system ideas and practices into ongoing collaborations. For example, by hosting a local foods meal and presentation on the benefits of local food systems, the agent brought the idea of localizing food systems to a community development group that had in the past advocated for public spaces and greenways. As a result, the group rallied around local foods, beginning with a community "Home Grown" event to showcase locally grown foods, and then applying for community development funds to build a produce aggregation center. The agent also brought local food issues into discussion of the county farmland protection plan, using this as a vehicle to support local food systems in lieu of his PDP team's original idea of creating a food policy council. The agent's justification for working through an existing initiative was pragmatic: "There are already so many committees in the world," he noted, and it is "easier to find momentum than to try and create your own." Demonstrating a strategic knowledge of local conditions, the agent explained: "Whatever groups you are talking to, you are on their turf, they see the value and it is an easy way to engage and to give them ownership." Knowing where to "find momentum" and where ideas are likely to take hold is a unique and valuable resource held by Extension educators.

Extension agents were able to successfully act as conveners for food system initiatives because of the legitimacy conferred by the PDP project and by other LFS support efforts in the state. As noted by PDP leaders, having funding and being designated as a local food leader could be leveraged into support among groups previously uninvolved in local food system advocacy, including tourism, the arts, and the small business community. Extension legitimacy with respect to food systems has also been enhanced by three actions at the state level that have increased the visibility of the issue within both the agricultural community and the extension profession: establishment of the legislated North Carolina Sustainable Local Food Advisory Council (SLFAC), chaired by the commissioner of the Department of Agriculture and Consumer Services with support from CEFS, the North Carolina Farm Bureau, and other traditional agriculture entities; the creation of a new role within Cooperative Extension, called local food coordinators, with a coordinator in each of the state's 100 counties as well as five regional local food coordinators; and, in 2012, designation of local foods as a flagship Cooperative Extension program for the state. The state SLFAC submits policy recommendations that both remove barriers to and actively support local food system efforts, and is structured to include nonvoting subcommittee members to ensure input from a large network of cross-sector, grassroots

leaders. The local food coordinators legitimize local foods as an Extension issue and identify a specific contact person for communities, while the flagship program makes it more likely that educator work will be supported with needed resources (e.g., funding, training materials, educational opportunities, new support positions, credibility, political opportunity).

Empowering Extension Educators for Institutional Change

A localized food system seeks to embed the production, distribution, and consumption of foods in community relationships (Morgan, Marsden, & Murdoch, 2006). Over the past decade, interest and advocacy related to food and agri-food systems has spread from academics and community leaders working on rural economics and food security to professionals in business development, tourism, health, planning, and many other areas. Various groups have found common ground for discussion using the cultural frame of "local food." Proponents of local food systems have sought to localize food for a variety of different reasons: to enhance rural and urban economies, promote sustainable farms and farming practices, and improve individual health. "Local food" has thus worked effectively as a bridging device (Benford & Snow, 2000) to bring together various constituencies to effect institutional change in the existing agri-food system.

Transformation in food systems, from national and global to more local, critically depends on harnessing the momentum and resources of individuals and organizations to create collaborative initiatives. Institutional change occurs as potential relationships among advocates solidify into actual coalitions, with actors in the emerging institutional field developing mutual awareness and practices becoming accepted and taken for granted (Barley & Tolbert, 1997; Greenwood, Suddaby, & Hinings, 2002; Lawrence & Phillips, 2004; Maguire et al., 2004).

Evidence from the North Carolina program indicates that Extension educators can play a crucial role in cultivating relationships that heighten mutual awareness and enhance the adoption of localized practices of food production and consumption. Their experiences illustrate the unique skill and resource set of Extension as it could be used to build LFS, and suggest supports needed by educators to leverage these skills and resources for institutional change. In this concluding section we recommend four ways in which Extension educators could be further empowered to act as institutional entrepreneurs. Although these suggestions are applied specifically to LFS as concept and issue, they could also be applied to other areas of community interest that require a systems approach, including health, education, and sustainable economic development.

The first is continued legitimization of local foods as an important issue, with resources to back this up. A critical resource noted by the PDP leaders was information on the benefits of and strategies for developing localized food systems, and a communications structure to share information with collaborators. During the project term educators and community members coalesced around a distinct project, sharing information and linking to informational resources through the work of the project's lead organization. They exchanged information through agent-to-agent mentorship, bimonthly conference calls among project participants across project counties, and a midproject discussion forum at a regional sustainable agriculture conference. As the two-year grant concluded, agents expressed the need to continue to have the opportunity to learn about food systems and to network among peers on these issues. North Carolina's designation of local foods as a flagship Extension program indicates a commitment of resources at the state level and provides a mechanism for Extension staff to work across program areas. At the national level, current efforts to develop an eXtension virtual community of practice based on local and regional food systems provide a means to institutionalize information exchange on the issue, and ties into the Cooperative Extension Service's eXtension program, with which agents are already familiar.[4] Validation of

[4] eXtension is a national Internet-based Cooperative Extension educational network accessible to the general public. For information on the developing eXtension Community of Practice focused on "Community, Local and Regional Food

agent work and support for informational exchanges, both virtual and face-to-face, empowers agents to take the lead in food systems change.

A second way to support institutional entrepreneurship is to incorporate local food system ideas and initiatives within the established and familiar organizational routines associated with the Extension Service advisory boards. State- and county-level advisory boards are designed to inform extension staff of community needs. Inertia in populating these boards with new members, however, may account for the recognized mismatch that sometimes occurs between emerging citizen concerns and boards' continued emphasis on traditional programming areas (Robinson, Dubois, & Bailey, 2005). It is likely that the mismatch occurs simply because boards are not regularly rejuvenated with community members who are outside of these traditional programs. One way around entrenched advisory boards is creation of county or regional food policy councils or advisory committees that focus specifically on LFS, with leadership from CES. Or, deliberate efforts could be made to communicate promising local food programming to existing advisory board members and to populate boards with members who support food system localization activities. Each of these possibilities for board rejuvenation requires the support of the county extension director. Therefore, special attention should be made to work with county extension directors to increase awareness of the benefits of LFS and the successful outcomes of these systems in their state, region, and nationally.

A third means to empower institutional entrepreneurship is to stimulate integrated programming across all four extension program areas to draw upon diverse resources. Although cross-program contact is encouraged in Cooperative Extension new agent training (see for example Safrit, 2011), organizational structures such as the program-specific advisory boards and program-defined reporting structures can segregate information by program area. To mitigate this silo effect, cross-program advisory groups could be used to forge relationships and generate integrated programming.

A final suggested means to support agents is to design new measures of success to evaluate the food systems work of extension entrepreneurs. The current focus on monthly and annual reporting of program impacts encourages short-term educational programs that are insufficient to create systemic change. Measured impacts are often based on the number of individuals served, where this number depends on the actual number of individuals attending a training or field day, pre- and post-measures of information gained during the training, and adoption of specific technical practices. These measurements correspond to diffusion models of behavioral change. The challenge now is to design measurements that can show evidence of and track institutional changes in the food system over time. Shifting from a reliance on "comprehensive counts of inputs and outputs" to evaluating change by "look[ing] for patterns of emergence" (Meter, 2010, p. 25) poses a challenge to advocates of food localization, but is one that can bear significant fruit because it empowers change agents situated in advantageous structural and relational positions.

Researchers and practitioners involved in food system assessments have perhaps the greatest potential to design measurements as part of their ongoing work to identify valid and reliable measures of food systems and food environments. Deriving suitable reporting and assessment strategies and measures remains a substantial challenge. For the moment, prioritizing integrated programming and collaborations, and permitting a longer time frame for outcome reporting, may enhance extension educators' involvement. Working over a period of two or three years with multiple partners to successfully open a community garden, an urban farm, a community kitchen for value-added products, or a new or rejuvenated farmers' market should be considered a highly successful outcome for agents. Recognition that regional projects, perhaps not located in the agent's home county, are valid outcomes is also vitally important. A produce aggregation center serving multiple counties or consolidation of several small struggling rural farmers' markets into a strategically located multi-county market, perhaps not in the agent's home county, should be measures of agent success. Establishing mechanisms to gather information on

systems," see http://collaborate.extension.org/wiki/Local_Food_Systems_-_for_Extension_Educators

food systems is also a key role that could be taken on by extension. Creating databases that link local producers and local businesses, identifying local producers who could supply schools and hospitals, and establishing mechanisms to track changes in these purchases over time are vital data-gathering activities and should be considered legitimate uses of extension time and be a part of agent work plans.

In Closing

CEFS's PDP project sought to build on the impressive innovation already existing in North Carolina offices of Cooperative Extension, with agents who have always been engaged with "local food" through their work with local farmers. Much of the success of the project is attributable to the inspiration of local extension staff and their capacity and willingness to work with partners in their communities.

The Cooperative Extension Service in North Carolina and other states is primed to lead in the transition to more regional and local food systems. Supporting the capacity and expertise of county-based field agents to serve as institutional entrepreneurs can enable agents to respond to the growing public demand for local foods through partnerships and can maintain the Extension Service's relevance in a challenging budgetary climate. As this shift occurs, it will be important to fully engage university-based research and extension faculty. While this may require a shift in focus from traditional agriculture research topics, it also invites collaboration with faculty and practitioners who have not traditionally worked in agriculture, including planning, supply chain development, and epidemiology and other areas of public health. It also provides the opportunity for cross-program collaboration in the field and among extension research specialists to address the need for measures to evaluate the work of localizing food systems and to determine which LFS-building initiatives "work" — and why and how. This collaboration and engagement with, recognition of, and support for extension's work as change agents can bolster the development of a self-perpetuating cycle of institutional change in food systems.

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Community-engaged learning in food systems and public health

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Abstract

Food preferences, systems, and policies influence the health of individuals and communities both directly, through food consumption choices, and indirectly, through environmental, economic, and social impacts. To aid student understanding of these complex determinants of food choice, a student-driven, community-engaged learning course on food systems and food choices was developed. Guided by the socio-ecological model for health and the goals of the Emory Sustainability Initiative and supported by the Center for Community Partnerships (CFCP), the course objectives, curriculum, and activities were determined by the students in collaboration with the faculty advisor and community partners. Two central components of the course were student-led learning modules and community-engaged research on food systems. The four learning modules included: (1) determinants of individual food preference and choice; (2) food and agriculture systems; (3) food access and food justice; and (4) agricultural policy. Community research projects

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Author note: Findings from student research projects presented here were previously presented at a community symposium at Emory University in May 2011. A presentation about the course, entitled "Community-engaged learning on food systems and public health," was presented at the American Public Health Association Meeting on November 1, 2011.

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described the role of farmers' markets, community supported agriculture, conventional markets, community gardens, and farm-to-table restaurants in the production and distribution of food in metro Atlanta, with an emphasis on locally produced fruits, vegetables, meats, and milk. Where possible the projects mapped the reach of these distribution models to low-income communities and food deserts, and identified strategies to improve access to healthy food options in these communities. The course culminated in a student-organized symposium for community members and in research reports for community partners. The symposium drew diverse participants, including growers, farmers' market managers, advocacy groups, public-health scientists, policy-makers, students, and academicians. Discussions with symposium participants assisted in refining the research reports for community partners and helped identify strategies and topics for future collaborative efforts and course improvements. A grant from Emory's CFCP facilitated collaboration with community partners, community research, and dissemination of research findings.

Keywords
community-engaged research, food policy, food systems, higher education, public health nutrition, service-learning, sustainability

Background

Food systems, policies, and individual food preferences play important roles in the health of individuals and communities. These factors act both directly through food consumption choices and indirectly through environmental, economic, and social impacts that affect the safety, availability, and accessibility of healthy foods. Despite the growing interest of the mainstream media in the relationships between food systems and individual, community, and environmental health, there is limited academic conversation on these relationships, especially in public health education. Little is written and published in peer-reviewed literature about public health education approaches to sustainable food systems and their capacity to meet the needs of low-income and food desert communities. Furthermore, academic courses and programs that address these topics are not widely reported in the literature or shared across institutions, despite their relevance to numerous fields of study, including agriculture, health, economics, community development, and environmental studies. Francis and colleagues argue that research and learning on agriculture and food systems rarely cross disciplines (Francis et al., 2008). An opportunity exists to improve interdisciplinary as well as interinstitutional collaboration on food system education and research. To address the gap in food system education, a student-driven, community-engaged learning course on food systems and the determinants of food choices was developed. The course was piloted as a two-credit directed study in the 2011 spring semester. This manuscript describes the pedagogical and theoretical frameworks that undergird the course, the student-driven development and implementation of the course, course outputs, and lessons learned during the first offering of this course.

Comparable models

A limited number of other academic institutions are addressing the larger and interrelated issues of food systems, justice, sustainability, and policy. Depending on their academic environment and resources, schools approach research and learning on food in a variety of ways. For example, the Center for a Livable Future at Johns Hopkins University is a multidisciplinary center that explicitly connects agriculture, food systems, and public health in its research, education, and community-outreach efforts, focusing on sustainable food systems and food security (Johns Hopkins University, 2011). The center offers two graduate-level courses on food. As well, the Friedman School of Nutrition Science and Policy at Tufts University includes departments for Nutrition Science as well as Food and Nutrition Policy. Tufts' Master of Public Health curriculum includes a concentration in nutrition in collaboration with the School of Nutrition Science and Policy, and food systems are addressed through some of the elective courses (Tufts University, 2012a, 2012b).

The University of Minnesota's Institute for Sustainable Agriculture fosters an interdisciplinary network of academics, sustainable agriculture practitioners, and rural communities to conduct community-based research, teaching, and outreach on sustainable agriculture. However, this institute does not appear to connect with the School of Public Health's nutrition concentration (University of Minnesota, 2011). Likewise, Cornell University's Division of Nutritional Sciences includes programs in molecular, human, and international nutrition (Cornell University, 2011a). Food policy spans several of those programs, and it has an interdisciplinary program on food systems (Cornell University, 2011b).

Other institutions lack programs in sustainable agriculture or food systems but are integrating these topics into the health curriculum. For example, a course entitled Food, Health, and Justice was recently added to the College of Health Sciences curriculum at the University of Wyoming. This course maps the national and global food systems, identifies positive and negative contributions to health outcomes, and discusses alternatives such as community-based food systems (Christine Porter, personal communication, March 9, 2012). At the University of South Carolina, a course on Nutrition and Public Health investigates the complex interactions between food, diet, and health while integrating policy, community, and environmental approaches to improve nutrition (Sonya Jones, personal communication, March 11, 2012). Unfortunately, few papers have been published to date that describe the process whereby these programs and courses are developed, implemented, and refined.

Development of a Community-engaged Public Health Course on Food Systems

Course Formation

In the fall of 2011, a group of eight graduate students in public health and nutrition began discussing the need for a course that explores food systems and food policy as they apply to public health and nutrition. Students met with a faculty advisor and began identifying the primary topics of interest and the best strategies to address those topics. After the group came to consensus on four key topics, the students assigned themselves to develop specific learning modules around each topic (described in detail under course activities). The professor and students also agreed that engaging the local food community would greatly enhance learning about food systems. Students identified appropriate community partners and developed the framework for community-engaged research projects to explore various aspects of the food system around metro Atlanta. The course was granted departmental approval as a pilot directed-study course in late fall of 2011 to be offered in the spring 2012 semester.

Theoretical Frameworks

Two overarching theoretical frameworks, the Ecological Model of Health and of Sustainability, guided course development. The Ecological Model of Health emphasizes the interrelatedness of individuals with the larger system of natural, built, policy, and legal environments within which they make health decisions (Sallis, Owen, & Fisher, 2008). This model states that healthy behaviors are possible when policies and environments provide support for and/or motivate healthy choices and when people are informed and empowered to make those choices. Guided by the framework of the Ecological Model, the course addressed food and diet choices by studying how food systems, food environments, and food policies influence an individual's ability to act on their knowledge and/or beliefs about healthy foods. The Sustainability Vision of Emory University adopts a commonly used definition of sustainability: "meeting the needs of the present generation without compromising the needs of future generations" (Emory University, 2008; World Commission on Environment and Development (WCED), 1987). Emory's commitment to sustainability includes a commitment to ensuring "a more sustainable food system" for its campuses and hospitals. In 2007 Emory University adopted as part of its strategic planning the ambitious goal to "procure 75% of ingredients from local or sustainably grown sources by 2015" (Emory University, 2008). In defining purchasing priorities for local and sustainable food, Emory University

considers environmental, social, and economic criteria while also taking into account cost and supply barriers that limit the ability of the university to source local or sustainably produced foods.[1] As part of didactic course work, students debated the priorities and definitions outlined in this document. The university's commitment to sustainability provided institutional support for students to critically consider how sustainability is integrated with food systems, food policy, and health.

Building on these two theoretical frameworks, students prioritized three key goals for the course: (1) understand how individual food preferences are formed and influenced; (2) identify how food policies and food systems influence food choices and diet behaviors, as well as the implications of these on health outcomes; and (3) explore the important issues of food justice and environmental sustainability as they relate to food production, availability, and access, and health.

Pedagogical Approaches

The course utilized three complementary pedagogies to achieve the course goals: (1) student-centered learning; (2) community-engaged service learning; and (3) transformative learning. Student-centered learning puts students in charge of identifying the topics they feel are important, deciding why those topics should be prioritized, and selecting effective strategies for teaching the material (O'Neill & McMahon, 2005). In this model, instructors are not the bearers of information on a given topic but rather serve to facilitate learning by providing students support to identify and explore their own learning objectives through student-selected learning strategies. Students share greater responsibility in the learning process and are expected to be actively engaged.

Student-centered learning was emphasized from the initial stages of course development, when students worked as a team to identify and prioritize the key concepts, relationships, and skills that they deemed important for the course and the activities they would use to engage student learning. In developing the course, students advocated for opportunities to gain practical experience related to the course topics and to further develop skills taught as part of the general public health curriculum. Through this process, students made substantial inputs and decisions on course objectives and topics, course structure, assignments and grading criteria, and student responsibilities. Student-centered learning continued to be a primary pedagogy throughout the course as students worked in teams to develop and facilitate their selected learning modules and identify, implement, and disseminate their community-engaged research.

Community-engaged learning is a unique pedagogical approach that engages students in experiential learning while contributing to community building and meeting academic learning objectives (Howard, 1998). In the case of public health education, students utilize skills and content acquired in the academic institution to identify and address community needs with community partners, to learn about the varied and unique perspectives of public health issues, and to engage with partners to identify and mobilize community assets, wisdom, and strategies. Early in course development, students recognized the importance of engaging with community partners and prioritizing their needs and interests. Partners, including a local food advocacy group and the local board of health, contributed to identifying and prioritizing course goals and objectives, developing course activities, and also served as guest speakers and mentored community-engaged research projects.

The course also emphasized transformative learning, defined as "the process by which previously uncritically assimilated assumptions, beliefs, values and perspectives are questioned and thereby become more open, permeable and better justified" (Cranton, 2006, p. vi). Transformative learning is a voluntary process of being critically

[1] Emory University's "Sustainability Guidelines for Food Purchasing" provides detailed information on the definitions of sustainable and local. This document and information on Emory's progress towards its sustainability goals can be found at http://sustainability.emory.edu/page/1008/Sustainable-Food. It should be noted that the document outlining the Sustainability Guidelines is a dynamic one and is periodically revised by the Sustainable Food Committee to reflect evolving certifications, fluctuations in costs, and changes in supply.

self-reflective by integrating personal experience with critical reflection to generate learning (Kolb, Boyatzis, & Mainemelis, 2000). In this course, reflection, defined as the "intentional consideration of an experience in light of particular learning objectives" (Bringle & Hatcher, 1997, p. 153) allowed students to link their experiences in community-engaged learning and research back to course content and, in the process, examine their own beliefs, assumptions, and biases.

These pedagogical approaches were realized through key activities undertaken to achieve content and skills objectives. Activities included development of student-led learning modules, community-engaged research projects, in-class discussions and written reflections, a food insecurity experience, and organization of a Local Food Systems symposium. Activities are discussed in the next section and briefly summarized in Box 1.

Box 1. Course Activities for a Directed Study on Food Systems

1. Student-led Learning Modules: Students worked in teams of two to three to facilitate a learning module of their choice. They were responsible for inviting speakers, providing background readings, facilitating group discussions, and /or designing community-based activities that linked classroom learning with community-based experiences such as volunteer activities.

2. Community-Engaged Research: Students worked in teams of two on a semester-long project to map the reach of local foods systems in DeKalb County and metro Atlanta. Students also documented challenges faced by producers in providing healthy and sustainable food through the various food systems, especially in low-income communities. The project culminated in student presentations and facilitated discussions at a community-wide symposium on Local Food Systems and a white paper for the DeKalb County Board of Health.

3. Reflections: During the semester, students periodically reflected, through short essays and discussion, on the evolution of their beliefs about and understanding of the complexities of food intake and food systems, including effective, feasible, and empowering strategies to improve access to healthy food in all communities, especially marginalized communities. Students also participated in and reflected on a month-long food insecurity project in which they lived on a predetermined "food stamp budget."

Course Activities

Learning Modules

Didactic coursework to accomplish the three key course goals was facilitated through student-led learning modules (see Box 2 for a description of the learning modules). Students were responsible for all aspects of developing and delivering the learning modules to their peers, including choosing the discussion topics, selecting relevant readings, coordinating guest speakers or developing other content materials, and facilitating discussion. Within each module students explored the implications of the module topic on health outcomes, especially in relation to chronic diseases such as obesity and cancer. The implications of the module topic on sustainable production of food and for environmental health were also explored. In addition, as part of module 2 specifically, two

Box 2. Didactic Learning Modules for a Directed Study on Food Systems

1. Development of Individual Food Preference
   - Biological determinants of food intake and dietary choices
   - Psychosocial determinants of food intake and dietary choices
   - Environmental determinants of food intake and dietary choices
   - Food marketing

2. Food Systems
   - Evolution of agriculture systems in the United States
   - Overview of industrial food systems
   - Overview of alternatives to industrial food systems
   - Food labeling, certifications, terminology and regulations

3. Food Justice
   - Food security: availability, accessibility, quality
   - Nutrition safety nets and food banks
   - Farm worker health

4. Food and Agricultural Policy
   - Dietary guidelines
   - History of the farm bill
   - Overview of farm bill nutrition title; farm bill commodities, conservation and other titles
   - The influence of agriculture policies on food systems and health
   - Local and state policies; advocacy
   - International trade and food aid

class periods facilitated by members of Emory's Sustainable Food Committee focused on the history of food production systems in the U.S., sustainable food production practices, terminology and certifications, and the processes required to obtain certification. The syllabus and additional course materials are available upon request from the authors.

Reflection

Students completed five short reflections on their learning and experiences throughout the course. Through these reflections, students integrated the content learned through class readings and discussion with their experiences conducting research, visiting a community food bank, and living on a "food stamp diet." Reflection topics encouraged students to recognize and think critically about their own assumptions and biases related to food choices and how these evolved as they engaged with course activities and community partners. A list of the reflection topics is provided in Box 3.

Box 3. Student Reflection Topics for a Directed Study on Food Systems

1. How I decide what to eat: Personal philosophy on food and how and why you prioritize food choices
2. Living on a food stamp diet — Expectations*
3. Can sustainable food systems adequately feed the US? The world? A response to *The Economist* series (*The Economist,* 2011)
4. Living on a food stamp diet — My reality*
5. Incentives vs. penalties vs. individual choice — how can we ethically legislate to influence food intake in the U.S.? Around the world? Should we?

* Reflections were based on a month long experience of students living on a "food stamp budget" based on the average monthly allotment for residents in the state of Georgia (Kaiser Family Foundation, 2011).

Community-engaged Research Projects and Partnerships

To gain experience in community-engaged research and enhance learning about food systems through practical experience, students undertook community-engaged research projects. Students expressed an interest in better understanding barriers to accessing healthy foods, namely fresh fruits and vegetables, lean meats, and milk that are locally produced and/or produced using environmentally sustainable methods. Discussions with community partners highlighted the potential influence of production and distribution barriers to availability and consumer accessibility and indicated that the impacts of production and distribution barriers on local food systems are not fully understood. As a result of these conversations, students explored four food production and distribution systems in DeKalb County and metro Atlanta communities: (1) farmers' markets and community supported agriculture operations (CSAs); (2) community gardens; (3) farm-to-table restaurants; and (4) conventional retail. Student projects sought to identify where and how these systems operated in DeKalb county and metro Atlanta, including the barriers and facilitators in the production and distribution of locally and/or sustainably produced foods,[2] how these systems reached communities, and barriers and facilitators for improving access to these systems in low-income or food-desert communities. Findings from the student projects were used by community partners to identify the areas of greatest need in the provision and access of healthy and locally and/or sustainably produced food, particularly in low-income communities, and to characterize strategies to improve production

[2] Local and sustainable foods were defined by each community partner and thus each research team differently; in some cases these definitions were formal, such as the conventional retail research group which used USDA organic certification to define organic products. In other cases definitions were less formal and more variable; for example, most community gardens reported using sustainable and organic growing practices, prohibiting pesticides and herbicides, limiting water use, and composting, but were not certified as USDA organic. Likewise, many farms interviewed were not certified organic but reported using organic production methods and emphasizing other sustainable practices to reduce erosion, minimize water requirements, and diversify crops. In terms of locality, some partners defined local foods as those grown and sold within DeKalb County or Atlanta, while others defined local as coming from the state of Georgia and /or surrounding states. Local production was not equated with sustainable production methods, although in many cases (for example farm-to-table restaurants, community gardens, farms selling at farmers' markets and CSAs) these concepts did overlap.

and access. In the next section we identify these community-engaged projects in more detail and briefly discuss the findings of each project.

Community-Engaged Learning and Research: Individual Project Methods and Findings

For each community-engaged research project, qualitative research methods, namely interviewing and observation, were the primary methods used. Project teams developed interview guides to collect information on the operation of local food systems, accessibility of local and/or sustainably produced foods, and barriers to and motivating factors for developing local food systems. Data on location of the local food resources were provided to geographic information systems (GIS) analysts at Fox Environmental and contributed to the development of a local food map for DeKalb County (Figure 1). All projects were deemed exempt by the Emory Institutional Review Board, and all participants provided informed consent. A brief summary of each project's methods and findings was drafted by each student team and is presented below.

Farmers' Markets and Community Supported Agriculture

Background: Adapted distribution systems such as farmers' markets and CSAs offer possible solutions to the lack of accessibility of local, fresh foods. Students aimed to understand from the perspective of local farmers, farm managers, and market managers how these distribution systems operate, reach the community, and affect food access through social and economic impacts.

Methods: Students completed interviews with three farmers' market managers, four CSA farmers and/ or CSA managers, and one cooperative market manager. After all interview data were collected, interview audio was used to identify themes from each interview. Themes were used to understand challenges, barriers, and successes.

Findings: Respondents perceived that consumers face a number of barriers to accessing local food, including awareness, cost, transportation, time, etc. As barriers become too great for consumers, many are driven to consume nonlocal/conventional foods. Respondents identified prohibitive policies, financial barriers to production, and limitations for marketing as some of the challenges to successfully distributing food through farmers' markets and CSAs. According to the respondents, these challenges faced in production and distribution underlie consumers' challenges in accessing local foods from markets and CSAs in terms of availability and pricing of locally grown and sustainably produced foods. Some producers and vendors have responded to these challenges by adapting their business models. For example, they have formed cooperative groups and developed mobile and online markets as ways to work with multiple farmers.

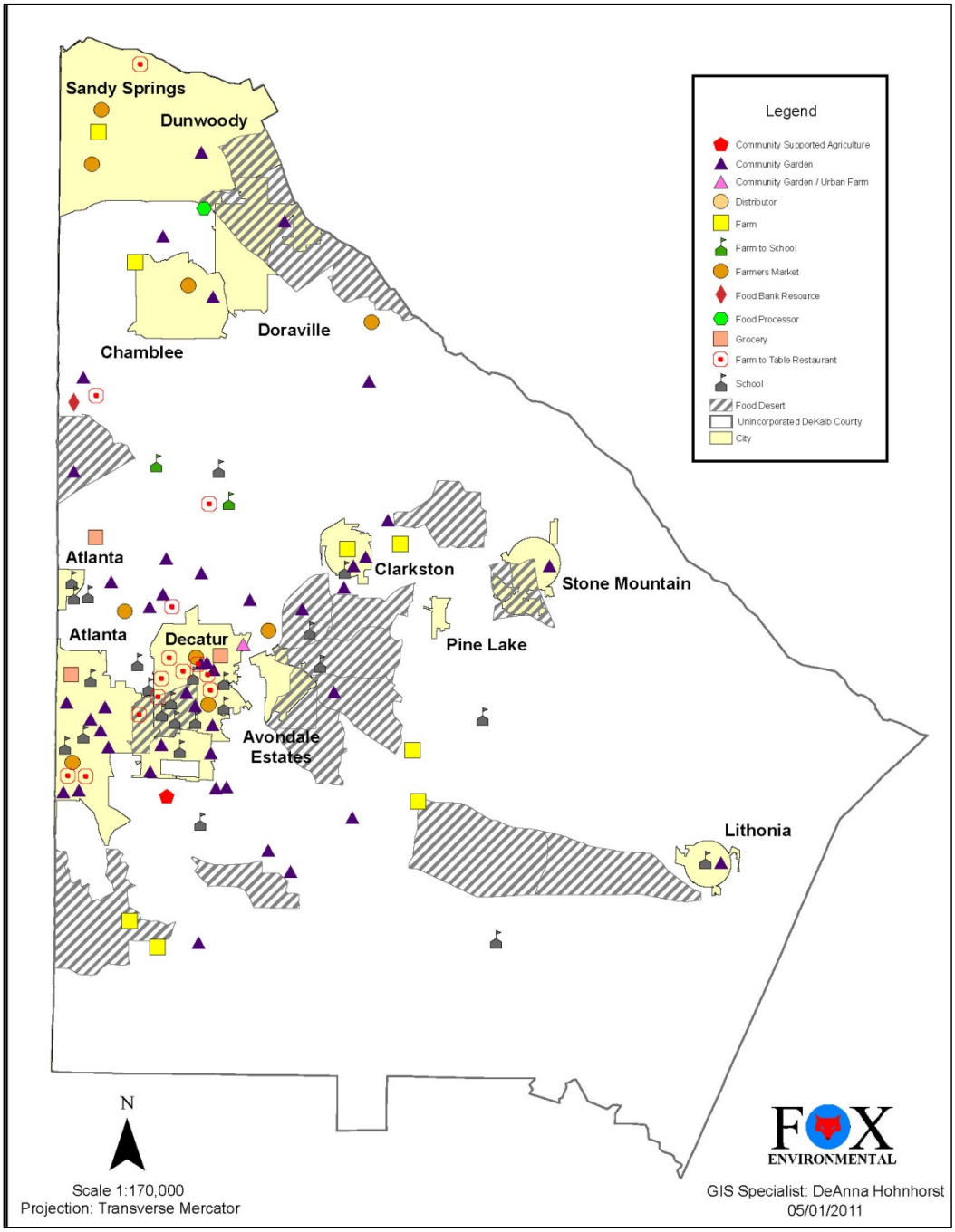
Producers perceive there to be additional barriers to accessibility of local foods for those receiving federal food assistance benefits in the form of the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). These additional barriers include operational difficulties, stigma, and lack of awareness that some markets accept federal benefits.

Interviewees also proposed possible solutions to increasing consumer access to local foods, which are summarized in Box 4. Furthermore, producers noted the importance of maintaining transparency and continuing to have open communication and collaboration between

Box 4. Solutions Proposed by Respondents To Increase Consumer Access to Foods Sold at Farmers' Markets and Through Community Sponsored Agriculture

1. Assisting with or reducing the burden of mandatory regulatory activities (permits, certifications, etc.).
2. Providing resources or alternative options to negotiate proposed regulations.
3. Drawing upon policies that other states have used and lessons learned for streamlining and simplifying processes.
4. Decreasing taxes on small farmers while increasing incentives to grow fruits and vegetables using sustainable methods.
5. Creating partnerships with low-income communities to promote availability of SNAP at markets.
6. Enabling community stakeholders to build new models and adapt old ones.

Figure 1. Map of Food Deserts and Local Food Resources in DeKalb County



Local food resources include food production, retail, or distribution sites, for example, groceries, farmers' markets, restaurants, food bank outlets, urban farms, community gardens, etc., that self-identified as producing or sourcing locally produced foods. Food retail outlets such as groceries or convenience stores not sourcing local food are not indicated. Data for local food resources included are current as of May 1, 2011, and were provided by the following organizations: Georgia Organics, Atlanta Community Food Bank, Fox Environmental, and Rollins School of Public Health at Emory University. Data on food deserts, which the USDA defines as a "*low-income census tract* where a substantial number or share of residents has *low access* to a supermarket or large grocery store" (USDA ERS, 2012a, "How is a food desert defined?") were provided by the USDA Economic Research Service and defined using 2000 census tract data (USDA ERS, 2012b). The map was developed and prepared by DeAnna Hohnhorst, Geographic Information Systems and Database Specialist (GIS/DBA) and independent contractor for Fox Environmental in Decatur, Georgia.

communities, local businesses, markets, and producers. In summary, local food distribution systems serving DeKalb County have adapted to suit the needs and resources of producers, consumers, the community, or any combination of the three, but still face multiple challenges. In order to increase access to local, healthy foods in low-income areas of DeKalb County, local- and state-level government can reduce producers' risk through funding logistical and policy support for adapted models.

Community Gardens

Background: Community gardens are an increasingly popular part of local food systems. However, little has been documented about how the gardens function, barriers to operation and uptake, what motivates communities to establish a garden, and how gardeners perceive their role in the creation of an accessible, just, and sustainable local food system.

Methods: To address these gaps, students conducted qualitative interviews with individuals representing 18 community gardens in DeKalb and Fulton counties of metro Atlanta.

Findings: Gardeners interviewed represented gardens that varied in size, location, demographic served, length of operation, and operational strategy. Primary purposes of the gardens included growing food for home consumption, growing food for donation, and any combination of these purposes. The gardens were mostly growing typical annual vegetables, with some herbs, berries, fruit, and flowers.

Primary motivators for participating in community gardens included learning more about gardening, forming community connections, growing fresh food, and saving money. Decisions about which crops to plant were determined by each plot holder, or in the case of communally managed gardens, through a group decision-making process. Crop choices were often based on what had the biggest difference in taste or price compared to store-bought alternatives.

Three general successes were highlighted by garden leaders: (1) educational impact; (2) creating neighborhood or community pride; and (3) building community connectedness. When asked about barriers to successful community gardens, participants highlighted the balance between leadership and collective responsibility, availability of natural resources such as water and appropriate land, commitment of human resources, and processes related to permits, regulations, and fees. Although not all interviewees had firsthand experience promoting gardens in low-income communities, the ones who did cited similar barriers. Even so, participants indicated that some of the barriers may be more acutely felt due to limited time, resources, experience, and capacity within low-income communities.

Four primary areas for action emerged from these interviews: (1) developing networking and communication opportunities between gardens; (2) creating zoning and other policies that explicitly support urban agriculture; (3) encouraging clear, mutually respectful communication with city and county government; and (4) increasing awareness of available resources.

Farm to Table Restaurants

Background: The farm-to-table movement in DeKalb County is playing a significant role in driving local, sustainable food production and educating consumers about healthy food choices. However, there is little information available on the process through which the farm-to-table system operates in DeKalb County, which factors enable or hinder this process, and how these influence access to locally produced, sustainable foods.

Methods: Thirteen farm-to-table restaurants were identified in DeKalb County using Internet searches and the Georgia Organics Local Food Guide (Georgia Organics, 2011). In-depth interviews were conducted with the owners or managers of the three that agreed to participate. In-depth interviews were also conducted with four suppliers, including three growers and one distributor, who were identified during the restaurant interviews.

Findings: Participants identified several challenges inherent in a farm-to-table restaurant system. Generally, the farm-to-table restaurant system operates on a smaller scale than the conventional restaurant supply system, and participants do not benefit from the same economies of scale.

Everyone involved in the system has smaller profit margins than conventional restaurants and suppliers, exacerbated by the higher cost of producing food through sustainable growing practices. Respondents also cited a high delivery cost to volume ratio, as suppliers have to expend time and money making frequent deliveries. Additionally, the consistency of the quantity and quality of locally sourced foods is variable and affected by many factors, including weather and season. The farm-to-table restaurant system requires intense logistics management to keep inconsistencies to a minimum. Lastly, the higher costs make reaching low-income communities a challenge; none of the restaurants identified by this team were located in low-income areas.

Participants also discussed factors that enabled successful farm-to-table operations. Relationships between suppliers and restaurants are critical and facilitated by direct interaction, regular and consistent communication by phone and email, and transparency about availability of foods and their use in the restaurant. Participants also emphasized flexibility since restaurants may need to change their menu or provide a substitution if an expected item is not available. Both restaurants and suppliers said that the ability to innovate and a willingness to experiment with different processes and products are keys to making the farm-to-table system work well. They also agreed that knowledge transfer between the restaurants and suppliers is essential for understanding each other's needs and challenges. Additionally, both suppliers and restaurant managers highlighted that consumer awareness about health risks associated with the industrialized food system and the benefit to the local economy of purchasing locally drives the farm-to-table restaurant trend and is critical for ongoing and future growth and support of this food system in DeKalb County.

Conventional Retail

Background: The objectives of the conventional food system project for grocery stores in DeKalb County were to (1) understand the availability of regionally produced products, (defined as those produced in Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Alabama, and Mississippi); (2) understand the availability of certified USDA organic foods; (3) assess the variability of availability and pricing of regional or certified organic foods in areas classified by different income levels; (4) assess the variability of food prices between and within grocery store companies; and (5) supplement the survey research with interviews with grocery store manager.

Methods: Three national chains and two independent grocery companies in DeKalb County were identified by the researchers for surveying purposes. The percentage of students receiving free or reduced price lunch in 2011 was used as a proxy measure for the income level of a school district. The researchers classified each school district into one of three categories, high-income, middle-income, or low-income, based on tertiles of the distribution of students receiving free or reduced-price lunch. Using this breakdown, DeKalb County had one high-income school district, seven middle-income school districts, and 11 low-income school districts. For two of the three national chains, the researchers selected one store each in the high-income, middle-income, and low-income school districts for a total of six stores. The third chain did not have a sufficient number of stores to sample in this way.

Prior to surveying the stores, the researchers created a list of commonly purchased items that included fresh vegetables and fruit, meat, dairy, and grains. The specific foods were chosen to reflect items that are widely consumed and widely available in retail stores to facilitate comparisons of availability and cost and are itemized in Table 1. Items sold by weight were priced per pound, and a commonly available size was selected when pricing all other items. All identified stores were surveyed on April 8, 2011. At each store, the researchers attempted to find all 27 foods in both the conventional and organic varieties using the same brands across stores when feasible. If the product was available, the production location was recorded to assess whether the food was regionally produced. Brand and price were also recorded.

To supplement the survey data, the researchers sought to interview general and/or produce managers at grocery stores in DeKalb County. The managers of identified stores were contacted by

Table 1. Foods Assessed for the Conventional Food Distribution System Project

Fruits	Vegetables	Grains and Cereals	Dairy and Eggs	Meat
apples, **grapes, strawberries, bananas,** oranges	**plum tomatoes,** cucumbers, **green bell peppers,** carrots, iceberg lettuce, **romaine lettuce,** Idaho potatoes**, yellow onions,** cabbage, kale	**Honey Nut Cheerios–type cereal, Raisin Bran–type cereal, whole wheat bread, white bread**	**1% milk (½ gallon or 1.9 liters),** 1% milk (gallon or 3.8 liters), **strawberry yogurt, one dozen eggs**	**ground beef, ground turkey, boneless skinless chicken breast,** whole chicken

*Items in bold were included in price comparisons.

phone to request in-person, semistructured interviews; only two consented, as many companies do not permit interviews. Both interviews were conducted at the managers' respective stores.

Findings: In DeKalb County, conventional products were widely available. The five grocery store companies stocked a mean number of 24 products from the list of 27 food items, with a range of 19 to 27 products stocked. Organic products were not as widely available, with a range of 10 to 23 products stocked. The most commonly available organic products included fresh produce and dairy items. Regionally produced products (within the eight-state area) were extremely limited, with a mean number of five products stocked and a range of two to seven. The most widely available regionally produced products were milk, chicken breasts, strawberries, and green peppers. Informant interviews with produce managers confirmed that there are several barriers to stocking organic and/or regional produce, including product price and availability, store size, and potential low consumer demand. There was no product price variability found within stores of the same grocery store chain, regardless of school district income level. This was confirmed by one interview participant, who noted that all DeKalb County stores within the chain should offer products for the same price per company policy.

In order to compare the prices between the five grocery store companies, the 27-item food list was reduced to 17. This was necessary because not all products were available at each store. The prices of organic products were not used when totaling the cost of the food list unless the store did not stock the conventional varieties. The total cost for the entire foods list ranged from USD39 to USD50. Grains were particularly expensive in some of the independent grocery stores (mean = USD13) as compared to the chain grocery stores (mean = USD7.50). This is partially due to the fact that the independent grocery stores focused on organic grains.

Community-Engaged Learning and Research: Dissemination

The community-engaged research and learning projects culminated with a symposium for community partners and other stakeholders. The symposium served as an opportunity to present findings to community partners, receive feedback on findings and implications, and engage in meaningful discussion with partners about next steps. The symposium, also student-organized, drew a large and diverse group of participants, including farmers, market managers, public health scientists, dieticians, policy-makers, staff from community-based organizations, community advocates, and students and faculty from local universities. After introductory presentations were made, each student group presented its community project and findings. Breakout sessions designed to encourage further dialogue followed the presentations. Feedback from the breakout discussions with symposium participants was incorporated into a research report for community partners, which was further adapted into a report on food systems by the local board of health (DeKalb County Board of Health, 2011). The research and feedback from the community also helped identify strategies and topics for

future collaborative efforts.

A notable theme emerged from discussions at the symposium: residents of low-income communities were not well represented. This was largely because the community-engaged research component focused predominantly on those food procurers, sellers, and producers who could potentially provide food to these communities. Participants agreed that while a focus on producers within food systems was a logical and useful starting point, future iterations of the community-engaged research and learning component of the course should strive to include the perspectives of purchasers and consumers of food and especially those in low-income or food desert communities.

Discussion

This course provided a unique opportunity for students to explore the complex relationships between food systems and policy, nutrition, health, justice, and sustainability in an academic setting, while experientially investigating these issues through direct community-engaged research and learning. Students reinforced research and critical evaluation skills developed during their public health and nutrition training by reflecting on their experiences, designing learning modules, and engaging in research. In course evaluations, students reported that the experience from this course opened their eyes to the complexity of food, nutrition, and health issues, and both challenged and prepared them to think critically about causes and consequences of food systems and food insecurity. At the end of the course, students reported having a better understanding of the relationships between food systems and policies, individual dietary choices and health outcomes, and issues of sustainability and justice, indicating that the course had achieved the desired objectives. Students also reported increased conscientiousness in their own dietary choices, concern about the difficulties in accessing quality food due to system-level barriers, and desire to emphasize a food-systems perspective in nutrition and public health research and practice. Since participating in the course, most of the students have undertaken meaningful volunteer or paid work based on their experiences in the course, some with community partners they met during the class projects and some with like-minded organizations at other locations. Several students are pursuing careers directly related to the course topics, and several other students report that the course has impacted their professional goals. Additional benefits of the course reported by students include developing the capacity to move from problem-oriented thinking to solution-oriented thinking about food systems, recognizing the potential impact of small-scale but intentional collaborations, and empowering students to be informed and engaged citizens.

Successes and Limitations of the Course

There are many important factors that contributed to the success of this course. Several limitations also emerged in the process of course development and implementation. One of the greatest strengths identified by students and faculty was that it was student-driven. It specifically addressed the needs and interests of the students and met a gap in the existing course selection in the public health curriculum. Also, this was an excellent opportunity to proactively apply the research skills gained in other courses. Because of this, students were engaged and committed to the success of the course. Secondly, the course was consistent with Emory University's principles for sustainability and student engagement, resulting in a supportive university environment and departmental buy-in. Support from Emory's Center for Community Partnerships (formerly the Office of University and Community Partnerships) facilitated the community-engaged research and learning component of the course. The purpose of the CFCP is to connect and support partnerships between Emory and the community through engaged learning, research, and community work (Emory University, 2012). CFCP offered assistance throughout the process of course development and relationship-building with community partners. Additionally, the CFCP provided financial support for student participation in a conference on sustainable food systems and dissemination of research findings at the student-organized symposium.

Lastly, the faculty advisor was committed to ongoing collaborations with the community part-

ners beyond the tenure of the course. Community partners were encouraged to view themselves as partners in the success of the course and projects and as stakeholders in deciding the direction and focus of future iterations of the course. This commitment has resulted in the development of relationships that ideally will foster long-term collaborations with mutual benefit for and engagement with community partners.

Despite the identified successes, there were certainly some constraints. First, developing a new course required a significant time commitment, both for faculty and students. Although the advance planning during the fall semester contributed to a successful course, without that additional commitment, it would have been difficult to develop meaningful partnerships and design community-engaged research. The time commitment during the semester was also substantial, especially for a two-credit course. When making recommendations about how to manage the time commitments required by the course in the future, students emphasized the importance of retaining all components of the community-engaged portion. Students felt that maintaining both the extensive didactic component and community-engaged project would require the course to be offered for three credits. Conversely, if the course were to be offered as a two-credit then the didactic portion would need modification in order to retain all of the community-engaged work.

Another challenge encountered throughout the semester was keeping each class session focused on the given topic. For example, it is difficult to address food justice and sustainability without discussing food and agriculture policy, so those topics overlapped in multiple modules. This presented a logistical challenge because it required students to remain flexible and frequently collaborate in the development of their course modules. The overlap was also positive because it reinforced the interconnected nature of these issues and allowed the students to revisit key topics and relationships throughout the course activities. Utilizing a complex case study approach to teaching these principles in the future, rather than trying to teach them through distinct learning modules, may be a more appropriate pedagogical approach and will be tested in future course offerings. Lastly, conventions and definitions of key terms, such as health and sustainability, vary between and among different fields. This posed a problem for clarity and consistency in defining sustainable foods, but it also created a rich opportunity for discussion of the importance of terminology, labeling, and marketing in food systems and policy. In conducting the community-engaged research projects, definitions for local and sustainable foods were fluid and dependent on the definitions provided by community partners or by participants who self-identified as providing locally sourced or sustainably produced foods based on their own understandings of what these terms mean.

Future Plans

In future years, we anticipate the course will be offered as a three-credit course due to the time commitment of community-engaged work. To continue the student-centered approach that is critical to its success, the course content and format will be adapted each year according to student interests and academic needs. However, based on feedback from students and community partners, future iterations of the course will have a greater emphasis on the causes of food insecurity and community-based strategies to improve access to healthy and sustainably produced food. Case-based learning strategies will be utilized to emphasize the integrated and complex relationships between food security, agriculture, food policy, and food systems. Community-engaged research will strive to partner with residents of low-income and food desert communities to document their challenges and strategies for purchasing and consuming healthy, sustainably produced foods.

The interdisciplinary nature of food systems suggests that a course on food systems would benefit from a diverse set of student backgrounds, not just those in public health. Therefore future offerings will be open to students across the various disciplines and schools within the university system. Engaging students early in their graduate career may provide opportunities for students to develop a more sustained engagement with communities and community partners.

Conclusion

This student-led, community-engaged pilot course on food systems allowed students an opportunity to explore a topic of great interest in an academic setting while simultaneously engaging with active community partners. Community-engaged learning courses often struggle to balance the service and the scholarship aspects of a course. However, because this was a student-driven course, students were successfully able to engage with both the academic and the community perspectives on food systems. With students as a conduit, this course structure allowed the academic sphere to interact and build relationships with the public/private sphere. Through collaboration, the students, faculty, and community partners were able to expand the body of knowledge relating to local food systems to continue to support the development of a healthier, more sustainable food environment in DeKalb County, the metro Atlanta area, and beyond.

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Interdisciplinary model for infusing food security into STEM curriculum

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Abstract
Integrating applied learning and research experiences into the curriculum at any academic level represents hands-on, student-centered learning at its best. It provides expanded opportunities for instructional innovations and faculty-student mentorships that can both translate to the classroom and extend beyond the classroom. Here we propose an interdisciplinary, comprehensive, and immersive approach to integrating service-learning and research into the science, technology, engineering and math (STEM) classroom by devising the infrastructure necessary for students to have the opportunity to actively participate in a local food security network. Presented here are two examples of experiential-learning activities integrated into STEM curricula that align learning objectives with food security stakeholder needs. We hypothesize that the sense of personal responsibility to serve and empower food security network stakeholders will be a very important motivating factor for students to master the accompanying STEM learning objectives that have been integrated into the framework of the service-learning project.

Keywords
community stakeholders, experiential learning, food security, health clinic, hoophouse, service-learning, STEM

Introduction
The multifaceted and complex issues associated with food security allow for a wide array of interconnected, globally and locally pertinent research and service-learning activities that immediately connect students to their communities. A food security network helps to establish safe, nutritious, and affordable food for all citizens that is culturally acceptable, can be obtained in a dignified manner, and is produced in ways that are environmentally sound and socially responsible. Here we present an interdisciplinary, comprehensive, and immersive model for integrating service-learning and research into the science, technology, engineering, and mathematics (STEM) classroom by developing a network of community and campus food security stakeholders (local food pantry, community garden, faculty, and community members utilizing the services offered) and identifying areas for research and service that align and overlap. When the term "STEM" was first coined in the early 2000s, the

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National Science Foundation (NSF) envisioned that high-quality STEM educational experience should be highly integrative and cross-disciplinary (Duggar, 2010). We hypothesize that aligning service-learning and research experiences with the needs of food security stakeholders in the local community results in transformational curricular experiences. We also hypothesize that these tangibly impactful experiences are an important motivating factor for students to master the accompanying STEM learning objectives that have been integrated into the framework of the associated curricular activity.

The broad, complex, and diverse components of "food security" as described by the Food and Agriculture Organization of the United Nations (FAO) (figure 1) provide an ideal framework for creating interdisciplinary service-learning and research opportunities that are tightly woven into the larger food security stakeholder network. In 2007–2008, requests for emergency food assistance increased by about 18 percent in the 25 cities surveyed by the U.S. Conference of Mayors, on Hunger and Homelessness; however, there was only a five percent average increase in the quantity of food distributed (U.S. Conference of Mayors, 2008). When asked to anticipate their biggest challenges for 2009, "nearly every city cited an expected increase in demand resulting from the weak economy coupled with high prices for food and fuel" (U.S. Conference of Mayors, 2009, p. 1). In Dunn County, Wisconsin, 14 percent of the population lives at or below the poverty level (U.S. Census, 2007), and over 10 percent of the population receives food stamps (University of Wisconsin–Extension [UWE] and the Wisconsin Department of Health and Family Services [WDHFS], 2005) While three food pantries operate within the county, there are no community gardens specifically targeting low-income families, nor are there community supported agriculture (CSA) programs with special access for low-income families (UWE and WDHFS, 2012)

Having access to nutritious food is vital to good health (Bernstein, de Konig, Flint, Rexrode, & Willett, 2012; Halton, Willett, Liu, Manson, Stampfer, & Hu, 2006; Malik, Popkin, Bray, Despres, & Hu, 2010; Marckmann & Gronbaek, 1999; Oh, Hu, Manson, Stampfer, & Willett, 2005; Srinath Reddy & Katan, 2004).

Maintenance of good health is also significantly impacted by the provision of health care. In 2009, 11 percent of the population was uninsured or was insured for only part of the year (Wisconsin Department of Health Services, 2010). This suggests that over one-tenth of the population persistently lacks insurance coverage and access to preventative and potentially life-saving care. The poor are at the highest risk, as they generally lack preventative health care and consume the least nutritious food (Andrulis, 1998; Baker, Schootman, Barnidge, & Kelly, 2006; Flores, Abreu, Olivar, & Kastner, 1998). Perhaps the worst culprit in the diet of the poor is fast food (Baker et al., 2006). Fast food is highly processed and often deep-fried in partially hydrogenated oil — a precursor to high cholesterol levels and subsequent heart attacks (Hu & Willett, 2002). Combined with starchy vegetables and sugary drinks, these foods have a high glycemic load, a factor that contributes to obesity, which has been linked to the onset of diabetes, although the mechanism is still under investigation (Shimabukuro, Zhou, Levi, & Rounger, 1998). The rapid growth of the fast food industry has dramatically changed the population's health and well-being (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004).

Abundant research has shown that students are typically more engaged and become more aware of problems faced by members of their own community after taking part in a classroom activity based on service-learning (Bringle & Hatcher, 1996; Giles, 1994; Lui, Philpotts, & Gray, 2004; Markus, Howard, & King, 1993; Mentkowski & Rogers, 1993; Shumer, Treacy, Hengel, & O'Donnell, 1999). Through service-learning, students use what they learn in the classroom to solve real-life problems. They not only learn the practical applications of their studies; they also become actively contributing citizens and community members through the service they perform. Development of academic skills, life skills, civic responsibility, and citizenship occur when service is introduced to undergraduate students (Astin & Sax, 1998; Eyler & Giles, 1999). One particularly advantageous feature of service-learning is that it is not suited to just one type of

student; the gifted, the talented, the average, and the exceptional can all contribute to and benefit from the experience. It is an all-encompassing activity that allows all to serve, usually in a team environment. Service learning projects that benefit both students and community are built from authentic partnerships defined by the Community Partner Summit Group (2010) as (1) embracing quality processes, (2) achieving meaningful outcomes, and (3) being transformative at multiple levels. An important aspect of the learning in service-learning is reflection (Bringle & Hatcher, 1999; Eyler, 2002; Payne, 2000). Reflection is an internal process that allows students to think about how the external experience (service) has affected them on both personal and cognitive (learning) levels (Daudelin, 1996). The reflection activity, therefore, becomes the lynchpin for connecting service-learning with course content (Eyler, 2002; Hatcher & Bringle, 1997). There are a variety of reflection activities that one may assign to students (Eyler, Giles, & Schmiede, 1996). We have used survey questions that allow for open-ended answers so that students may freely express themselves.

The integration of applied learning and research experiences into the curriculum at any academic level represents hands-on, student-centered learning at its best. It provides expanded opportunities for instructional innovations and faculty-student mentorships that can both translate to and extend beyond the classroom. These applied types of learning opportunities engage and retain groups at risk of dropping out of STEM programs (Lee, 2002). The NSF identifies these applied types of practices among the core principles of a high-quality and effective educational experience in biological sciences in its 2011 Vision and Change document (see figure 1).

This study presents two examples of curricular experiences that embed food security principles and practices into the classroom and connect students to the community in impactful ways.

Method

Activities related to food security were integrated into two courses at University of Wisconsin–Stout, a polytechnic university that blends theory with practice to produce innovative solutions to real-world problems. The courses were BIO 242 (Botany), a course for Applied Science majors, composed of a lecture and lab with 24 to 48 students per semester, and BIO 362 (Advanced Physiology), a course for Applied Science pre-professional majors and Food and Nutrition majors. This course is also composed of a lecture and lab with 18 to 36 students per semester. Both courses integrated a six-week-long service-learning project into their curricula. Botany students were directed in the establishment of four-season growing (FSG) facilities at the newly established community garden. Advanced Physiology students were directed in the establishment and running of a preventative health clinic (PHC) at a local food pantry. To ensure that curricular experiences were the most likely to result in effective and transformational pedagogy and significant outcomes for the community, four key principles were applied to the design and implementation of the work:

Figure 1. Components of Food Security According to the Food and Agriculture Organization of the United Nations (FAO) and How Curricular Experiences Supported Local Food Security

1. Service-learning projects were carefully aligned with course learning objectives and goals.
2. Service-learning projects were interdisciplinary in nature.
3. Service-learning projects made a tangible and overt connection to a food security stakeholder.
4. Service-learning project outcomes were aligned with the needs of community food security stakeholder.

Both curricular experiences used the NSF's core competencies of a biological education as a guide for framing the service-learning project, as shown in table 1.

Project Alignment with Course Learning Goals and Objectives

Both projects were designed to integrate and apply course content into their respective service learning activities. The FSG project was devised as a way to tie in many of the fundamental learning objectives of a traditional botany major's course, including fundamentals of plant cell structure and function, basic plant anatomy and physiology, and plant breeding and genetics. Through the semester-long activity, students were introduced to concepts of sustainable agriculture and horticultural techniques. This activity enabled the students to learn about the challenges involved in growing plants for food.

In the PHC experience, one major learning goal for students was to learn about the integrated nature of the organ systems and how organs systems rely on each other to maintain health. Specifically, the students learned about the importance of maintaining parameters such as blood pressure, glucose levels, and body weight in the healthy range. Those parameters are usually adversely affected by food insecurity due to poor or inadequate nutrition. Students also solved problems using real-life clinical case studies. Armed with this knowledge together with limited clinical experience via case studies, the students then ran a health clinic where they routinely measured

Table 1. NSF Core Competencies and Disciplinary Practices

Core Competency	Ability to apply the process of science	Ability to use quantitative reasoning	Ability to tap into the interdisciplinary nature of science	Ability to communicate and collaborate with other disciplines	Ability to understand the relationship between science and society
Examples of core competencies applied to Four Season Growing (FSG) and Preventative Health Clinic (PHC)	Both projects required students to synthesize scientific information to solve complex problems. *FSG students:* Researched crop plants and season-extension strategies to implement their own plan. *PHC students:* Analyzed medical protocols and health guidelines to provide patient participants with appropriate feedback.	Both projects required students to apply quantitative analyses to understand biological data. *FSG students:* Calculated crop production and yield. *PHC students:* Measured blood pressure and calculated mean arterial pressure to assess cardiovascular health. Measured height and weight to calculate BMI as an indicator for obesity.	Both projects allowed students to think about factors that play a role in the initial need for the projects. *FSG students:* Developed an appreciation for the physiological consequences of food shortage and lack of access to fresh fruits and vegetables. *PHC students:* Observed the link between nutrition and health in the community.	Both projects frame their work within sociology, economics, governmental policy-making, health care policy-making, ethnic studies, and epidemiology to give context to the background and need for the projects.	Both projects provided the students with a deeper understanding and appreciation for how science is tightly integrated into all aspects of society. They saw the positive aspects of this relationship (using botanical principles to grow food out of season, using knowledge of the human body to determine health status), in addition to the negative consequences (poor health outcomes due to food insecurity).

patients' blood pressure, urinary glucose levels, and body weight. They provided customized health and nutritional advice based on each patient's clinical results. Another major goal of the course was to provide free preventative health screenings for the prevention of chronic illness through the PHC.

Interdisciplinary Nature of the Work

Together, both class projects addressed the four key components of food security that immediately provided an interdisciplinary foundation for the activities. While the FSG project directly addressed food availability and stability, the PHC focused on access and utilization (refer to figure 1). Importantly, the consequences of food insecurity and further preventing the deleterious effects of food insecurity were themes of both courses that connected students to the significance of their work in the larger community. The two projects represented a synergistic approach to addressing a common issue.

In addition to the broader interdisciplinary concepts that applied to both courses, through the FSG project students were introduced to the highly interdisciplinary nature of plant science. Students investigated chemical properties of the soil, considered nutrient deficiencies in plants, and discussed the health benefits of fresh, locally grown, and organically produced food.

While working at the PHC, students researched the factors that necessitated the need for such clinics and therefore explored the relationship between socioeconomic status and health insurance coverage, or the lack thereof. Students also researched the relationship between pathophysiology, food, and nutrition, as well as the effect of exercise from a physiological standpoint with the onset of diseases such as hypertension, diabetes, and obesity.

Aligning Course Objectives with Stakeholder Needs

Both projects were developed with the long-term goal of establishing authentic and impactful partnerships with the community. It was important to carefully align goals of projects with the needs of stakeholders to ensure that all parties benefited from the experience. Both projects also built on previous successful community-based efforts, such as a local community garden that had been established in the community in the previous year. University students were critical to the successful establishment of the garden and maintain a strong presence on the board of the local community garden. In previous years, students had interned and volunteered at the Stepping Stones Food Pantry and participated in food drives and fundraisers for the facility.

For the FSG project, a direct community connection to the project was established by enlisting the support of the community garden board. The board director met the students on-site to assist them in the selection of hoophouse sites and inform them of other responsibilities associated with their community garden work. In addition to maintaining their hoophouses, students were required to participate in a pre- and postseason garden cleanup. The community garden board was the primary point of contact for requesting space in the newly existing garden facility. At the end of each semester, students prepared reports of their FSG results to the garden director so that outcomes could be shared with the larger community.

The Menomonie Community Garden has the mission of providing gardening space, horticultural training, and community-building activities to the larger Dunn County community. The FSG project was designed around the mission of the community garden and emphasized opportunities to empower community members to establish their own hoophouses and other simple yet innovative strategies for growing healthy food.

A hoophouse is a structure that is used as a season extender; crops may be grown out of their normal crop-growing season, thus effectively extending the growing season. This is a very important method for increasing the availability and stability of food, two of the key components of food security (see figure 1). Hoophouses are named due to their characteristic semicircular hoop shape with a frame typically constructed of lengths of PVC pipe (Upson, 2005). Other advantages of using a hoophouse include weather protection, selective pest protection, and cost. Hoophouses are easily constructed and last many years (Blomgren & Frisch, 2007).

The PHC was developed specifically to provide preventative health screenings for hypertension, obesity, and diabetes — three conditions associated with food insecurity that are studied in depth within the Advanced Physiology course. Populations living under the threat of food insecurity typically have inadequate or nonexistent health insurance and cannot pay for preventative health screening, which has been shown to result in better long-term health outcomes (Maciosek, Coffield, Flottemesch, Edwards, & Solberg, 2010).

The Stepping Stones food pantry is a custom-built facility that serves Dunn County by providing healthy and nutrient-dense foods to anyone in need. In the design of the building, it was always envisioned that a health clinic would be part of the establishment so that people using the food pantry service would also have easy and convenient access to basic preventative health-screening services. The timing for the student-run health clinic could not have been better. The proposed health clinic was perfectly aligned with the mission of the food pantry in that the health clinic would cater to people who are uninsured or underinsured with regard to health insurance and it would provide essential preventative health screening to the most vulnerable in the community.

Project Implementation

FSG. In this activity, teams of three or four botany students were assigned to a community garden plot with the materials to build a small (6 ft. x 6 ft. or 1.8 m x 1.8 m) hoophouse and given a goal of developing and implementing strategies to grow a winter crop. Students were responsible for selecting a crop (fiber, flower, or edible), growing their crop, and having a logical use based on community need for their crop. Students were given the choice to grow any number of different plants in any method they chose, but were required to clearly indicate how and why they chose a particular crop. Students were given the choice of starting with seeds, pregerminated seeds, or stem cuttings, the only stipulation being that the crops had to be planted in the hoophouse for a minimum of six weeks. Students were also required to assemble and maintain their own hoophouses and associated growing structures, maintain a log of activities, determine the role of each group member, make appropriate community contacts, inform the contact that the crop may not yield, and identify ways of handling and distributing the crop post-harvest for actual use by the community stakeholder. Two important aspects of this work connected the students to the community: (1) Students were required to research and select food crops to grow in their hoophouse structures that could be used for some purpose in the community, such as donation to local food pantry or for a cooking demonstration at the food pantry. A number of students cited the Stepping Stones food pantry as the final destination for their crops. This aspect of the project required students to research areas of need in the community and participate in outreach activities that aligned their potential food crop with an end user who had a food need. (2) Students were required to complete an end-of-semester report on the successes and failures of their four-season growing activities. The purpose of this report was to inform future users about successful strategies. The final report requirement integrated a student reflection component into their service-learning activity. This component gave the students an opportunity to reflect on their perceived learning outcomes, impact on the community, and ways they could improve project outcomes for future classes and the community.

PHC. Students were divided into groups of four and assigned time slots for working at the clinic according to their schedules. Before work at the clinic commenced, the students were trained to measure blood pressure and calculate mean arterial pressure from the measurements. Students were also trained on urinalysis and auscultation and interpretation of lungs sounds. They learned about self-breast examinations and how to teach patients to self-examine. They also learned how to weigh patients and measure their height accurately and calculate their BMI from the measurements. In addition to the technical training, students were trained to interact with patients in a respectful, friendly, and diplomatic manner. The PHC operated in a room of the food pantry. Students operated the clinic five days per week for a two-hour period. Every day before it opened, the students organized the clinic by setting up a heart

and lung station to measure blood pressure and pulse rate and to listen to lungs. A BMI station was set up for height and weight measurements, and a urinalysis station was set up for measuring urine glucose and ketones. Once the various stations were organized, they then invited patients to the screening. The screening room was adjacent to the waiting area for the food pantry. Students would enter the waiting area and distribute a list of services provided by the screening clinic. Patients would check one or more services of which they wished to avail themselves. When patients were called, they were escorted into the clinic and screened. During the screening students were required to interpret blood pressure measurements and determine whether the patient was normotensive (normal blood pressure), prehypertensive (normal but elevated blood pressure), or had stage 1 hypertension (moderately elevated blood pressure), or stage 2 hypertension (significantly elevated blood pressure) (Chobanian et al., 2003). Based on the patients' clinical results, students were required to make lifestyle recommendations for patients who were not normotensive. After the urinalysis, students interpreted the glucose and ketone readings and determined whether the patient was normal, prediabetic, or diabetic.

Coding for Qualitative Data

Having completed the six weeks of service learning, students were given the opportunity to reflect upon their experience. This activity enabled FSG students to reflect upon whether they could communicate successes and failure in growing crops; suggest strategies for improving crop growing; whether their harvest had been successful; and whether they could create detailed reports of the crop-growing activities for the community garden board. For the PHC students, the reflection activity was an opportunity for determining whether they understood the connection between course content and the services they performed at the clinic; how they felt about themselves having worked in the clinic; whether they understood the underlying need for the clinic; and how they felt about the impact of the clinic on the community. Students' open-ended responses were assessed as either positive or negative with respect to the questions in the reflection activity and then tabulated as a percentage of total responses for each question (see table 2). In addition to the specific reflection questions, students were asked for general comments or recommendations for their respective projects. These responses were grouped into major themes for each project.

Results

Botany — FSG Outcomes

Eighty students in 18 groups over three semesters (fall 2010, spring 2011, and fall 2011) participated in the FSG project. All participants were able to communicate their successes and failures in growing crops and provide suggested strategies for successful season extension. Approximately 25 percent of groups were able to successfully harvest edible or otherwise useable plants from their season-extension efforts (see table 2a). All students created reports to present to the community garden board detailing their four-season growing project and describing how they would improve their efforts.

Students' self-reported learning outcomes showed three major themes:

1. Students reported that it was more difficult to grow and care for crop plants than they had initially anticipated. They also reported a better understanding of the influence of soil, temperature, and light on plant growth.
2. Students reported that selecting the appropriate crop plant is a critical factor in

Table 2a. Results of Botany Student Reflections (n = 80)

Student Reflection	Percent Positive Comments
Able to communicate successes and failures in growing crops	100%
Able to suggest strategies for improving crop growing	100%
Successful harvest	25%
Able to create detailed report for community garden board	100%

attempts to extend the growing season. While researching plants in the beginning of the project, students underestimated the importance of making careful crop selections and by the end of the project students were much more aware of the need to select crops appropriate to the growing conditions.

3. Students reported difficulty in making connections to local food security stakeholders. Nearly all groups reported contacting the local food bank as a place to donate their food. It wasn't until after their project ended that students reported learning that to adequately serve their community stakeholder, their crop required specific post-harvest handling and a distribution plan. Specific post-harvest handling requirements as outlined by safety and regulatory bodies include food safety standards in schools, hospitals, and daycare sites, to name a few (Wisconsin Department of Agriculture, Trade and Consumer Protection, 2011). In addition, daycare sites and schools also have guidelines that require specific nutritive standards for meals (Nutrition Standards in the National School Lunch and School Breakfast Programs, Final Rule, 2012). Adhering to these safety requirements would require strict coordination of the end users' needs with the students' post-harvest handling.

Advanced Physiology — PHC Outcomes

Results obtained from the reflection activity following the health clinic demonstrated that students understood how course concepts directly related to the service learning activity; that they felt they were better citizens for having participated in the service learning activity; that they felt positively about the impact of the service-learning activity on the community; and that the overwhelming majority of them understood the underlying factors that necessitated the need for the health clinic within the community (see table 2b).

A breakdown of student recommendations following the service-learning activity showed four major themes:

1. The health clinic should continue and also expand to multiple locations within the community.
2. Better marketing should be done to attract more patients to the health clinic.
3. All students on campus should participate in similar service-learning activities.
4. The range of health services offered in the clinic should be expanded.

Discussion

The FSG and PHC projects represent two projects from seemingly unrelated disciplines that directly address the four components of food security: availability, stability, access, and utilization. Importantly, these two projects lay the foundation for a series of food security–related curricula that will be embedded across the Applied Science program in the future. Embedding food security themes into multiple curricula will provide a connective scaffolding and knowledge base of food security presented from different perspectives throughout each student's academic career. These projects also helped us identify and make plans to address significant gaps in understanding between campus stakeholders and community stakeholders.

The FSG project was initiated in fall 2010 and for three semesters has resulted in engaging botany students in an applied, community-focused research activity. During their self-reflection activity, most students reported that this was their first experience attempting to grow food. The

Table 2b. Results of Advanced Physiology Student Reflections (n = 30)

Student Reflection	Percent Positive Comments
Understood connection between course content and real-world applications	100%
Believed to be better citizens for participating in health clinic	97%
Appreciation for the fundamental needs of the health clinic	93%
Positive feelings about impact of health clinic on community	87%

experience offered students a real-life opportunity to understand the challenges involved both in growing food and with season extension in a cold climate. Beyond simply researching the theory of growing food and season extension, students applied their knowledge to design and build FSG structures, make crop plant selections, and devise plans to keep their plants alive in extreme environmental conditions. All students reported having a much greater appreciation for the skills and knowledge required to grow food, and all groups documented how they would modify their strategies for successfully growing food in a season-extension system in the future. This is a significant outcome for this work, mainly because the students participating in the FSG project now possess the skills and strategies for growing their own crops or passing on that knowledge to others within the community.

Our research suggests that providing members of the community with the autonomy to grow their own food may be a small but important step toward achieving a more sustainable food system. In addition to the goal of providing students with an applied, research-focused educational experience, a second goal of the work was increasing students' awareness of the role that plant scientists play in supporting a secure food system by increasing food availability and food stability in the local community. As an important aspect of the FSG activity, students were required to select crop plants with the needs of the local food security stakeholders in mind. The instructor provided direction on crop selection through one-on-one meetings with groups early in the semester, providing students with a text on the subject of season extension, and several laboratory and lecture sessions dedicated to the topic. However, students did not report leaving the experience with an understanding of how their crop selection could be connected to a community need.

The project aligned students with the community through stakeholders responsible for the community garden, and students were actively involved in the community by maintaining the community garden facilities and their own hoop-houses. However, the students' lack of understanding how their crop selection was tied to community need identifies an important gap in the project. In this project iteration the instructor failed to align the project also with other possible community stakeholders who would have been valuable resources for students when tasked with identifying "community need."

The pilot PHC was successful in terms of its goals and objectives, that is, student appreciation of the integrated nature of the organ systems for maintenance of health; understanding the significance of abnormal readings for health parameters, such as blood pressure, BMI, and glucose levels; and fully realizing their potential deleterious health consequences. Students reported perceiving their learning outcomes to be of greater depth due to their work experience at the PHC. The fact that every student participating in the clinic fully understood how the clinical work directly applied the knowledge they had acquired in the classroom (based on the reflection activity) demonstrates that service-learning is an effective tool for student engagement.

The second principle goal of the health clinic was to provide free preventative health screenings for the prevention of chronic illness. Access to health care is necessary not only for the prevention and/or management of diseases (such as hypertension, obesity, and diabetes), but also because poor health and certain diseases negatively affect food utilization (Stratton, Green, & Elia, 2003). Students were encouraged to focus on this important aspect of food security. Many of the students were Food and Nutrition majors and therefore possessed a vast wealth of knowledge regarding maximum utilization of food as well as diseases that affect nutrition. Informal chats with the patients revealed conditions (for example, acid reflux disease, Crohn's disease anddiarrhea) that did not necessarily show up through the tests offered at the clinic and allowed the students to counsel patients towards proper food utilization.

It is interesting to note that while 100 percent of the advanced physiology students understood the needs for the health clinic and how it related to the food security stakeholder, many of the botany students did not fully appreciate the need for the project in the larger context of food security, evidenced by their inability to make crop selections

based on community need. This suggests that to fully realize project goals, the FSG activity requires a more thoughtful alignment with food security stakeholders in the community. However, while additional stakeholders may benefit students, meeting the needs of all community stakeholders can become a delicate balancing act for the instructor. The FSG activity was intentionally designed to minimize the number of community stakeholders involved in order to reduce the likelihood of failing to meet expectations of stakeholders, which can lead to increased and long-term friction between the campus and the community.

Conclusion

Meeting both course learning objectives and community needs is not always easily achieved through a service-learning activity. When designing and implementing service-learning projects, instructors must carefully consider limitations they will have in establishing authentic partnerships in the community. These limitations may include scheduling issues, the necessity to meet course-learning objectives at the appropriate academic level, and limitations on the time, resources, and abilities of students, faculty and stakeholders. Projects do not always lend themselves well to establishing authentic partnerships that are based on shared decision-making, have meaningful outcomes, and are impactful on multiple levels in the community.

The PHC activity provides a good example of a project that aligns students with community stakeholders, meets stakeholder need, and does not overburden the course instructor. The FSG activity provides an example of an activity that may have overambitious goals, and likely requires multiple iterations in order to establish partnerships between campus and community that are transformative at many levels. Great care was taken in both projects to not promise stakeholders more than the course could provide. Stoeker, Beckman, and Hee Min (2010) suggest that the true impact of service-learning on the community is likely overstated and underassessed, and in most instances the primary beneficiary of service-learning projects are students and not the community. We believe that promising more than we can provide to our stakeholders is destructive to long-term community-campus partnerships and must be carefully balanced with providing students quality instruction. Specifically, our lessons learned include:

1. Projects should be carefully planned with the learning objectives as the primary goal and the needs of the community food-security stakeholder as a close second. Without careful planning and alignment with the needs of the food security stakeholder, the students' efforts in the community could in fact be detrimental to the mission of the food security stakeholder and could result in a very negative experience for both the student and the community partner. Scaling back and staging larger projects into longer time frames to allow for better communication and project management may lead to more effective educational outcomes and more impactful interactions with the community.
2. Successful projects should allow students to have direct contact with the food security stakeholder. A critical aspect of students recognizing their role as scientists or professionals in society appears to be interaction with the community members most affected by their service-learning or research activities. Opportunities for students and community members to work together would be mutually beneficial to both the student and the community and may help students understand their role as it relates to food security.
3. All projects should incorporate multiple opportunities for skills assessment and student self-reflection. Skills assessment allows the students to understand the sometimes intangible outcomes of their service-learning or experiential learning experience and feel more confident in their abilities at the end of the classroom experience. Self-reflection is critically important to students understanding their role and impact as future scientists, farmers, or medical professionals working

within a local food system (Eyler, 2002; Hatcher & Bringle, 1997).

4. Both projects successfully resulted in offering students an applied learning experience that intentionally connected them to the community through food security stakeholders. This was achieved by carefully aligning the projects to desired learning outcomes and developing collaborations with food security stakeholders but also using great care and thought when determining how and when to involve stakeholders. Anecdotally, students reported that their learning experience and outcome were more valuable than the traditional classroom model. The project would be improved by better aligning student training with the needs of the food security stakeholders. Future project goals include the establishment of a campus-based "food security coordinator" who would act as a liaison between faculty, students, and food security stakeholders in the community to better refine student projects and skills training to meet the needs of the community.

Recommendations for further research include assessment of the specific impact of these two service-learning projects on the community from the perspective of the community stakeholder. Very little research has been done to investigate the long-term impact of service-learning on the community (Bailis & Ganger, 2009). We also recommend further assessment of the affective domain (Bloom's taxonomy) on student learning (Bloom, 1956) through the two service-learning projects presented in this paper.

In conclusion, framing service-learning projects around a central theme such as food security serves to benefit both student and community. These interdisciplinary types of projects allow students to think about a central problem from multiple perspectives, thus providing the student an appreciation for the complex nature of solving problems within a community.

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Community food security via urban agriculture: Understanding people, place, economy, and accessibility from a food justice perspective

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Abstract

This paper examines the role of urban agriculture (UA) projects in relieving food insecurity in lower-income neighborhoods of post-industrial U.S. cities, using Philadelphia as a case study. Based on food justice literature and mixed-methods such as GIS, survey, field observations, and interviews, we discuss how neighborhoods, nearby residents, and the local food economy interact with UA projects. Our findings suggest that, although UA projects occupy a vital place in the fight against community food insecurity in disadvantaged inner-city neighborhoods, there are debates and concerns associated with the movement. These concerns include geographic, economic, and informational accessibility of UA projects; social exclusion in the movement; spatial mismatch between UA participants and neighborhood socioeconomic and racial profiles; distribution of fresh produce to populations under poverty and hunger; and UA's economic contributions in underprivileged neighborhoods. Finally, we outline future research directions that are significant to understanding the practice of UA.

Keywords

community food security, community gardens, food access, food deserts, food justice, GIS, Philadelphia, post-industrial cities, urban agriculture

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Introduction

Community food insecurity is among the most pressing issues in many U.S. inner cities. By food insecurity, we not only mean the presence of hunger, but also the lack of physical and economic access to safe and nutritious foods that meet the dietary needs and cultural preferences of people of all socio-economic and racial backgrounds. As a response to these problems, and with the presence of ample vacant land parcels, urban agriculture (UA) has taken root in such cities. In addition, city residents are becoming increasingly aware of the environmental and social impacts associated with the food they eat and the proximity of where it is grown. The complexity of urban food systems, such as the availability of local organic produce in affluent neighborhoods and the apparent lack of healthy food options in disadvantaged neighborhoods, has given way to an increased interest in the equity of the local food movement.

In this paper, we discuss two types of UA activities: community gardens and urban farms. A number of qualitative, and a limited number of quantitative, studies have been done on the many benefits of UA (Irazabal & Punja, 2009, pp. 9–10). Using geospatial and/or statistical methods, some researchers have analyzed the impacts of UA and urban greening programs on neighborhood property values (Been & Voicu, 2006), quality of life (Tranel & Handlin, 2006), and crime (Kuo & Sullivan, 2001). Other relevant quantitative studies have discussed community food access and spatial inequality (Hallett & McDermott, 2011; Hubley, 2011; Raja, Ma, & Yadav, 2008; Russell & Heidkamp, 2011; Smoyer-Tomic et al., 2008) and the potential and capacity of urban food production (Kremer & DeLiberty, 2011; Metcalf & Widener, 2011). On the other hand, many researchers have studied community gardening as a social process by using qualitative methods (Teig, Amulya, Bardwell, Buchenau, Marshall, & Litt, 2009). A smaller group has used mixed-methods or a qualitative GIS approach to combine these two types of research (Corrigan, 2011; Knigge & Cope, 2006).

Our broader research objective was to use the food justice literature and a mixed-methods approach to examine the relationship between UA and the urban social environment. The methods included GIS analysis, survey, field observations, and interviews. This research was done within the context of Philadelphia, a post-industrial city with over 45,000 vacant parcels and various community-based foodcentric programs. Our primary research question was whether or how UA can be considered as a viable solution to community food insecurity. This study also examined the following questions: What are the socio-economic and racial characteristics of active UA participants, and are they consistent with the neighborhood demographics? What distribution networks exist to move food to the neediest populations? Is UA socially accessible to disadvantaged community residents? What external and internal pressures do UA project representatives have to deal with? To what extent do UA projects make an impact on the local economy?

Background

Alternative Food to Food Justice

The alternative food movement seeks to relink food production and food consumption through emphasizing a local foodshed that promotes regional economies, sustainable growing practices, and social justice (Allen, 1999; Starr, 2000). The movement works in direct opposition to the corporate food regime, which is a global food supply system where a select few multinational corporations control the production and distribution of food products (Allen, 2010). This regime operates under, and also produces, unjust social practices, such as low wages, poor working conditions, hunger and starvation, and misdistribution of resources (Allen, 2010).

Much of the research and practices associated with the alternative food movement can be understood from a food justice theory that is related to environmental justice, race, history, and socioeconomics. Food justice argues for a more democratic process that distributes power more equitably, not just to the hands of the purchaser (Alkon & Agyeman, 2011). As a theory, food justice "opens up linkages to a wider range of conceptual frameworks drawn from the literature on democracy, citizenship, social movements, and social and

environmental justice" (Wekerle, 2004, p. 379). It scrutinizes power, resource control, and lack of participation within a food system, and problematizes the hegemonic agro-food industry by calling for alternative solutions such as local agriculture, farmers' markets, and community supported agriculture (CSA) (Allen, 2010; Macias, 2008). A food justice framework assumes that basic human needs are met through equal access and opportunity at participation, without exploitation. Thus a socially just food system is one that equitably shares power so that people and communities can meet those needs (Allen, 2008, 2010). Based on this understanding, food justice work engages racial, economic, and political inequality associated with any and all food systems (Alkon & Agyeman, 2011).

In practice, the alternative food movement, working from a food justice background, plays out as a creation of local food campaigns; a promotion of food access and hunger relief; a concern for sustainable food production and public health; a focus on economic development based in a regional food economy; and occasionally a concern for race, ethnicity, class, and gender issues associated with the power structure of food (Gottleib & Joshi, 2010). An example of this movement is its attempts to provide services to underserved populations. Many farmers' markets and alternative food outlets have begun to accept supplemental nutrition assistance program (SNAP) benefits, and some CSAs provide alternatives to the relatively high financial commitment for membership in order to create a more equitable member base (Gottleib & Joshi, 2010).

A closer examination of the alternative food movement from a food justice perspective demonstrates that, while working to create greater democracy, sustainability, and access, this movement may unintentionally be creating its own inequality. Although such campaigns promote the support of local farmers in the economy, few movements acknowledge that the "existing patterns of local livelihood and exchange could be unequal or unfair" (Hinrichs & Allen, 2008, p. 335). The "selective patronage" of "buy local" campaigns, as it is understood by Hinrichs and Allen (2008), may aim to support an approved list of farms or farmers' markets and may not be equitable in their support. Additionally, Born and Purcell (2006) argue that, "there is nothing inherent about any scale" (p. 195), suggesting that just because food is local, that does not make it socially just. Such structural problems are rarely addressed in local campaigns.

UA and Food Justice

UA participants practice a bottom-up and multi-actor approach to decision-making (Lang, 1999), and gives power to women, minorities, and other disadvantaged populations (Smit & Bailkey, 2006). According to Anderson and Cook (1999), UA supports a food system that is "decentralized, environmentally-sound over a long time-frame, supportive of collective rather than only individual needs, effective in assuring equitable food access, and created by democratic decision-making" (p. 141). However, UA needs to be more thoroughly examined from a food justice perspective to understand if it truly is making the food system more democratic, secure, and socially and environmentally just.

Much research has shown that poor urban neighborhoods have insufficient and inconsistent access to healthy foods, causing social, environmental, and health concerns to neighborhood residents (Raja et al., 2008). In addition, U.S. urban development patterns have contributed to spatial inequalities that separated communities along racial and class lines (Ball, Timperio, & Crawford, 2009). These inequalities lead to what the literature understands as food deserts: areas lacking easy access to supermarkets or full-size grocery stores that sell a wide range of healthy and fresh food. By growing food in blighted neighborhoods, UA project participants bring fresh and local food to food desert areas, often with the added benefit of environmental and community development goals (Block, Chávez, Allen, & Ramirez, 2012).

Community-based UA has shown positive effects in the surrounding neighborhoods, benefiting the residents with healthy food access, food equity, social interaction, natural human capital, and learning opportunity (Macias, 2008). UA projects may increase neighborhood property values, act as a catalyst for neighborhood revitalization and stabilization, create venues for commu-

nity organizing and networking, offer opportunities for recreation, exercise, and therapy (Been & Voicu, 2006); improve social, physical, ecological, and environmental conditions of a neighborhood (Tranel & Handlin, 2006); and reduce neighborhood crime (Kuo & Sullivan, 2001). Overall, localized agriculture addresses the issues of food access and food justice (Wekerle, 2004) and it also has economic benefits. A study of Philadelphia-based programs found that community garden participants reported an annual savings of USD700 per family (Brown & Carter, 2003).

In the U.S., the idea of providing lower-income and unemployed households with access to urban vacant or underutilized land for the purpose of growing food dates back to the 1890s (Lawson, 2004). This movement is particularly gaining momentum now in many post-industrial cities that have lost jobs, population, and other resources, and have been affected by the recent housing crisis. UA in these cities has become a symbol of local reaction to two consequences of inner-city decline: urban blight and food deserts. Since the beginning of the 1970s, UA projects have been developed "as a way to counteract inflation, civic unrest, abandoned properties, and to satisfy new environmental ethics and open space needs" (Lawson, 2004, p. 163).

As a subversive movement, the practice of UA generally increases social capital, civic involvement, community efficacy, and empowerment (Armstrong, 2000; Ferris, Norman, & Sempik, 2001; Gittelsohn & Sharma, 2009; Teig et al., 2009). In addition, studies have identified public participation as a crucial component of the food security planning process (Jacobsen, Pruitt-Chapin, & Rugeley, 2009; McCullum, Desjardins, Kraak, Ladipo, & Costello, 2005; Vasquez, Lanza, Hennessey-Lavery, Facente, Halpin, & Minkler, 2007). Urban farming can transform its participants into urban ecological citizens who not only receive agriculture and environmental education, but also acquire the political and social skills necessary for effective citizenship and community building (Travaline & Hunold, 2010).

Under these assumptions, UA projects can achieve justice at a myriad of levels — socially, economically, and environmentally — although UA sometimes faces similar criticisms as the local food movement for not being socially just. Based on food justice and food access literature, we have identified the following components to discuss the role of UA in community food security within the context of a post-industrial city: socio-economic characterization of UA project participants; geographic, economic, and informational access to fresh and healthy food; hunger relief; social exclusion; and food production, distribution, and economic contribution.

Context

Philadelphia's population decreased between the 1950s and 2010, when the census indicated it had increased slightly. Our comparative analysis of land use change in Philadelphia from 1990 to 2005 shows that residential, wooded, and agricultural lands are diminishing, but parking areas and vacant lands are growing. Following the trend of other post-industrial cities, over that period Philadelphia experienced a decrease in property values, jobs, educational attainment, and community resources, and an increase in vacant land, blight, concentrated poverty, and racial segregation.

Many lower-income neighborhoods of this city face significant food insecurity. According to a national survey created for the Gallup-Healthways Well-Being Index, Pennsylvania's first congressional district, which includes a major portion of Philadelphia, was named the second hungriest in the nation (Lubrano, 2011). Another national study completed by The Reinvestment Fund (TRF) has identified many *low-access areas* throughout the city that are underserved by full-service supermarkets (TRF, 2011).

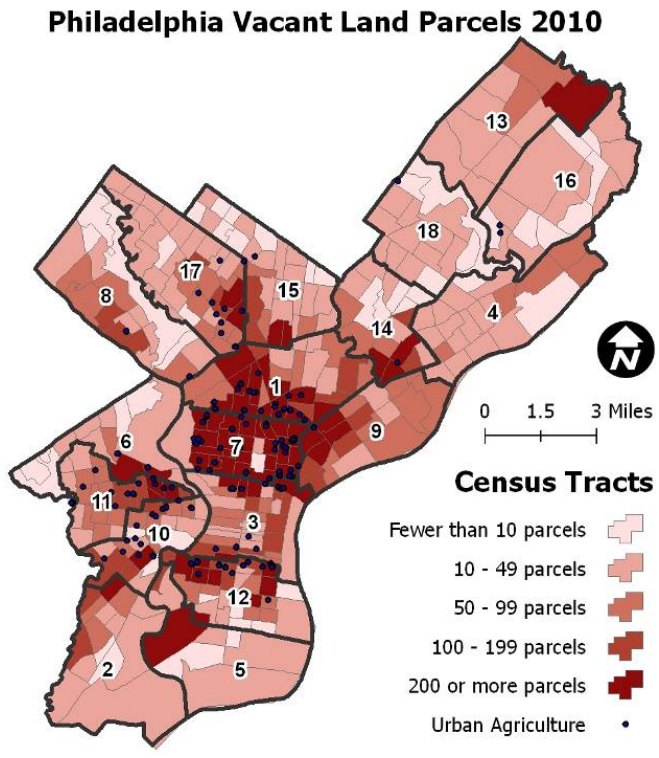
Philadelphia's local food landscape, on the other hand, is celebrated on a national scale for various programs, including a healthy corner store initiative and Fresh Food Financing Initiative (FFFI). The UA community in Philadelphia is an extensive network of community gardens, farms, and backyard or rooftop gardens. More than 700 food cupboards and soup kitchens are located in the city (Greater Philadelphia Coalition Against Hunger, 2011), some of which distribute fresh produce through innovative programs. The UA community, however, faces major challenges.

Between 1996 and 2008, the number of food-producing community and squatter gardens in the city dropped from 501 to 226 for reasons such as land tenure issues and lack of financial support (Vitiello & Nairn, 2009). Figure 1 shows the concentration of vacant land parcels and community gardens with respect to Philadelphia's 18 planning districts. There are more than 230 ecologically defined neighborhoods in the city, and boundaries of these neighborhoods are not universally accepted. We decided to use planning district boundaries in our maps.

Data and Methodology

We collected data for GIS analysis from various sources. Demographic data were downloaded from the U.S. Census Bureau (2009, 2010). Vacant land parcels data were purchased by Temple University's Center for Sustainable Communities (CSC) from Philadelphia's Office of Property Assessment (OPA, 2010). Planning district boundary data was collected from Philadelphia City Planning Commission (2011). Land use data for the years 1990, 1995, 2000, and 2005 were purchased by CSC from Delaware Valley Regional Planning Commission (DVRPC, 2009). Household-level survey data were purchased by Temple University's Metropolitan Philadelphia Indicators Project from Public Health Management Corporation (PHMC, 2010). The survey, known as Community Health Data Base — Southeastern Pennsylvania Household Health Survey, is conducted every two years and provides timely information on more than 13,000 residents living in the five-county Philadelphia metro region;

Figure 1. Land Use and Vacant Land Trends in Philadelphia, 2010



(a)

District No	District Name	Vacant Lot
7	Lower North	13229
1	North	6126
12	South	3627
3	Central	3588
9	River Wards	3457
11	West	3171
15	Upper North	2190
17	Upper Northwest	1760
10	University/Southwest	1508
14	Lower Northeast	1230
8	Lower Northwest	995
6	West Park	954
2	Lower Southwest	934
4	North Delaware	722
13	Upper Far Northeast	574
5	Lower South	534
18	Central Northeast	335
16	Lower Far Northeast	203

(b)

(a) Location of vacant land parcels (N = 45,139) and urban agriculture projects
(b) Number of vacant lots in Philadelphia's planning districts.

Data sources: U.S. Census; City of Philadelphia; Philadelphia Office of Property Assessment; and Philadelphia Redevelopment Authority.

we narrowed the responses down to just those in zip codes located within Philadelphia for the purposes of this study. UA project location data were collected from Pennsylvania Horticulture Society (PHS, 2011), Philadelphia Orchard Project (POP, 2011), and Philadelphia Urban Food Network (PUFN, 2011). We created primary GIS data, such as locations of UA projects that participated in our survey, food cupboards that receive produce donations from those projects, and gardeners of three UA projects in three neighborhoods.

We used the following GIS techniques: (1) geocoding addresses, (2) joining PHMC data with zip code boundaries and census data with census tract boundaries, (3) mapping and interpreting relationships between UA project locations and vacant land parcels, race, population under poverty, and population facing hunger, and (4) analyzing network connectivity between gardens and their active participants, and between gardens and food cupboards. We used ESRI ArcGIS 10 software and its Network Analyst extension.

In addition to GIS work, we developed a 36-question online survey in Qualtrics and conducted it for a two-week period, from February 21 to March 7, 2011. The survey was distributed through the listservs of PHS, POP, and PUFN. Overall, the survey reached out to representatives of 120 UA projects throughout the city. We received 46 responses (a 38 percent response rate) from individuals and nonprofit organizations who manage a total of 81 community gardens and urban farms in Philadelphia (N = 81). In addition, we conducted 20 semistructured interviews of the representatives of community gardens, urban farms, and nonprofit organizations. The interview process was done in two stages: one during the summer of 2011 and the other during the winter of 2012. Two-thirds of the interviews took place at the locations of community gardens, farms, or organizational offices. The rest were done by telephone. Most of the interviewees were selected from neighborhoods that face higher rates of poverty and hunger. Finally, 35 field visits (to food cupboards, gardens, and farms) and observations (of community events) were made from spring to fall of 2011.

Findings and Discussions

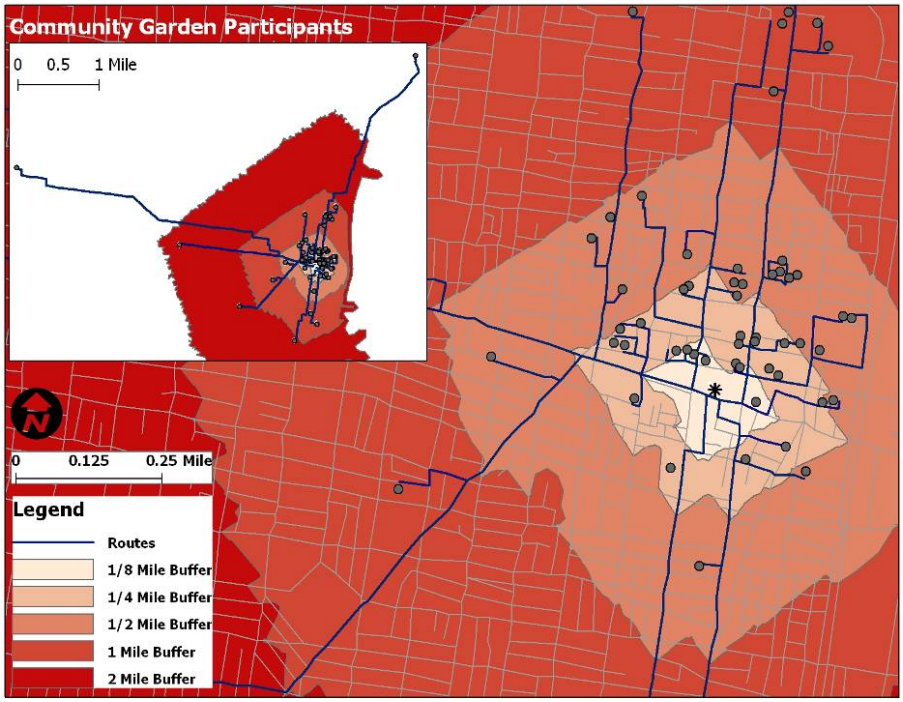
The People: Characterization of Food Producers and Produce Recipients

Of the 81 UA projects represented by respondents to our survey, 30 are smaller than 2,000 sq. ft. (186 sq. meters), 16 are between 2,000 and 10,000 sq. ft. (186 sq. m and 929 sq. m), and the remaining 35 range from 10,000 sq. ft to 2 acres (929 sq. m to 0.8 hectare). Altogether, the respondents reported serving about 18,000 people in an average year. They reported that many community gardens in Philadelphia are initiated by the unemployed or underemployed who want to grow their own food. Included in this characterization are the "creative class," "hipsters," immigrant and ethnic population, and young people — mostly White — interested in a sustainable lifestyle. According to respondents, although community gardeners are mostly in their 30s or 40s, overall they represent a wide range of age groups, from school-age children to 85 year olds, with or without prior experiences in gardening. The primary recipients of food produced through UA are lower- and middle-income households. Schoolchildren are more likely to participate in gardening, but less likely to be the primary recipients of produce. In contrast, households on government assistance and seniors are more likely to be the main recipients, but less likely to participate in production.

Twenty-five garden representatives mentioned that they get fewer than 25 participants from their own neighborhoods, eight gardens get 25–100, and five gardens (primarily urban farms) get more than 100 participants from immediate neighborhoods. From this data alone, we could not conclude that Philadelphia's UA projects are not drawing the majority of their participants from their respective neighborhoods. Low neighborhood participation happens mostly in smaller gardens (the majority of survey respondents), which also have an overall lower number of active gardeners. In addition, our follow-up GIS network analysis of three randomly selected small to medium-size gardens in North, West, and South Philadelphia revealed that most active gardeners come from their immediate neighborhoods. Figure 2 shows that most gardeners of a South Philadelphia community garden live within a

half-mile (0.8 km) walking distance. The map is a result of the shortest path distance calculation between this garden's location and its participants' locations. Routes are displayed on top of five network buffers, ranging from ⅛ mile to 2 miles (0.2 km to 3.2 km).

Figure 2. Locations of a South Philadelphia Community Garden and its Members



Data sources: Survey by authors; Delaware Valley Regional Planning Commission (DVRPC).
Note: 2 miles = 3.2 km.

The UA projects represented in this survey are located in neighborhoods of diverse race and ethnic backgrounds, each of them contributing something unique to the landscape. Figure 3 shows the co-existence of higher non-White population density and the locations of community gardens. Although the primary racial group in Philadelphia is Black, it is mostly White population who are more active in UA activities, sometimes in predominantly Black neighborhoods. As shown in figure 3, the average racial and ethnic compositions of active gardeners were reported by survey respondents as 47 percent White, 36 percent Black, 12 percent Hispanic, and 5 percent Asian. The composition of White and Black races did not match proportionately with census demographics (41 percent White and 43 percent Black). We found the high percentage of White gardeners in some predominantly non-White neighborhoods a surprising trend, and we have discussed it in another section (social exclusion).

Accessibility — Geographic, Economic, and Informational

The number of vacant land parcels in Philadelphia increased almost 50 percent from 1999 to 2010 (Econsult Corporation & Penn Institute for Urban Research, 2010). Over the past decade, the major geographic concentration of these vacant parcels remains almost the same. Philadelphia's planning districts with higher percentages of vacant lands also have higher concentrations of poverty and underrepresented populations. The UA community tries to play an important role in the redevelopment of many blighted neighborhoods. Acquiring, leasing, preparing, and maintaining vacant lands for gardening purposes, however, is a challenging task. Respondents from several organizations trying to start community gardens expressed frustration about working with the city to gain access to vacant property (see the quote in table 1(i)). This makes gardens much less accessible for neighborhoods with little social or political capital. In terms of external difficulties, many garden respondents faced unsupportive land use policies and redevelopment pressure. A few interviewees commented that Philadelphia's community gardens cannot be utilized to their full potential and contribute to the communities because of little or limited support from the city.

Many areas within these neighborhoods do not have easy access to healthy and fresh food. About 43 percent of the survey respondents believe their

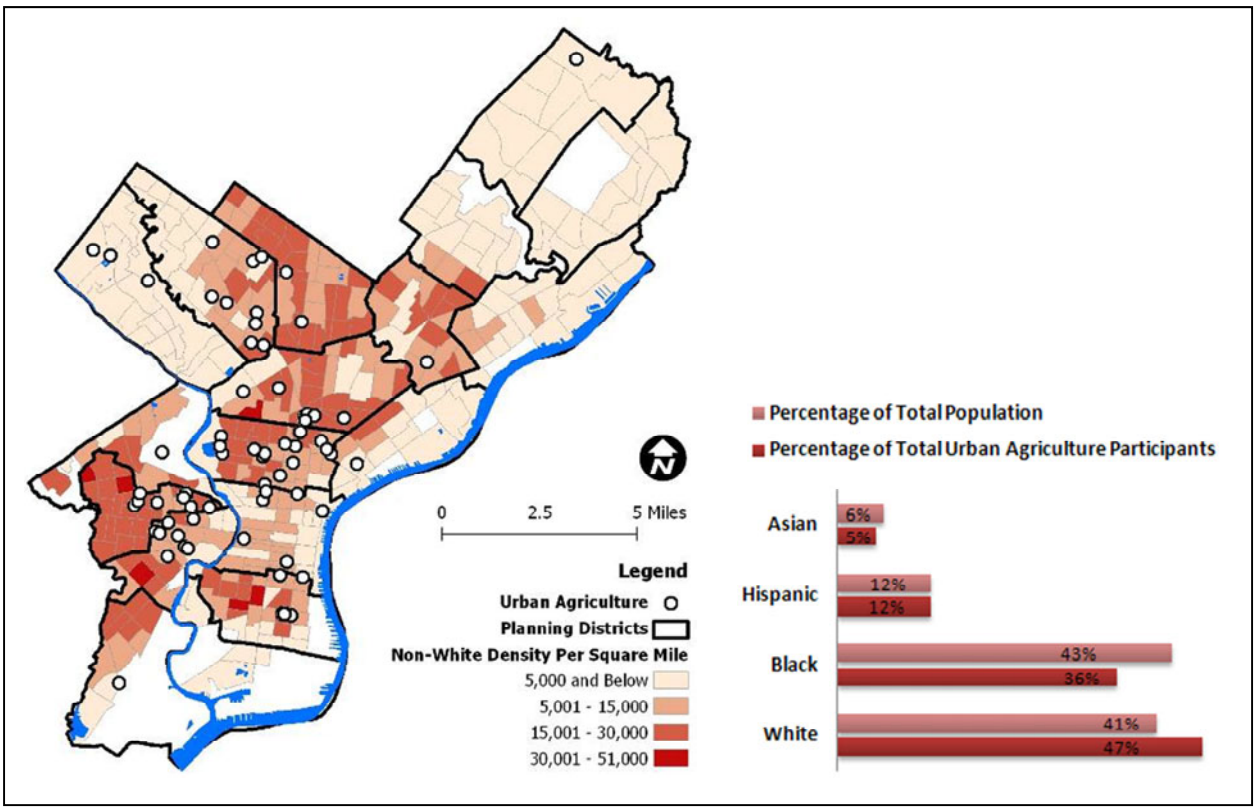
neighborhoods to be food deserts, broadly defined. In contrast, a number of interviewee expressed dislike for the term "food desert." They commented how confusing the term food desert has become in literature, political circles, or neighborhood conversations, and how many different meanings the phrase conjures up. One interviewee commented that food is available in all parts of the city, but is not always of good quality or culturally appropriate. Promoting healthy and fresh food is also a challenging task (see the quote in table 1(ii)).

In general, community gardens are economically accessible to neighborhood residents, according to respondents. About 67 percent of gardens do not require a membership fee, which for the rest of the gardens vary from USD5 to USD100 per season. Poor neighborhood residents, however, face issues with informational access. The majority of garden representatives surveyed use the Internet and digital technologies to communicate with their members (76 percent) and promote UA activities (88 percent). Many lower-income and elderly residents with limited or no access to the Internet cannot be part of such outreach efforts. Figure 4 shows locations of UA projects and the pattern of Internet use throughout the city.

Fresh Produce as Hunger Relief

Many lower-income households practice subsistence agriculture or participate in UA activities, as they do not have easy access to healthy and fresh food. A visual inspection of GIS maps (figure 5) shows that there is a spatial connection between higher concentrations of UA projects and higher concentrations of people experiencing hunger. A similar relationship exists between UA projects and poverty concentration. Many UA practitioners donate their harvests to hungry people through religious institutions, food cupboards, and shelters. Philadelphia's major

Figure 3. Comparison of the Racial Profiles of City Residents and Urban Agriculture Participants



Data sources: U.S. Census; City of Philadelphia; survey by authors.

hunger relief organizations (such as Philabundance and Share) have specific programs that distribute produce to populations in need. Additionally, as part of the PHS City Harvest program, 33 cupboards receive donations of fresh, local produce grown in 44 community gardens. In a regular growing season, this program reaches out to 1,000 lower-income families, and between 2006 and 2009 it distributed more than 64,000 pounds of produce (PHS, 2011).

Typically, these cupboards are located close to their partner UA projects. Figure 6 shows a screen shot of a GIS-based origin-destination network analysis of distance from UA projects to food cupboards. A cupboard may be affiliated with more than one UA project. Based on our survey data, the travel distance varies from 0.1 mile to a mile (0.2 km to 1.6 km) (mean distance = 0.44 mile or 0.71 km). Of course, the availability of fresh produce in these cupboards is not always guaranteed. Our site visits to 15 food cupboards in the summer of 2011 revealed that fresh produce was not always available even during the height of the production season. Although there is a higher presence of UA projects in struggling neighborhoods and these projects' participants highly value donations of fresh produce to more disadvantaged households in their vicinity, 58 percent of the gardens' representatives surveyed reported serving people who live outside the immediate neighborhood.

Social Exclusion

Some UA projects face internal difficulties that may come from community members themselves, possibly due to various forms of social exclusion. Most community gardens are member-only gardens with long waiting lists, and it takes a tremendous commitment of time to create and sustain a productive garden. According to an

Table 1. Selected Quotes from Interviews

(i) "The fact is this is an all-volunteer organization and we don't have any money….Working with the city in any regard, the people will help you up until the point where you actually need help and then they stop communicating with you….It's exhausting, it's a full-time job insuring any legal permission to do this kind of project [urban agriculture] because no one really knows what's going on."

(ii) "It's disingenuous to call anywhere in Philadelphia a food desert. We are the second largest food import city in the nation. Is that produce I want to buy? Not necessarily. If you go to the grocery store and all they have is ratty collard greens and some old apples, it does not make people curious about how to bring fresh produce into their daily lives. I don't like saying that anyone is food insecure, but maybe food culture insecure. [Healthy and fresh food is] tucked away on a bottom shelf. Excitement about food is lacking. [Unfortunately] food is a commodity, it's just another ingredient."

(iii) "A lot of communities see programs like this come and go, and are very skeptical. Until you are there for 5 or 6 years, you won't get that buy in."

(iv) "This isn't a public park, it is owned by [a Philadelphia-based land trust]. There are people who have their things in their gardens that are theirs; they are not for the public."

(v) "Until the garden is more secured in the community, I don't think it has that much of an impact."

(vi) "There is no fence….People always say, 'don't people steal vegetables?' No, because the community runs this facility. If it's something that outsiders are running and you have a fence around it, of course people are going to steal stuff because it's outsiders doing things in your neighborhood. If it's something that is of your neighborhood that is totally open….and people in your neighborhood run it, nobody steals things."

(vii) "Food that we grow here does not make us money….[You] cannot make money selling local produce unless you are selling to the highest market downtown."

(viii) "Just developing a community garden is nice, but we want this to be something that could be assisting in business development, job creation, [and] financial literacy."

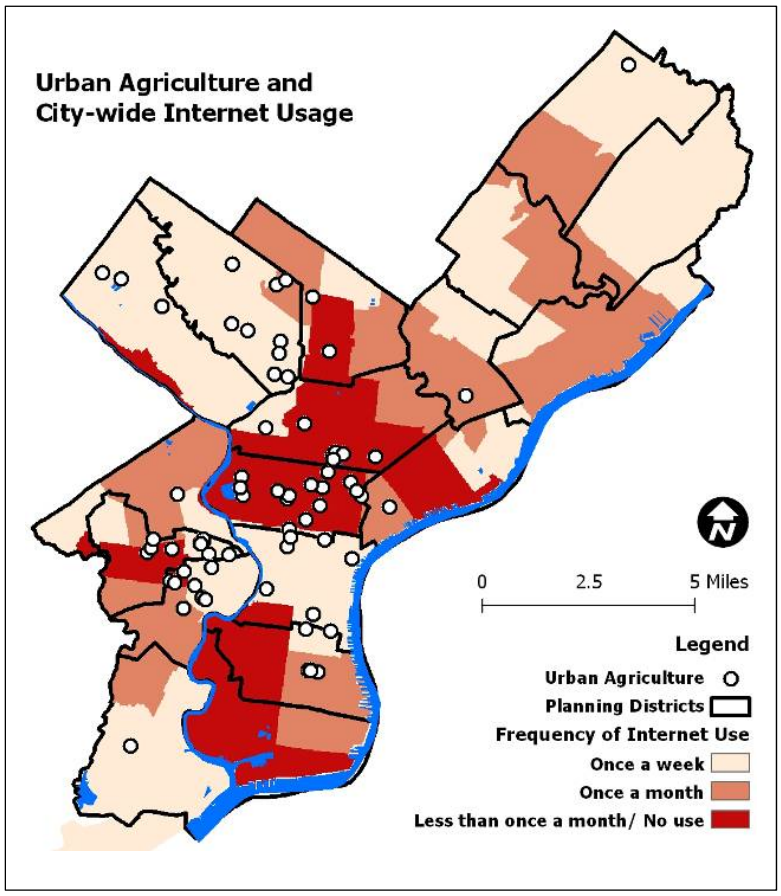
(ix) "Community gardens build a great demand, but if you don't have a regional food system, people won't be able to get food when they want it. Both are essential."

(x) "Is [UA] a critical part of a regional food security solution? Absolutely. Is it going to replace supporting medium-sized farms in South [New] Jersey, Lancaster [County] and Adams County? No. Nor should it."

interviewee, this can be difficult for lower-income residents who have two or three jobs, often outside of their neighborhoods, and rarely have time to cook food, let alone grow it. Some gardens also face a generational and cultural gap between younger and older residents who migrated from southern states or Caribbean islands with agricultural knowledge. Some UA projects come up short in encouraging community involvement and overall longevity, according to some respondents (see the quote in table 1(iii)).

Additionally, multiple organizers brought the topic of exclusivity to our attention from various comments made during the interview process. This refers to the exclusion of a particular people or groups based on their inability to participate due to financial, racial, age, or access limitations and their perceived socio-economic status. For example, one White garden organizer thought that urban farming in Philadelphia is primarily a "White top-down" movement that is run by young White people, unintentionally excluding a non-White population. According to this organizer, "The people who are doing [urban farming] are mostly 20- to 30-something White kids who are farming in these little communes.… There are no older people there, they are all young people and they are all White… [Urban farming] is still a White, top-down activity." Some UA project organizers perceived the Black population as voluntarily excluding themselves from urban farming. One of the projects we visited was in a neighborhood with an 85 percent Black population. The coordinator reported a low level of community involvement and having heard comments related to race and slavery, and thought that a generational gap in farming could be another reason for low community participation. This coordinator said, "Many African Americans do not like to garden. Teenagers have said to me 'Oh look, we're out working in the fields again.'…You just don't find many African Americans who can be farmers in the city. Most people have forgotten how to garden. Most of the gardeners are the grandparents."

Figure 4. Spatial Pattern of Internet Use and UA Project Locations



Data sources: Public Health Management Corporation; City of Philadelphia; survey by authors.
Note: 5 miles = 8 km.

Since Philadelphia has experienced a lot of systemic and historical racism, non-Whites will be suspicious if apparently privileged White people come in and start a garden that is fenced off, even if they do not make overt references to slavery. These suspicions may also be attributed to the existing class structure in Philadelphia. It is a city of more than 230 neighborhoods, oftentimes defined by class-conscious boundaries. Any outsider coming into the neighborhood may be perceived as "other," regardless of race. In addition, most second-generation-and-beyond urban people are

out of touch with gardening regardless of race. Therefore, the reason for social exclusion might not be uniquely racial. Rather, one interviewee commented that immigrants and some African American populations are primarily responsible for Philadelphia's urban agriculture movement, although their efforts and contributions are not as visible as that of White populations. This interviewee said,

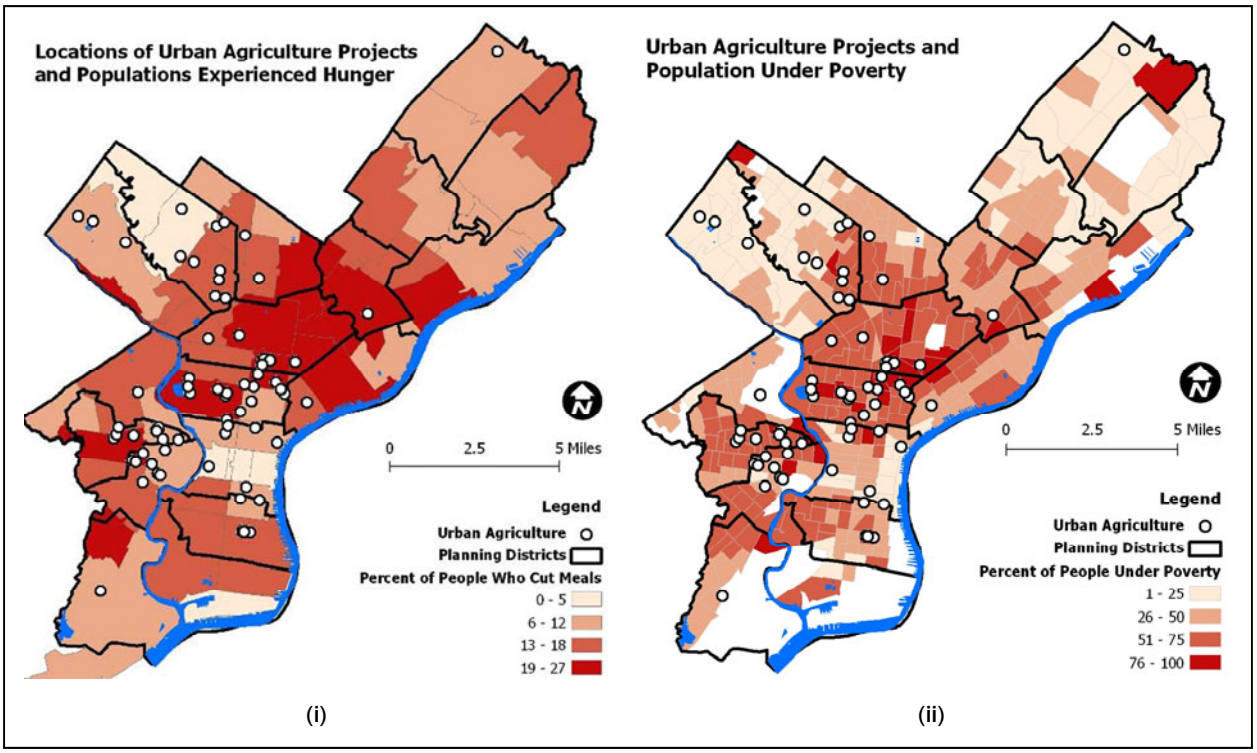
> The real [urban farming] movement is [coming] from immigrants, but no one knows about it because they do not see it. The visible movement is majority White… There is a real perception deficit — people are focusing on these large-scale for-profit or production style gardens as opposed to on-the-ground community-building which has been the trajectory in Philadelphia. What is still happening [small-scale or grassroots community gardening] among immigrant populations and some African American populations is what is actually putting the most food in people's mouths.

Social accessibility issues raise another question: Is a "community" garden public or private space? Most community gardens use fences to either protect personal belongings or exclude "non-members." One interviewee talked about fences as being "a sign of the times," referring to the fact that tools and produce would be stolen without the presence of a fence (see the quote in table 1(iv)). Another respondent expressed similar concerns over security (see the quote in table 1(v)). On the other hand, one garden organizer said that there is no fence on their garden site, and it will remain that way, because it is run by community members — not outsiders (see the quote in table 1(vi)).

Food Production, Distribution, and Economic Contribution

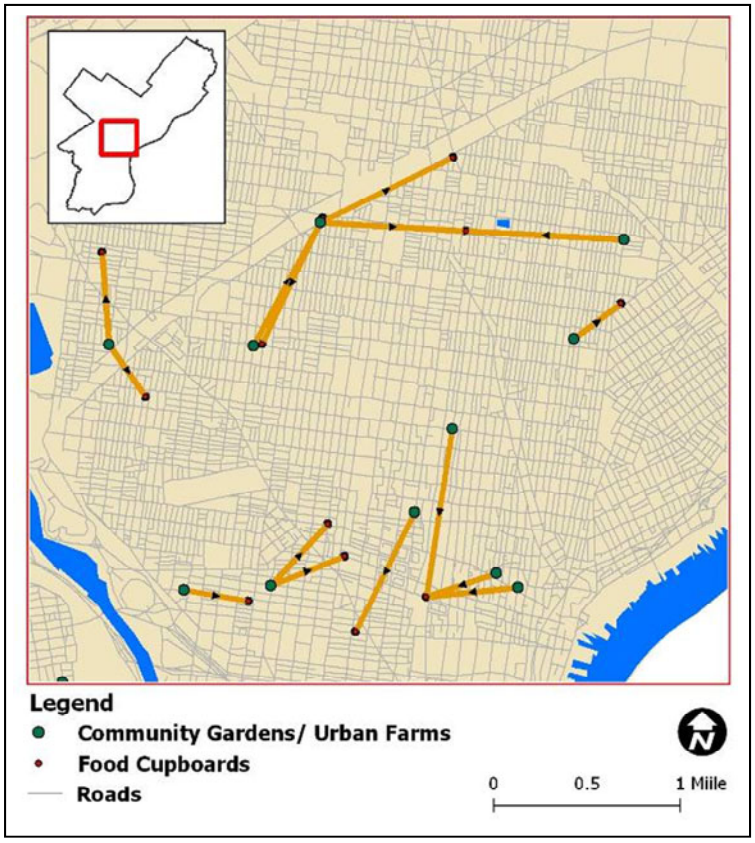
A recent study estimated that Philadelphia's community and squatter gardens produced USD4.9

Figure 5. Spatial Connections Between Concentrations of Urban Agriculture Projects, Hunger, and Poverty



Data Sources: Public Health Management Corporation; U.S. Census; City of Philadelphia.
Note: 5 miles = 8 km

Figure 6. Origin-Destination Network, from Community Gardens or Urban Farms to Food Cupboards

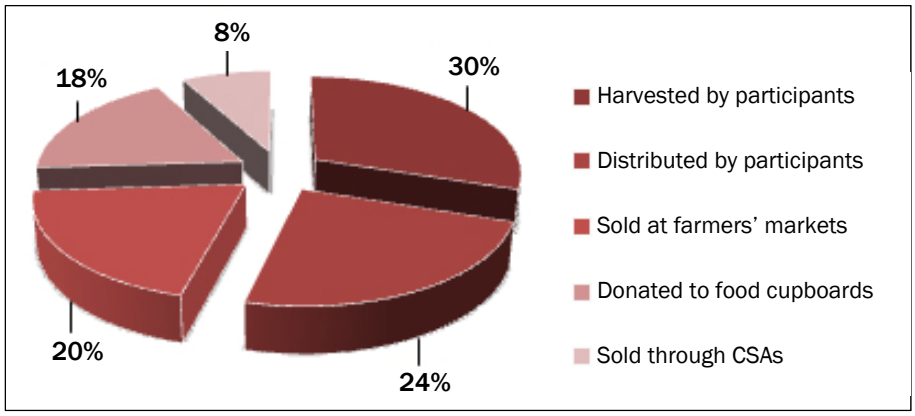


Data sources: Delaware Valley Regional Planning Commission (DVRPC); survey by authors.
Note: 1 mile = 1.6 km.

million worth of vegetables during summer months (Vitiello & Nairn, 2009). According to our survey participants, there are five major types of food distribution practices: (1) harvested by participants, (2) distributed by participants, (3) sold at farmers' markets, (4) donated to food cupboards, and (5) distributed through CSA (see figure 7). We have re-grouped these categories into three primary distribution models: (a) informal distribution (harvesting and distributing by participants), (b) sales (selling produce at farmers markets' and through CSAs), and (c) donations (distributed to cupboards). These models are discussed in the following paragraphs.

(a) **Informal modes of distribution:** About 54 percent of survey participants identified informal modes (harvested by gardeners or shared with neighbors) as their primary vehicle of distribution. Community gardens are typically neighborhood-based and their members identify mostly with the social network of their neighborhoods, which results in a comfort in and desire to distribute food through that same network, either through sharing produce or subsistence agriculture. These informal modes are expected by respondents to create a greater sense of community and help to feed families with fresh, local produce. However, as some interviewees commented, informal modes can be less consistent than formal ones due to many factors along with uncertainties associated with UA practice.

Figure 7. Modes of Urban Agriculture Produce Distribution in Philadelphia



Data source: Survey by authors.

(b) **Sales:** Urban farms and even some community gardens (39 percent in our survey) grow food for the purpose of selling at least part of their harvests, at or to a farmers' market, through a CSA program, or to a grocer. When asked about the approximate amount of produce sold each year, respondents gave a wide

range of responses, varying from five pounds (2.3 kg) to tens of thousands of pounds (4,536 kg or more). A number of respondents also shared the dollar amount earned from selling produce in a given year. These responses also varied, ranging from USD150 per week to USD4,000 in a year.

(c) **Donations:** About 18 percent of survey respondents' UA projects primarily distribute produce to food cupboards. The amount of food donated to cupboards is separated into three categories: low (<250 pounds or 113 kg), medium (250–750 pounds or 113–340 kg), and high (>750 pounds or 340 kg). A total of 18,712 pounds (8,488 kg) of produce was distributed to 15 food cupboards by 20 gardens in 2010, according to survey respondents.

Surrounding the discourse about UA is the debate about economic opportunities. Does UA provide jobs in the neighborhoods projects are located in, or are they simply there to provide the services of community greening, education and training and, if possible, food for underserved families? Our survey participants identified community greening (32 percent), food production (31 percent), or community development (23 percent) as their top three missions, followed by education and training. Additionally, many claimed that their projects produce transferable knowledge and skills for teens or adults that will assist them in finding gainful employment even in sectors other than agriculture. In this way, UA projects may provide an indirect economic benefit to neighborhoods.

The cost of informal UA is low, especially when projects are supported by free or low-wage labor and by financial and organizational support from nonprofits or other sectors. Many gardens are operated by community members and volunteers from other organizations. Even many commercial urban farms do not engage laborers in the same way as other typical urban employers, as they may have to rely on free or reduced labor. Some UA coordinators stated that urban farming is not an economically viable and a practical job-creating industry for city residents (see two quotes in table 1(vii and viii)). However, one coordinator shared that a teenager involved in the UA project's training program found a job at a construction retail store working in the landscape department. While such training programs are beneficial for teens, they are more focused on developing transferable skills rather than creating jobs in the agricultural industry. There was little mention of long-term employment opportunities for any age group through UA experience.

Role of UA in Minimizing Food Insecurity

Most UA project participants work hard to address the food gap found in disadvantaged urban neighborhoods. With a decreased presence of fresh food outlets in lower-income communities, these projects provide an important service to their residents by growing fresh and often affordable produce. About 67 percent of survey participants strongly agreed that Philadelphia's UA projects contribute to alleviating the food gap. In addition, these respondents expressed a desire to create greater knowledge and excitement about fresh produce by giving it those who previously did not have that choice. By giving people options, UA participants are trying to "differentiate [fresh food] from the industrial food system or ways [lower-income residents] were getting free food," said one respondent. While community gardeners are trying to get food into the mouths of underserved residents in their neighborhood, their goal is not to supplant the role of primary food outlets in a neighborhood. By providing fresh food, and education about fresh food, these gardeners believe they will increase the demand for such foods, thus impacting the type of food outlets in the neighborhood.

According to some interviewees, UA projects should be considered only a component of a regional food system, and they consider the projects to be a part of a bigger solution to community food security (see two quotes in table 1(ix and x)). Some respondents, however, thought that UA participants are not doing enough to solve the food gap, and should be doing more to create opportunities at the neighborhood level. One interviewee identified disconnects between growing food in the city and distributing food in the city, along with some of the problems about the perceptions of UA practices. He explained that there needs to be a change in the way urban farming is perceived, to be "not something cute, but something revenue-producing."

Conclusion

We initiated this study by asking about the role of UA in community food security. While UA projects cannot feed everyone in a city, they can be an important way to gain access to affordable, nutritious, and culturally or ethnically acceptable food. We have identified three separate modes of UA produce distribution: informal distribution by UA participants, sales at farmers' markets and through CSAs, and donations to food cupboards. We have seen that the majority of grassroots UA projects are located in neighborhoods where the problems of food insecurity, hunger, and vacant land parcels are severe.

Within the context of post-industrial cities, our research has identified various types of UA activities playing multiple roles: UA as an answer to urban food deserts; UA for community services and charity; UA as representations of ethnic identity; UA as vehicles for social change and blight prevention; UA as educational tools for students and community members; and UA as models for creating indirect economic opportunities in their neighborhoods through hands-on training of transferable skills. Minimizing the food insecurity of underserved and underrepresented populations, however, is considered the key aspect of many UA activities, including community gardening.

In general, UA projects have the following limitations in alleviating problems of fresh food access in inner-city neighborhoods, according to respondents. Most projects are seasonal and cannot offer fresh produce year-round. Moreover, hundreds of projects have closed down over the last two decades for a myriad of reasons, including discontinued or decreased financial support, loss of farming interests and skills among new generations, and real estate development pressure. UA projects also take a tremendous amount of time and capital to be developed and sustained. Additional struggles consist of organizing neighbors and volunteers, securing funding and tools, confronting vandalism and theft, paying for or managing water for irrigation, dealing with soil remediation, and securing land from the city.

Many nonprofit organizations in Philadelphia use UA projects to achieve their missions of impacting their surrounding neighborhoods. One of their most important impacts has been the creation of knowledge of local produce for a generation unfamiliar with the production of food. By doing so, UA project representatives articulate that they are creating a higher demand for fresh produce and working to improve the health of neighborhood residents, a proposition that requires more attention. However, simply creating knowledge for urbanites about where biological products originate is valuable, as many urbanites have no concept of how plants grow or where food comes from.

UA is usually considered an integral part of the local food movement whose participants advocate for relocalization of food systems, after delinking them from the corporate global food system. However, many Philadelphia UA activists who took part in our study do not believe in microlevel food localization. UA advocates never claim that UA as a concept can "solve" food insecurity problems alone; neither do they claim it conflicts with regional food systems.

Through UA projects a greater understanding of the food systems that support urban dwellers will be useful in a society that is moving toward more sustainable systems. UA can be an integral part of sustainable agricultural practice that advocates for social and economic benefits, although (1) not all community gardens can offer significant economic contributions, and (2) not all community gardens practice social inclusion, even if unintentionally, as we have discussed in a previous section.

Historically, Philadelphia's many lower-income neighborhoods have experienced racial segregation and social and environmental injustice, coupled with other issues such as vacant lands, blight, crime, and food insecurity. As we have noticed, many UA participants not only try to address these social problems, but also try to build community capacity, expand the community social network, and improve community economic development. This is where we think UA as a concept primarily intersects with food justice theory and practice. UA projects can also be tied to food justice because the legal demands related to land tenure that these projects may pose can influence existing land use policies.

The community-based responses to food insecurity that include local, nonprofit projects compose the core of the food justice movement (Alkon & Agyeman, 2011). We find that UA projects, or more specifically community gardens, can be one type of response, as long as participants try to address their limitations, struggles, and challenges such as social inaccessibility and social exclusion.

Future Research

Our study has some limitations. We did not have a large sample size; we did not survey or interview active gardeners, but only garden coordinators; our citywide community garden GIS data may not be up-to-date; and we did not discuss much about land use and zoning policies related to UA practices in post-industrial cities. While there is a growing scholarship on Whiteness in the food movement (Alkon & Ageyman, 2011; Alkon & McCullen, 2011), future research should explore to what extent UA achieves justice to the standard that a food justice framework argues. Does UA create greater democracy, citizenship, and social and environmental justice by subverting negative power structures associated with a corporate food regime?

UA projects have important roles to play in Philadelphia and other post-industrial cities, but more research needs to be done to understand exactly what steps can be taken to ensure that UA participants make a positive impact on the problem they are trying to solve — specifically as it pertains to race, community efficacy, and the economy. Researchers may ask these questions from a broader theoretical framework of environmental justice, community economic development, and/or critical race theories. Research topics to consider range from identifying the most efficient form of garden produce distribution, to the policies concerning land tenure and the access of underprivileged populations to this movement, or to the social control of UA production.

Questions may be developed in terms of UA project locations: Are UA projects located where they are due to readily accessible land, or are UA projects located in areas lacking food access? Additionally, few research studies have been done on the pricing benefits of UA. Without a defined pricing benefit, it is hard to state the true output of UA movements in these cities. In this matter, discussions should consider how corporate farm subsidies impact food pricing in urban communities, and what, if any, subsidies can be provided to urban growers. It is also true that most of the smaller UA projects only need part-time voluntary contributors to survive. In the cases of commercial urban farms that involve paid labor, we may need to analyze wages and other benefits in comparison with other city jobs.

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Close to home: The drive for local food

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Abstract

One popular approach in the recent discussion around sustainable food systems has been to encourage a shift to locally and regionally produced food. The logic of doing this is multifold: locally produced food is good for the environment, helps a regional economy thrive, and provides a greater connection between people, their food, and those who produce it, which should also lead to equitable labor practices and greater food security and access. Yet for all of the benefits of a locally based food system, there are certain problematic elements inherent to some of these claims. In this paper I link these social, economic, and environmental elements through a review of what we know about locally based food systems as a function of sustainable agriculture. A careful examination of the literature shows that although local food systems hold considerable promise, they are not inherent mechanisms of sustainability.

Keywords

local food, social justice, sustainability

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Introduction

Over the last half century, many people have become aware of the host of environmental and social problems in the agro-industrial food systems and the way these food systems feed both America and the world. This growing awareness has driven the formation of many alternative agriculture movements, the latest iteration of which has been a call for more locally based food systems. Under the Obama administration even the U.S. Department of Agriculture (USDA) has gotten on board with this movement by creating new programs supporting locally based farmers and encouraging production for local consumption. In his examination of modern food systems in America, Michael Pollan (2006) follows his discussion of the industrial and organic food systems with a discussion of food localism, a trend in which people eat food produced close to home because of the social and environmental benefits this is supposed to bring, as well as how it can reflect a person's values regarding these (and other) perceived benefits. This move to eating locally is a relatively recent emergence in the nexus of alternative (and sustainable) food, especially when compared with the trend toward organic production and consumption.

Many people see local food as a panacea for

the problems of the industrial systems, but this solution requires some close examination. When it comes to sustainable agriculture, local food systems offer a mixed bag. For the moment, let us define sustainable agriculture as agricultural practices that "meet the needs of the present without compromising the ability of future generations to meet their own needs" (Feenstra, Ingels, & Campbell, n.d.); such practices, then, should be able to be maintained indefinitely without significant adverse consequences to the physical or social environment (Ikerd, 2007). While this definition is rather broad — and I give it further nuance below — it allows us to ask the following question: in what ways are local food systems examples of sustainable agriculture? That is, in what ways can local food systems offer a positive, long-lasting alternative to the harms of industrial systems, particularly on the surrounding physical and social environment? Although locally based systems have much promise as a sustainable food source, these systems are not without their pitfalls. As such, we should be wary of jumping on the local food bandwagon, as we run the risk of deifying the local as some sort of salvation to our dominant food systems' problems. As with most "wicked" problems (Rittel & Webber, 1973), the question of how we sustainably feed ourselves is not one with so easy an answer.

My goal in this article is to review what we know about locally based food systems as one aspect of sustainable agriculture. By a local food system, I mean the food production, distribution, and consumption arrangements in which all elements of the system are parts of both a physical and social proximity intended to (re)connect these different elements in the same place (see Fonte, 2008). In meeting the goals of sustainability, there are things locally based systems do well and also ways they could improve. My central argument is that although local food systems hold considerable promise, they are not inherent mechanisms of sustainability. How, then, can they be improved? To address this, I begin with a brief review of the history behind our modern industrial food systems to provide context for the alternative and local food movements. I then discuss the logic of local agriculture and the kinds of problems such systems are supposed to solve as understood in three areas: environment, economy, and social responsibility. I conclude by highlighting some of the structural changes needed to see the development of a truly sustainable local food system.

A Brief History of (Industrial) Food Production in the U.S.

To understand the rise of alternative, and especially local, food movements, we must first have a basic understanding of how the industrial food system developed. The bulk of our modern food supply is built on a global food system, providing not only a wider variety of food than one region alone can produce, but also year-round availability of most foods. Conventional wisdom would have us believe that the current dominant system of food production in the U.S. is the best in all of history. Americans today (and others throughout the industrialized world) enjoy a plentiful supply of food with high variety.[1] Further, many have this access consistently and uniformly: for example, fresh strawberries are available in winter (not just June, when they are in season in North America) and fresh tropical fruits like pineapple and kiwi can be found even in New England. These benefits, however, come at enormous, often hidden, costs.

U.S. food production has had a global element from its inception (Allen, 2004); much of the colonial system was geared toward supplying bulk goods and commodities to Britain.[2] Nonetheless, up through the mid-19th century, a majority of the U.S. population was engaged in farming; today the opposite is true (Bureau of Labor Statistics [BLS], 2010; Lobao & Meyer, 2001). Regular booms in agricultural and other markets throughout the late 19th and early 20th centuries encouraged farmers to plant more crops in subsequent years, which routinely created food surpluses. Since food demand is closely tied to population size, and does not easily grow or shrink via other influences (see Cochrane,

[1] It is important to note that this access depends largely on one's class standing and social location; many of the urban poor in the U.S. do not even have easy access to a grocery store, thus limiting the true "variety" of foods they consume.
[2] Murray (2007) notes how the global food trade has existed at least as far back as the Roman Empire with the trade of olive oil from Spain throughout the Mediterranean region.

2003) this served to drive down food prices.[3] These boom periods, however, led to periods of bust as many farms experienced economic collapse, driving many people to migrate from the rural countryside to cities to seek employment. Increasing industrialization created jobs in the cities, further helping to draw farmers off the land (Andrews, 2006; DuPuis, 2002). While some farm organizations, even before the Great Depression of the 1930s, encouraged farmers to voluntarily limit production in response to shrinking markets (Andrews, 2006, p. 161), they met with little success. These inadequacies in a voluntary system of control ultimately brought about many of the agricultural stabilization policies of the New Deal era of the late 1930s into the 1940s (Andrews, 2006; Rasmussen, Baker, & Ward, 1976).

New Deal agricultural stabilization programs were designed to reduce acreage planted, fix market quotas, levy taxes, purchase surplus crops, and even remove certain lands from production. These systems were designed to regulate prices (for the benefit of farmers) and conserve soil. However, they only applied to a few basic commodity crops (such as corn, soybeans, and grain). Further, these price-fixing mechanisms often raised the immediate cost to consumers. They also created incentives for farmers to intensify production on their land, thereby defeating the market stabilization goal as well as allowing them to increase their capital gains (not to mention the further environmental destruction due to fertilizer and pesticide use). Essentially, farmers did not trust the system to provide them with a means of survival. Thus federal policies from the World War II years onward, which were designed to limit production, have instead stimulated the overproduction of certain foods (Andrews, 2006).

These subsidies gave farmers, especially those who managed to consolidate into ever larger production units, considerable wealth. Many other players in the agricultural system, such as the agricultural supply industry, also benefited. This wealth, coupled with growing political influence, has helped perpetuate a system of low environmental regulation with respect to agriculture.[4] In addition, government support of these subsidized crops began to push many remaining farms into intensive production of primarily — and in some cases only — those crops. This increased the overproduction and contributed to the further deterioration of prices for subsidized crops and the increased need of the government (and therefore taxpayers) to support farmers who produce those crops (Cochrane, 2003).

World War II brought about many changes in consumption patterns that have lasted well into the 20th and 21st centuries. During the war, troops needed food supplies. One factor related to the war effort (although also a consequence of the rise of mechanized farming methods) was an increase in domestic food production. Farmers were given increased subsidies to encourage the needed excess production of selected crops (Andrews, 2006). Following the war, these increases further contributed to the economic problems of food surplus, which carry forward into today (Friedmann, 2002). The federal government attempted to deal with this overproduction by diverting it first to welfare relief and school lunch programs and later to food aid for post-colonial countries, practices that still exist today though the National School Lunch Program and the Food for Peace Act (P.L. 480). These international donations weakened farm prices and undermined the farm economies of recipient countries, thereby encouraging urban growth as impoverished farmers moved to the cities for work (Warman, 2003). Ultimately, what appeared to much of the American public to be gestures of goodwill and humanitarian relief were actually attempts to hide a politically embarrassing situation: domestic surpluses stimulated by government subsidies and policies[5] (Andrews, 2006).

[3] As one reviewer points out, the critical assumption here is the capacity for overproduction compared to demand. This assumption may be problematic in the face of things like climate change, population growth, and biofuel production.

[4] Agriculture is not the only industry for which this occurred. Other industries include automobile, steel, and rail transport, just to name a few (Andrews, 2006).

[5] A 1996 "freedom to farm" bill would have phased out crop subsidies that had come to benefit only a small number of large corporations at the expense of taxpayers, the environment, and small-scale farmers. However, the farm lobby convinced Congress to instead increase subsidies via

Also during the war, U.S. troops could not be fed off the land in which they were located, because it was often heavily damaged by the war and not capable of supporting even the local population. To address this problem and the difficulty of long-distance food transport, scientists developed many ways to package and preserve food while keeping it lightweight so that it was easy to ship and easy to carry (Murray, 2007). This technological drive for lightweight food continues in military and space research today. Many of these technologies are now found in the public sphere, encouraged by and encouraging many people's increased desire for convenience, travel, and mobility. This has been fueled (literally and figuratively) by the low cost of transportation, largely through cheap oil and the ubiquity of refrigerated transport. Between cheap transport, abundant food processing and packaging technologies, and continued technological advances in farming — what Buttel, Larson, & Gillespie (1990) refer to as the Treadmill of Technology — it is now easier and cheaper to grow food at a large scale and ship it than it is to diversify and feed ourselves from a certain locality.

The Logic of Local

Out of this increasingly globalized and industrialized food system has emerged an alternative, and some would claim sustainable, food movement. From its inception with J. I. Rodale in the early 1930s through the early 1990s, alternative food has largely been equated with organic food. Proponents of such approaches challenge conventional agricultural production and consumption patterns by focusing on natural processes to grow food that is healthy to the earth and healthy to eat (that is, not contaminated with synthetic chemicals). The rise of the organic movement is well documented (Duram, 2005; Fromartz, 2006; Pollan, 2001, 2006; Raynolds, 2000[6]). Beginning as a fringe movement and experiencing considerable animosity for a long time from mainstream institutions like the USDA, land-grant universities, and major farm organizations, it was only in the mid-1980s that organic food caught on in more mainstream circles. As language related to organic and sustainable farming was gradually added to the 1985 and 1990 Farm Bills (Youngberg, Schaller, & Merrigan, 1993), organic farms and food processors across the country began to go the way of conventional agriculture: smaller operations, particularly in areas of the country with land and conditions suitable for large-scale production, were bought up by major industrialized food producers, while larger conventional producers simply transitioned part of their land to organic production while maintaining an otherwise industrial operation. These trends have continued to this day such that now much of our organic food supply is part of an industrial, albeit organic, food chain (Howard, 2009; Raynolds, 2004). Further, many (although not all) of the environmental externalities associated with the conventional industrial food chain have carried over into the industrial organic system, making the environmental benefits of large-scale organic only marginally better than their conventional counterparts (Cuddeford, 2003; Guthman, 2004b; Obach, 2007). In other words, the counterculture movement of organic food was co-opted and mainstreamed by the industrial food chain, making it considerably less "alternative" than it once was (Campbell, 2001; Guthman, 2004a, 2004b; Pollan, 2006; Walker, 2004). The clearest example of this mainstreaming is that since 2002 the USDA, with primary input from large agribusiness interests, has determined what qualifies for the organic label (Deaton & Hoehn, 2005; Pollan, 2006).

While this standardization was ostensibly an attempt to clarify what organic means among what were — and still are — a variety of competing definitions, the meaning of organic is still hotly contested. While federal standards focus primarily on input substitution (i.e., using manure and compost instead of synthetic fertilizers), many alternative food advocates see organic in a more rigorous

"temporary emergency payments." By 2002, a congressional election year in which the farm bill was due for reconsideration, most politicians (especially those from farm states) were instead promoting subsidy increases in order to garner votes (Andrews, 2006).

[6] Raynolds also discusses the fair trade movement, which focuses on "equitable social relations." She argues that fair trade is better than organic as an oppositional movement by its focus on relations of trade and distribution.

and holistic manner (i.e., ensuring farm ecosystem integrity through maintaining soil fertility, preserving the water supply, and protecting human health and species diversity; see Crews, Mohler, & Power, 1991). Recognizing that mainstream definitions of organic do not describe production systems that are demonstrably sustainable, many in the alternative food movement have advocated for an expansion or even a shift in focus to locally based food systems, arguing that locally based food would be both more sustainable than organic and more difficult for conventional interests to co-opt (Guthman, 2004b; Halweil, 2002; Hines, 2000; Hines, Lucas, & Shiva, 2002; Kloppenburg, Hendrickson, & Stevenson, 1996). While the co-optability of local food is beyond the scope of this paper (although some recent scholarship indicates that the concept is not nearly as safe as some believe; see, for instance, Fonte, 2008), my goal in this paper is to evaluate the merits of locally based food systems as sustainable alternatives to the conventional food system.

I consider locally based (or locally oriented) food systems to encompass food that is intended for consumption within the same area that it is produced. This element of intentionality is important in distinguishing local food as an orientation to food production and consumption rather than simply the food that is available in a particular area. Often local food is marketed on the basis of shared values between farmers and consumers, although I do not include this element in my definition primarily because of the variation in how different actors may value local food, including (or not) such qualities as environmental benefits, local economic development, and personal health. While the definition of what constitutes "local" is open-ended and may vary depending on whom one asks (and has been conceptualized as everything from a radial distance of 50 or 100 miles to a collection of states, like New England or the Pacific Northwest), local by this understanding is a social proximity in which producer and consumer are connected to the same place (Fonte, 2008). This way of understanding local food also distinguishes it from a perspective that places value on a product's origin for use in distant markets, such as Vermont maple syrup or Palizzi wine from Italy, though both may be found in many places throughout the world (Fonte, 2008).

It is important also to further clarify my initial definition of sustainable agriculture. Beyond simply avoiding adverse consequences to the physical and social world, sustainability is broadly seen as consisting of three main components: ecological and environmental soundness, economic viability, and social responsibility (particularly in light of social and economic justice), which often also includes human health as well as the ability simply to provide enough food. I further articulate the details of each element below. Additionally, it is helpful to think of sustainable practices and orientations as existing along a continuum rather than being absolutely sustainable or not sustainable; that is, certain practices can be more or less sustainable than others depending on to what extent they align with the hallmarks of these three pillars. I turn now to an examination of locally based food in light of each of these three legs of sustainability, highlighting the main points advocates make in favor of local food systems and empirical evidence that either supports or refutes them.

Ecological and Environmental Soundness

The environment is perhaps the first thing people call to mind when they think of sustainability. Indeed, environmental stewardship has been a central focus of the alternative agriculture movement since its inception (Crews, Mohler, & Power, 1991). In a globalized and highly corporatized food system (O'Hara & Stagl, 2001), an emphasis on producing as much as possible leads to agricultural practices that are destructive to the environment in numerous ways (see also MacCannell, 1988, pp. 25–26). It is for this reason that in the early years of the alternative agriculture movement sustainability was understood mostly in terms of organic agriculture: organic practices are about treating the land well and minimizing and eliminating farming methods that harm the soil and surrounding environment. However, organic food is not the only way in which we can understand ecological soundness. Locally produced food also promises several environmental benefits as a response to the industrial system, including shorter transportation lines and a reduction of the destructive patterns of large-

scale production. Though I will address these areas separately, we must bear in mind that they are interrelated.

Shorter Transportation Lines

One of the natural consequences of the concentration of our food supply is the necessity to transport it long distances (Pirog, van Pelt, Enshayan, & Cook, 2001). This need for increased transport carries with it the need for fuel as well as proper means of storage so that food stays fresh until it arrives at its destination and then makes its way into the hands of consumers. Much of the energy required for this currently comes in the form of fossil fuels, which highlights the problem of using nonrenewable resources and generating greenhouse gases (Hines et al., 2002; Peters, Bills, Wilkins, & Fick, 2008). The concept of food miles offers us a way of thinking about the distance our food travels (Iles, 2005; Paxton, 1994). Simply put, the measure of food miles is the number of miles a given piece of food had to travel from its source of production (the farm) to its final destination (the plate). Many scholars and activists use the term food miles as a proxy for the environmental impact our food has simply by the resources it uses to travel from one place to another. They argue that it is more environmentally friendly to consume food grown within a local foodshed,[7] because of its low food miles, than food that has been shipped vast distances (Brown, 2003; Feenstra, 1997; Kloppenburg et al., 1996; Kloppenburg & Lezberg, 1996; Lea, 2005; Lezberg & Kloppenburg, 1996; Vogt & Kaiser, 2008). Of course, the strength of this argument depends upon a variety of factors besides simply distance traveled, such as the means of transport and the amount of food delivered.

Food miles may be a useful concept for increasing agency and responsibility in food choices, but it does have important limitations. For one thing, what counts as local is often quite difficult to determine (see Hinrichs, 2003; Iles, 2005; Selfa & Qazi, 2005). How do we account for items considered essential to an area yet not fully produced there? How do we even define what constitutes a foodshed? Peters et al. (2002) and Pirog et al. (2001) attempt to resolve these questions for the states of New York and Iowa (see also Thompson, Harper, & Kraus (2008) for an assessment of the San Francisco area), yet these studies highlight the very difficulty of finding an answer: it is very complicated to get the seemingly basic data for such supposedly simple concepts.

Perhaps more fundamentally, however, a focus on the local may in some ways leave out other aspects of sustainability, such as the means by which an item is produced or the economic conditions of production (i.e., fair trade). In other words, environmental impacts may not be totally represented by food miles (Edwards-Jones et al., 2008; Oglethorpe, 2010). For example, transportation is not the only — or even the greatest — food-related contributor to greenhouse gas emissions (Edwards-Jones et al., 2008; Heller & Keoleian, 2003; Weber & Matthews, 2008).

In short, food miles may be a useful concept, but its use as a tool is limited by the degree to which insights gained from it can be applied to change agricultural systems to actually *make* them more sustainable (Iles, 2005). As a means of reducing energy inputs and pollution generated in long-distance transportation, local food shows considerable promise. Insofar as locally oriented food reduces transportation lines, consumption of fossil fuels and emission of greenhouse gases will also be reduced. However, the distance food travels is but one aspect of a complex system of food production and it is imperative that future studies on energy expenditure in both local and nonlocal food production account for this more holistic picture (Duram & Oberholtzer, 2010).

Reduction of Scale

The economic logic of mass production often necessitates production on a large scale; in 2007, though average farm size in the U.S. was 418 acres (169 ha), of the 2.2 million farms in the country, almost 200,000 were larger than 1,000 acres (405 ha) (U.S. Department of Agriculture [USDA], 2009). As the agricultural scale increases, new considerations about and methods of growing and pest

[7] The term foodshed was first coined by Walter Hedden (1929) and reintroduced by Arthur Getz (1991). Similar to Hedden, Getz outlines a foodshed simply as "the area defined by a structure of [food] supply."

control must be taken into account. Large-scale farming in the U.S. typically involves the use of heavy machinery that allows one person to plant, maintain, and harvest vast areas in a relatively short time. However, these machines damage soil structure more readily than smaller equipment or draft animals, have the potential to accelerate erosion, increase silting of waterways, and necessitate the use of fossil fuels (depleting a nonrenewable resource and releasing greenhouse gasses into the atmosphere).

Proponents of local food systems claim that such systems tend to be small scale, which minimizes the need for heavy machinery and the destruction they cause. While it is true that smaller farms have lower environmental impacts than larger ones (Altieri, 1995; Bell, 2004; Rosset, 1999), the evidence linking locally oriented and small-scale farms is less clear. Large-scale farms can (and certainly do) provide for their local communities, though their primary orientations tend to be toward mass markets (Bell, 2004): "in an industrial farm context...the agricultural economy is integrated into the world system and becomes detached from the local rural community" (MacCannell, 1988, p. 57). Indeed, this orientation of large-scale farms to long-range markets supports the notion that locally oriented farms are more likely than nonlocally oriented farms to be of relatively smaller scale. And it further stands to reason that small-scale farms may have a shorter range of distribution due to their limited supply of goods relative to larger farms. We should be cautious, however, in assuming that this link between small-scale and short distribution range is necessarily so; consider, for example, small farms that specialize in a rare or very durable product, which may market its goods over a wide region. Inasmuch as locally oriented farms are smaller than mass-market farms, their need for large machinery is also minimized, as is the destruction such equipment causes. However, further research is needed to clarify exactly what connection exists between local orientation and small-scale. Further, while this discussion of "small scale" suggests some sort of discrete type or size, scale is more accurately a continuous variable and contingent upon the practices being used and the products being grown, fed, or produced.

Local Food and Organic Production

Organic food production is often argued to have a net environmental benefit relative to conventional production, if for nothing else than because organic production prohibits the use of synthetic fertilizers and pesticides that damage surrounding soil and water resources (Allen, 1993; Glaeser, 1997; Nierenberg, 2003). Though organic production today is done increasingly on an industrial scale oriented toward a wide-ranging market, early organic advocates often argued that part of the organic movement entailed consuming food close to the source of production (Belasco, 2007).

While not all locally oriented farms are certified organic, a much higher proportion of them tend to be than those which provide for the national and global markets; one large survey finds that approximately one-third of farms selling at farmers' markets are certified organic (Kremen, Greene, & Hanson, 2003) while another study cites as much as 90 percent of CSA[8] operations farming organically (Union of Concerned Scientists, 2004); however, it is unclear if all of these farms are *certified* organic. Compare this to estimates that less than 4 percent of the overall U.S. food market currently goes to organic sales (Organic Trade Association [OTA], 2010).[9] To the extent that locally oriented farms are more likely than mass-market–oriented farms to promote organic practices (whether certified organic or not), any adverse impact on the surrounding environment will also be minimized. However, similar to the discussion of farm scale, farms may engage in a variety of ecologically sound production practices independent of their market orientation; while locally based

[8] CSA stands for community supported agriculture. A CSA operation is a farm in which customers purchase a membership, usually before the start of the growing season, in return for typically a weekly share of produce or other products from the farm. Such arrangements allow farmers much-needed capital (especially in the off-season when money may be tight) and are considered effective ways of distributing the unpredictability and uncertainty of farming more equitably among the community. See Henderson, 2007, for more on CSAs.

[9] It is worth noting that many locally oriented farms not certified organic may nonetheless be employing organic practices without having obtained organic certification. They may refer to themselves with terms that are not regulated by a particular body, such as "beyond organic" or "natural."

food systems may have a tendency toward such practices, local and organic do not necessarily go hand-in-hand.

So how does local food stack up in terms of promoting environmental soundness? There is some evidence that locally based food is much more likely than food from the conventional system to be organic, which can mean at least some net environmental benefit. And local food's low food miles show a potential environmental benefit in terms of reduced transportation needs, depending on exactly how such a system is configured. However, there are certainly other significant aspects of the agricultural system that impact the climate-energy picture that are not captured in a focus on local food, including the link between local food and small-scale farming. On the whole, then, locally based food systems do show potential for promoting some environmental aspects of sustainability, but these need to be understood as part of a broader approach to food production.

Economic Vitality

In addition to being ecologically sound, sustainable agriculture systems must also be economically vital (Ikerd, 2007); a system cannot be considered sustainable if its producers are unable to economically provide for themselves. To contextualize this, I first examine some of the economic hardships created and exacerbated by the industrial food system. Recall that federal policies and subsidies encourage mass production and oversupply. Such practices mean lower prices (at least for farmers, if not consumers) and thereby favor large farms and agribusiness. This actually serves to limit market possibilities, thus making it harder for smaller producers to compete and driving them out of business[10] (Norberg-Hodge, 1998; Stephenson & Lev, 2004). The rise of supermarkets has added to the loss of market possibilities since it is much easier for large businesses to source material from one or two major distributors that can reliably ensure access to whatever may be desired than it is to work with many small farms which may have varying levels of crop availability (Halweil, 2002). This principle applies not only to supermarkets, but any institution purchasing large quantities of food, such as large restaurants, office cafeterias, and university dining services. Small farms have a difficult time competing with the availability and convenience provided by agribusiness.[11]

The "solution" for many farmers has been to contract through large agri-business firms, at least where such options are available. This means an ability to continue farming (and often retain their land) but at a cost of lower income and often a need to find other employment (Bell, 2004; Cochrane, 2003). Though the question of fair trade is typically only considered in regard to internationally produced goods, such as coffee and tropical fruits, it also needs to be asked of domestic producers: are they being paid a fair and livable wage for their work[12]? If they are part of the industrial agriculture system, the answer is often no.

It is this set of economic difficulties that locally based food systems purport to remedy. Advocates of locally based agriculture claim that such systems meet the requirement of economic vitality because they support small-scale and family farms and help a regional economy thrive. The ability of local food to support a regional economy makes sense. Purchasing food locally keeps money and capital circulating within a region, rather than going to a corporation with headquarters elsewhere[13] (Feenstra,

[10] These economic difficulties and structural impediments impact agriculture in less industrialized nations as well (Gellerman & Curwood, 2007; O'Hara & Stagl, 2001), in part because the major corporations that control most food supplies are multinational ones, with decreasing attachment to the parent nation-state (Bonanno, Busch, Friedland, Gouveia, & Mingione, 1994; for some examples, see Hines et al. 2002, Lang, 1996, and Nierenberg, 2003). If the multinational corporation is effectively outside the bounds of the state in terms of regulation, then it highlights an important limitation of the ability of policies to effect sustainable change in agricultural systems (Bonanno & Constance, 2006).

[11] NAFTA and other free trade agreements have also negatively impacted agriculture by encouraging centralization of food processing in areas where labor is cheapest — leaving other producers out of work (McDonald, 2002).

[12] Though asked in terms of economic vitality, such a question is also one of social justice.

[13] As an example of counterpoint, consider the impact of excess U.S. food production on the international stage. In an effort to deal with our national oversupply of food, the excess

1997; Halweil, 2002; Hines, 2000). Similar examples of this phenomenon can be seen in other local economies that are not necessarily food-related (Gibson-Graham, 2010; Hess, 2009).

The ability of local food to support small-scale and family farms is less certain, for reasons similar to the unclear link between local food and small-scale production discussed above. Nonetheless, even if we assume for a moment that local food and small-scale are more or less equivalent, the ability of local food arrangements to support small-scale, family farms faces considerable structural hurdles (Lyson, 2004). The very policies that support large-scale agriculture serve to undercut small-scale producers because of how they ultimately influence both individual and institutional food consumers: through pricing and sourcing. The scale of the industrial food system allows for greater ease of distribution and delivery than smaller farms can provide (Guthman, Morris, & Allen, 2006; Hinrichs, 2000). Even ignoring a farm's size altogether, farms with an orientation toward a wide-ranging market are better prepared to handle changes and upsets in that market than are farms geared primarily or solely toward local distribution and consumption.

Given these constraints, what makes local food work as an economically viable operation is the choice that consumers make to invest in such a system. While numerous studies show that many consumers do indeed want local food (Bond, Thilmany, & Bond, 2006; Brown, 2003; Institute of Agriculture and Natural Resources [IANR], 2003; Izumi, Rostant, Moss, & Hamm, 2006; Schneider & Francis, 2005; Sonnino, 2009; Starr, Card, Benepe, Auld, Lamm, Smith, & Wilken, 2003; Stephenson & Lev, 2004; Vallianatos, Gottlieb, & Haase, 2004; Vogt & Kaiser, 2008), their reasons for it are variable enough that some could potentially be met through nonlocal means (such as quality or concerns over food safety). Crews, Mohler, and Power (1991) suggest that economic viability (or profit) may not be a useful criterion of sustainable agriculture in part because markets are unstable. This instability can be seen both in the potential for changes in laws and policies that provide economic support to certain activities, as well as something as basic and unpredictable as a shift in consumer preferences. Crews et al. further argue that:

> If we use both economic and ecological criteria to define sustainability, progress toward ecological sustainability almost certainly will be hindered. We should work toward structuring society in such a way that sustainable agricultural practices are profitable (for example, by modifying commodity programs to end incentives for continuous corn cropping), rather than including profitability within the definition itself. (Crews et al., 1991, p. 149)

What makes local food systems economically viable, then, is an interest on the part of consumers in that locality to purchase locally. Insofar as they are willing to do so, such purchases do show the potential for significant benefit to the economic prosperity and stability of the community as a whole. However, as I discuss below in the section on social justice, this benefit may not apply equally to all participants. Considering this and the caution by Crews et al. (1991), perhaps economic considerations are less a central component to sustainable systems and more an artifact of the way those systems are established. Focusing too heavily on the need for profitability may be a distraction from the problem of sustainability, since profitability for different actors can be factored into a system in a variety of ways.

Social Responsibility

The third and final leg of sustainability is social responsibility (Ikerd, 2007). There is very little purpose in seeking to live sustainably if we don't remember for whom we seek to do so: people. The socially responsible promise of local food is that such systems ensure that people have an adequate amount and variety of safe, healthy, and nutritious

food that is not turned into value-added products is sent into the world market, sometimes for sale and sometimes as food aid. As external products flood a given market, farmers in the region are driven out of business, thus losing their income base. Further, money used to pay for the newly arrived food does not stay in the local economy. With money leaving the area, soon everyone's ability to pay for food is reduced.

food, linking locally based systems to questions of public health and food security. Though not exactly a function of social responsibility, I also consider here the claim that locally based systems generate greater social connections between consumers and producers. I begin this section by employing a social justice framing to consider how local agriculture does and does not provide food security.[14] Following this, I briefly examine the feasibility of locally based food systems to address concerns of public health. Lastly I review the limited empirical evidence for the increased social networks claim.

Social Justice in Local Food: Food Security and the Local Trap

Food security can be defined in many different ways, but at its core it is about the ability of people to legitimately and consistently procure the food they need. The inability to readily access food is a social health problem known as food insecurity. Food insecurity can be understood on two levels: when the supply of food to a particular place is disrupted, and when people are unable to afford or access food by legitimate means, even if it is otherwise physically available. Locally based agriculture is often argued as ensuring greater food security, both in terms of regional security and individual food access (see Enshyan, 2004; Lang, 1996; Thilmany & Watson, 2004). In this section I address each of these considerations in turn.

Our large-scale food production systems force us to rely on a very centralized supply. For example, should some extreme event (such as a terrorist attack or major weather event) cause the disruption of food supplies for even more than two or three days, many of our large urban centers would soon find themselves in a dire situation, as most large cities have a low-reserve food supply (Halweil, 2002; Henderson, 2007; Hines, 2000). Such potential danger is a powerful argument in favor of regionally reliant food systems. Ideally, locally based food systems should be capable of feeding a given region's population; however, because of the current format of agricultural production, many regions in the U.S. would likely need significant infrastructural development and agricultural rearrangement to realistically provide for their own localities (see Peters et al., 2002, and Pirog et al., 2001).

In addition to providing enough food for a given region's population, food security also entails that such systems be able to provide enough food in a way that all people in that region are able to physically and financially access that food. Currently in the U.S., hunger and malnutrition are due largely not to lack of availability of food, but to social policies regarding welfare and the poor —in other words, access is the key to dealing with hunger. Somewhat paradoxically, while the consolidation of agricultural production in the U.S. has led to a food abundance for many U.S. citizens, it contributes to malnutrition and hunger both domestically and in nonindustrialized parts of the world[15] (Nestle, 2002). Proponents of local food systems often argue that provisioning food locally is a way to ensure that all people within that locality will be fed.

It is on this point that proponents of local food are perhaps the most susceptible to being challenged. Local food systems (especially direct-to-consumer enterprises like CSAs and farmers' markets) are often charged with being elitist developments. CSA memberships, for example, typically consist of well-educated, high-income families[16] (Cone & Myhre, 2000; O'Hara & Stagl, 2001); further, both CSAs and farmers' markets have low institutional capacity to provide food security to low-income residents (Guthman, Morris, & Allen, 2006). This is due to a variety of barriers to access, most notably price and available time and means of

[14] Another important aspect of social justice that I do not consider here is gender equity in involvement in sustainable agriculture systems (see Cone & Myhre, 2000; DeLind & Ferguson, 1999; Hall & Mogyorody, 2007; Meares, 1997; Peter, Bell, Jarnagin, & Bauer, 2000; Trauger, 2004).

[15] The flooding of global markets is one major reason so many people in the world are hungry (Lang, 1996; Mancus, 2007; Lezberg & Kloppenburg, 1996). The tragic irony is that although the available food is even cheaper to purchase than if it had been produced by local farmers, most people find themselves unable to afford it.

[16] See Hinrichs and Kremer (2008) for an examination of a CSA-related outreach program designed to increase participation of low-income families through a subsidy program.

transportation. While such barriers and disparities are mainly products of the structure of the larger food system, without a change to said system, it is worth considering who has access to local food arrangements; generally speaking, it is the more affluent segments of the population.

The potential pitfall inherent to the logic of local food is what Born and Purcell (2006) call the "local trap." The local trap is the assumption that regionally based (and presumed small-scale) agriculture is *de facto* ecologically sustainable and socially just; however, this correlation is not necessarily true. Rather, sustainability and justice come out of particular agendas that may use the ideas of large and small scales (and local and global) strategically. DuPuis and Goodman (2005) make a similar argument: they do not deny the political power of the local as a force against globalization, but they do recognize the parochialism and elitism that can come from an un-interrogated understanding of the local (see also Allen (2004) and DuPuis, Goodman, and Harrison (2006)). In other words, food relocalization can be problematic if questions of social justice are left invisible. People derive a variety of meanings from localism. While it can encourage receptivity to difference and diversity, it can also be parochial and defensive (Hinrichs, 2003; Winter, 2003).

Rather than rejecting localism, DuPuis and Goodman argue for a reflexive localism that harnesses the power of the local while struggling against inequality in local arenas. "An inclusive and reflexive politics in place would understand local food systems not as local 'resistance' against a global capitalist 'logic' but as a mutually constitutive, imperfect, political process in which the local and the global make each other on an everyday basis" (DuPuis & Goodman, 2005, p. 369). Hess (2009) tackles this issue more concretely by highlighting some major critiques to the social justice side of localism (namely that localism benefits wealthy families, communities, and nations at the expense of less affluent ones) and discussing ways localism can potentially address these critiques so as to not fall further into the local trap (for example, through low-income scholarships or sliding-scale memberships to CSAs, farmers' markets accepting food stamps, and fairly traded goods).

The Public Health Benefits of Local Food

Part of the socially responsible (some might even say social justice) promise of locally based food systems is providing safe and healthy food in safe and healthy ways. Just as the high concentration of conventional food production generates environmental hazards, so does it also generate public health hazards, both in terms of the food available to us and in the ways in which it is produced. For example, increasingly frequent and widespread food contamination scares (resulting in illness and even death in the human population) have been linked to problems in the conventional food production system (Altekruse, Cohen, & Swerdlow, 1997; DeLind & Howard, 2008; Tauxe, 1997; Waltner-Toews, 1996). This is not to suggest that food contamination cannot occur in locally oriented systems, but the range and likely severity of its impact would be considerably less than such contaminations in the conventional system.[17]

Some people participate in local food as a way of avoiding the problems (and perceived risks) in the rest of the food system. This is what Szasz (2009) refers to as the Inverted Quarantine: we use commodities to shield or insulate ourselves from the outer environment. We do this with organic food in an attempt to avoid pesticides and other harmful chemicals, and we do this with local food as well, to avoid yet other unknowable risks (Bonanno et al., 1994; Knight & Warland, 2005; Szasz, 2009). In an attempt to remove themselves from that potentially harmful system, some people shop with local food in mind.

It was a similar logic of risk assessment and avoidance that drove us from the regional food supply systems of earlier centuries and decades. DuPuis (2002) highlights this through the lens of milk production and what she calls the Perfect Story: increasing technological innovation will

[17] While not something that advocates claim locally based food systems are able to solve (and therefore also beyond the scope of this paper), there are other health problems associated with industrial food production. Many overproduced products, especially corn, are processed into now-ubiquitous value-added food goods, such as high fructose corn syrup. Such products are considered a primary reason the United States is experiencing what some have called an obesity epidemic (Jennings, 2003; Nestle, 2007), with links to a host of medical problems.

increase our food supply and protect us from harm. In her discussion of the rise of modern industrial agriculture, she argues that a major drive behind this shift was the "industrial bargain": an alliance between consumers, mass-production capitalists, and intensive farmers to create a system of cheap nutrition (p. 89). But we can see the imperfections in this Perfect Story as consumers now have come to question the sources of their food and try to make sense out of a complicated yet minimally available realm of information (see also Blay-Palmer, 2008).

There are many things in our day-to-day life that are outside our control; consuming local food is one way rational actors try to deal with this. Yet it is very difficult to step completely outside the system and live apart from it. Even if we try, we find ourselves confounded by the systems from which we are trying to separate. Local food is no different. While consuming local food as a way to avoid the broader risks of the industrial food system might work on an individual level for some, local food is not immune from problems like food contamination. This type of green consumption provides a sense of personal responsibility and empowerment with respect to environmental risks while also incurring doubts and insecurities about choices made (Connolly & Prothero, 2008). Again we see a need for a reflexive localism that allows us to approach potential solutions to the problems of our dominant food system with a societal view in mind rather than one that only considers the individual level.

Local Agriculture and Social Networks

Perhaps the most difficult to assess claim of local food advocates is that locally based systems create greater connections among people, and sometimes greater connections between people and their food (see Halweil, 2002; Henderson, 2007; Hines, 2000; and Pollan, 2006). There is evidence that many local food participants *believe* in the potential for these increased connections (Cone & Myhre, 2000; DeLind, 1999, 2002; Wells, Gradwell, & Yoder, 1999), and studies dating as far back as the 1940s suggest that communities with small (though not necessarily locally oriented) farms have stronger community ties and higher levels of civic engagement than those with large farms (Goldschmidt, 1946; Lobao, Schulman, & Swanson, 1993; MacCannell, 1988; MacCannell & White, 1984). One not-insignificant challenge in assessing this claim of greater social connections is determining and measuring a basis of comparison. That is, when we say local food systems generate greater community ties, to what are we comparing these connections? Further, how are we to measure the prevalence of said connections? The concept of "greater connections" is an excellent rhetorical and philosophical device, but lends itself to very little empirical substance. In fact, there is some evidence that this claim has some key limitations. Though local markets may encourage human connections and direct interaction on some level, they are still places where relationships can be commodified by providing an alternative to "monoculture market economy" without challenging the fundamental commodification of food (Hinrichs, 2000). Further, one primary reason many people do not participate directly in local food systems is because it lacks convenience: they want food to be available when and where they desire (Cone & Myhre, 2000; Schneider & Francis, 2005; Stephenson & Lev, 2004). For example, for families who participate in a CSA one year but do not renew their membership the following year, the inconvenience factor is the primary reason: working with in-season produce each week requires a significant change in most people's lifestyles (Cone & Myhre, 2000).

If we broaden our scope from local orientation to include a variety of practices often included under the purview of sustainability, then it is possible to speak to the kinds of social networks necessary and inherent to the production of sustainable agriculture knowledge, at least among farmers and producers. If Lyson's (2004) understanding of the intersection between sustainable and local food holds true (what he calls civic agriculture), then such a shift in focus makes sense, as what we know about social networks as a function of sustainable practices should similarly hold true in locally based food. It is an open-ended question, however, whether such links between sustainability writ large and producer social networks also apply when the focus is restricted to locally oriented food systems and also whether such networks occur among con-

sumers as well. Nonetheless, I present here a brief review of the literature on sustainable practices as broadly conceived and their impact on social networks.

What we know about sustainable agriculture knowledge and social networks comes from research on farmers and food producers. Some scholars (Brodt, Feenstra, Kozloff, Klonsky, & Tourte, 2006; Lyson & Guptill, 2004) argue that conventional and sustainable farmers approach farming from fundamentally different paradigms, and that these paradigms impact farmers' interest in and willingness to engage in practices considered part of sustainable agriculture.[18] On the other hand, some scholars argue that farmers are reflexive actors who navigate expert and local knowledge in their decisions whether to adopt certain practices, whether to adopt the latest technological trend (such as Bt corn) or a new (possibly sustainable) method, and are more likely to be influenced by first-hand or local experiences than by state or expert observations (Bell, 2004; Kaup, 2008). Regardless, there is ample evidence that those who adopt sustainable practices often establish social ties and networks with other sustainable farming practitioners to better facilitate idea and knowledge exchange (Bell, 2004; Carolan, 2006b; Hassanein, 1999). Organizations and networks of farmers who practice sustainability are a primary way for this to happen. Sustainable agriculture becomes socially possible as a practice through such organizations because they act as informational and conversational venues for farmers interested in sustainability to engage with each other. The reason for such organizations and networks may be in part because farmers, especially members of sustainable agriculture organizations, see low governmental support for sustainable farming methods, prompting them to rely instead primarily on each other and their personal experience for information about sustainable practices (Carolan, 2005, 2006a).

So, does local food promote social responsibility, particularly in terms of equitable access to food, increased public health, and stronger social ties? In short, it can, though as DuPuis and Goodman (2005) and others remind us, this is but one possible outcome of local food and not an inherent one. Without reflexive engagement in the part of consumers and producers, locally based food systems are just as likely to promote inequitable access as they are food security. Similarly, local food has the power to provide public health benefits, but only inasmuch as it is *systematically* developed as an alternative to the industrial food supply. And it is possible that local food systems could promote stronger ties within a community, but this is not necessarily so (nor even the most important aspect of social responsibility). Locally based food systems, then, may have great potential for promoting the socially responsible leg of sustainability, with the important caveat that such systems (as with most methods of promoting social responsibility) require significant reflexive and systematic engagement.

Conclusion: The Individualistic Error

There is one more potential pitfall inherent to the claims of a nonreflexive localism that can be found woven throughout all of the various claims made about locally based food systems; I call it the individualistic error. Many scholars and advocates of localism (including Kloppenburg and colleagues as well as Brian Halweil (2002) and Colin Hines and colleagues (see Hines, 2000, and Hines, Lucas, & Shiva, 2002)) reason that if people know how problematic conventional food is in its production process, they will seek out better food sources. While there is evidence to suggest that this may be true in some instances (for example, regarding fear of food contamination, see Blay-Palmer, 2008, Fromartz, 2006, and Nestle, 2007), education on these issues is not enough; instead we need institutional change and social network reconfiguration to see a true shift to sustainable systems (see Carolan, 2005, 2006a). Even within sustainable agriculture organizations, this is not an easy line to walk (Campbell, 2001). In their calls for greater awareness and education on the problems of global food production, such advocates have a tendency to oversimplify awareness of these problems with a

[18] Abaidoo and Dickinson (2002) argue that sustainable and conventional agricultural systems themselves are founded upon fundamentally different paradigms.

logical shift toward sustainability.[19] In short, individual-level solutions are not effective for dealing with structural problems (Szasz, 2009). Recall, for example, the government subsidies geared toward certain crops but not others, or the fact that our severe overproduction of food indicates that hunger, domestically and abroad, is caused not by lack of food but by inequality and inability to access it. These problems will not be resolved by convincing people of the wonderfulness of local (or even sustainable) agriculture.

In considering the shift from an industrial to a sustainable food system, Blay-Palmer (2008) argues that "there are usually no clear boundaries between [industrial and alternative food] systems. More often it is the case that the two systems overlap. At the very least, *they are both contained within the same regulatory frameworks that serve to reinforce and constrain certain features of both systems*" (p. 134; emphasis added). To become more than marginal, niche spaces in the food system, proponents of alternative agriculture systems will have to work with and within the governmental regulatory frameworks that govern the broader system of food production. Political support for a locally based food system, then, is more than simply a local matter:

> First, a territorial and not a sectoral approach is needed to integrate agriculture with other elements....Second, decisions made about food systems need to be founded in subsidiarity, that is decisions should be made as low down the governmental hierarchy as possible. And third, to make this effective and relevant, consultation is needed to empower people as part of the process and to ensure that reflexivity is built into the process. (Blay-Palmer, 2008, p. 151)

Throughout this article I have attempted to walk a fine line between highlighting the potential benefits and solutions of a locally based food system and pointing out the potential pitfalls and shortcomings of adopting such an approach uncritically. I believe that despite all the complexity and uncertainty, there are a few things about which we can be very clear. First, the conventional industrial food systems we have today are not sustainable; this is true regardless of which leg of sustainability one considers. Second, locally and regionally based agriculture systems have great potential to resolve or remediate many of the conventional systems' problems, most notably through a reduction of transportation distances, a remediation of food inequalities, an ability to be regionally (though not totally) self-reliant, and a way out of the economic and social risks of global-industrial agriculture. Nevertheless, we should not assume that such systems offer an inherently sustainable solution. Meeting the promise of sustainability through locally based food systems will require not only the active engagement of reflexive consumers and reflexive producers, but also structural and systemic changes to the ways in which our food is produced and distributed.

[19] Johnston (2008) highlights a related case to this shortcoming in her study of the citizen-consumer concept as it relates to shopping at Whole Foods. Though the citizen-consumer concept encompasses the belief that how you shop can promote social change, the citizen-consumer is likewise inconsistent with growth-oriented capitalism.

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Economic viability of selling locally grown produce to local restaurants

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Abstract

The purpose of this study was to conduct a qualitative comparative analysis of growers' costs for inputs related to production, processing, packaging, and distribution of local foods to independent restaurants. Growers have been motivated to sell locally due to the asymmetry in farm-retail price spreads. Yet selling locally direct to restaurants may imply new types of processes, costs, and investments. While local farm-to-retail markets may provide opportunities to reduce these price spreads and maximize benefits for growers, it is unclear whether such efforts are economically viable for growers when all input costs are considered. Interviews with local food producers found that there were clearly higher costs for growers in most of the value chain for directly selling products to restaurants. Specifically, growers expressed a need for increased communication and interaction with restaurant buyers. Such interaction helped growers showcase their products to restaurants, yet required greater time inputs. However, premiums received by growers for these direct market sales were perceived to offset these costs. Local food is gaining popularity as an alternative economic strategy for developing local communities. For it to develop and be adopted progressively, however, clear costs and benefits need to be examined, evaluated, and communicated to producers and consumers.

Keywords

cost-benefit analysis, economic viability, growers, local foods, restaurants

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Introduction

Local food is viewed as an alternative economic strategy for developing local communities (Hinrichs, 2003). However, clear costs and benefits need to be examined, evaluated, and communicated to producers and consumers for this strategy to develop and be adopted progressively. Theories of economic sustainability such as eco-localism stress the importance of creating local or regional community economies that are self-reliant (Curtis, 2003). Emphasis has been placed on examining the economic possibilities that short-distance commerce and self-reliant local economies can offer. Research shows that while there may be significant environmental consequences of longer transportation of foods, actual transport costs are small. Therefore, shorter distances may not provide an economically competitive justification to choose local foods over the conventional system (Pirog, Van Pelt, Enshayan, & Cook, 2001). In this study, Pirog et al. calculated the weighted average source distance for locally grown produce to reach institutional markets at 65 miles, compared to 1,494 miles for the same products to reach the same locations from conventional sources. Gas prices have increased significantly since that research was conducted, thereby increasing the likelihood that transport costs could be a consideration in choosing local foods. A more recent study investigating fuel efficiency and CO_2 emissions of community supported agriculture (CSA) operations in Iowa found farmer delivery using the Toyota Prius resulted in 2.77 times lower fuel use and CO_2 emissions than consumer pick-up using the U.S. average fuel economy for passenger vehicles (Pirog & Rasmussen, 2008).

Markets for local foods have developed significantly. Local foods in restaurants have been identified as the "hottest trend" for 2009 and 2010 (National Restaurant Association [NRA], 2008; 2009a; 2009b). Reporting on "Finding Food in Farm Country" in over 30 states and tracking economic impacts of local food system developments, Ken Meter (2008) has found, for example, in an analysis of eight Iowa counties, that in 1998 three institutions were purchasing USD111,000 of local food, but in 2008 25 stores and institutions were purchasing USD1.8 million of local food. (One success story is an independent restaurant called Rudy's Tacos, which in 2008 purchased 72 percent of its food from local sources.) Other than these regional-specific reports, there is limited research as to whether it would be economically viable for growers to sell directly to restaurants, and under what conditions these transactions could occur. Economic viability for growers is critical to ensure that local food sales directly to restaurants as a sustainable strategy.

This study was part of a broader effort that took a systems view to evaluate the economic viability of local foods for food service organizations, local growers, and consumers. This study assessed economic costs and benefits for growers in order to further inform the connection with the wider literature in theories of economic sustainability, eco-localism, and farm-to-fork system approach. Specifically, this study investigated the costs and benefits for growers when selling products directly to independent local restaurants. It also evaluated ways in which growers can maximize economic benefits and minimize costs when selling to local restaurants. This study also developed a baseline model to capture such observable impacts of marketing local foods to one sector of the food service industry, independently owned local restaurant establishments. There is limited understanding by producers of local restaurant value chain dynamics. Our study contributes to this literature gap. The findings of this study present an opportunity for producers to align their costs-benefits in a manner that would increase the value of their transactions with local restaurants.

Literature Review

Local Food Movement

Many communities have initiated an alternative food and agricultural system in response to trends in the current food system characterized by global and corporate control, too few companies retaining economic control and benefits, and a lack of environmental concern (Feenstra, 2002). Farmers' markets and community supported agriculture (CSA) organizations reflect the characteristics of a local food system. Consumer interest in using and buying local foods has increased over the past

several years; this interest is reflected in the increased number of farmers' markets and CSAs in the U.S. Farmers' markets have experienced growth over the last two decades, with an increase of 33 percent in the number of farmers' markets between 1994 and 2009 (USDA, Agricultural Marketing Service, 2009). Data collected in 2007 by the USDA indicated that 12,549 farms in the United States reported marketing products through CSA arrangements (USDA, National Agricultural Library, 2007). The CSA concept is attributed to European and Japanese influences. CSAs were introduced in the U.S. in the mid-1980s. According to LocalHarvest estimates, the number of CSAs in the U.S. was 50 in 1990, with a current estimated number at about 2,000 (LocalHarvest, 2009).

Although there is widespread interest in local foods, there is no standard definition for local food. The term is fairly broad, with several different complementary and dynamic dimensions. Previous researchers have identified different definitions for what producers and consumers mean by local food, such as definitions framed around political boundaries, a specific distance from purchasing point to sale, and geographic place of production. Wilkins, Bowdish and Sobal (2000) examined several dimensions of the concepts "seasonal" and local food. Researchers surveyed 166 undergraduate students enrolled in an economics and nutrition class at a large university in New York. The authors concluded that meanings given for local foods involved distance, physical accessibility, and sometimes a dimension of specialty or uniqueness for products available in certain areas. Most meanings given to local food (65 percent of total responses) had to do with the place in which the food was produced.

Zepeda and Leviten-Reid (2004) conducted focus group sessions with food shoppers in Madison, Wisconsin, to investigate shopper beliefs and behaviors about local foods. The four focus groups consisted of two groups of regular organic food shoppers and two groups of shoppers who did not frequently purchase organic foods. A convenience sample was recruited from different sources to include specific ethnic and income groups. The sample included a Southeast Asian gardening community, an African American church group, members of a Slow Food group, and shoppers at a food co-op. The authors found that most participants defined local food relative to driving time. This criterion relates driving time to distance, with six to seven hours the most frequent answer to the question of the limit of time that would be spent to drive to a local food source. About half of the respondents in this study defined local food in these terms, with other responses such as product availability at farmers' markets or products from smaller farms also identified.

The Hartman Group (2008) reported the findings of a survey conducted in December 2007 about U.S. consumer understandings of the term "buy local." Results were based on a sample size of 796 and a contextual language analysis of hundreds of statements made by shoppers as well as online discussions about what buying local means. The report indicated that consumers defined local in terms of distance from their home: 50 percent defined local as within 100 miles, and 37 percent said within the same state. In view of these varied definitions of local food, this study defined local foods empirically by a preliminary review of the study sample's production and sales practices. This study defined local foods as that grown or produced for sale within a 50-mile radius of its source.

Factors Influencing Food Choice

A wide variety of factors can influence human food selection. Shepherd and Raats noted that "the range of factors potentially involved in human food choice is tremendously diverse and extensive" (2006, p. 2). They developed a food choice process model that incorporated and linked factors involved in making food selections. The model examined consumer individual food choices and identified three major components that overlapped and interacted when people constructed food choices: course of life (evolution of thoughts and feelings over time and transitions of time and place); influences (ideals, personal factors, resources, and social factors); and context (such as social institutions and policies). These food choice values change over time as events and experiences during the course of life shape food choice influences that may result in new or modified food choice values. Therefore, it is possible that in a

long-term perspective, trends in preference for local foods could be transitory. However, in the near and short term these trends have strengthened. Restaurants are therefore finding ways to capitalize on these trends. Growers tend to benefit through such trends, and in the process may also better understand opportunities that exist to extend the benefits from a diverse set of marketing outlets.

Motivations and Preferences for Buying Local Foods

Many factors are considered in consumer food decision-making. Taste, convenience, cost, and health are among the most important influences on food purchases (Shepherd & Raats, 2006). The identification of factors influencing the decision to buy local food is valuable knowledge that can be used by producers, restaurants, and food service institutions to define new marketing strategies. Research on consumer preferences of local food at farmers' markets and direct markets has determined some of the perceptions associated with these products and the motivations to buy local foods. In a study of consumer views on local food, Zepeda and Leviten-Reid (2004) also found that respondents had a positive attitude toward local foods because of its association with enhancing the economy and benefiting the environment.

Tregear and Ness (2005) conducted an analysis of consumer interest in locally produced foods in a region of England to determine what factors influenced their buying decisions. After reviewing the literature, the researchers hypothesized that three sets of factors were related to consumer interest in local foods: attitudes, situation, and demographics. The results of the study gave partial support to the hypothesis that interest in local foods was associated with relatively high levels of concern over food chain issues, as well as partial support to the idea that interest in local foods is associated with positive attitudes towards farmers. The study found that "contact with farming" was a strong discriminator of interest levels in local food. The demographic variable of "age" was the only significant discriminator, suggesting that interest in local foods is higher among older respondents. Carpio and Isengildina-Massa (2009) showed that premiums for local products were influenced by age, gender, and income as well by perceived product quality, a desire to support the local economy, patronage of farmers markets, and consumer ties to agriculture. While a wide variety of factors influence preference for local foods, an underlying factor is consumer concerns about the manner in which food moves along the local foods value chain. Sustainability of this value chain could be determined by its economic viability, yet it is unclear whether such value chains are economically viable.

Business to Business Research in Local Foods

There has been significant interest in local foods supply chains in the business-to-business (B2B) literature. For instance, Hardesty (2008) assessed the prospects for marketing locally grown produce (LGP) to colleges, universities, and teaching hospitals. The researchers examined the effects of transaction costs, institutional characteristics, and price proxy on the adoption of LGP-buying programs using survey data. The study found that colleges and teaching hospitals incur significant transaction costs and a price premium to have an LGP-buying program. As a consequence, the author suggested that growth of LGP programs required reducing transaction costs, to which grower collaboration and improved vertical coordination between growers and produce distributors was the key.

Strohbehn (2003) presented empirical evidence that food buyers for commercial and institutional food services in Iowa have strong interest in supporting local farmers, providing fresher and high quality foods, and lowering associated transportation costs. Data from the study also showed that operations wish to know the sources of foods purchased. In addition, the author suggested that commercial food buyers have more flexibility to adjust their menus according to seasonal harvest, while institutional food service operators have more concerns about product costs, labor time, and safety of food, and the food supply chain. Kirby (2006) investigated restaurants as a potential market channel for locally grown food in western North Carolina. The top challenges of purchasing locally reported in this study were coordinating purchase and delivery, and finding an adequate supply of locally grown food. Generating strong consumer

demand for local food was also cited as critical to maintain restaurant demand for local food.

Keifer (2008) discussed locally grown food purchasing from retailer and supplier perspectives, and discussed the challenges within this supply chain. Both small regional food producers and larger national brands can benefit from local sourcing. Large food suppliers may embrace local production as a means of maintaining lower costs and competitive prices. Although the local-sourcing trend offers the opportunity to reduce transportation, warehousing, and packaging costs by reducing food miles, it introduces new challenges for grocery retailers. Those challenges include wider variation in merchandise, reduced economies of scale, difficulties for supplier management, and more sophisticated pricing, ordering, and invoicing processes.

Kinsey and Buhr (2003) discuss how B2B relationships can reduce costs and increase efficiencies in the procurement, storage, and delivery of food to retail stores or distribution centers. The use of electronic commerce allows retailers to share information about consumer purchases and preferences with farmers, and to check food characteristics, sources, and movement from production to consumer. The authors state that this circle of information would allow high quality and consistent products to be consumed at lower prices.

In summary, the B2B literature shows that organizations could face economic challenges in sourcing local foods in a manner that could ensure sustainable demand for such products. The literature indicates that it would be worth explaining the sources of these transaction costs along the local food supply chain. The transaction costs are conceptually a measure of defining value within the value chain framework. In this study we adopt a value chain framework that helps identify the sources of these transaction costs.

Benefits and Obstacles Perceived by Food Service Institutions

Gregoire and Strohbehn (2002) conducted a study with school food service operations to determine current purchasing practices, and identify benefits and obstacles when purchasing from local growers or producers. They found that respondents identified good public relations and support to the local economy as the strongest benefits of buying local foods. Other identified benefits were the possibility of purchasing smaller quantities, obtaining fresher and safer food, and knowing product sources. Among the obstacles identified by respondents were the lack of availability of products year around, the inconsistent ability of obtaining an adequate food supply for the operation's volume, and unreliable food quantity.

In another study, Strohbehn and Gregoire (2005) collected directors' perceived benefits and obstacles in purchasing local foods for college and university food service operations. Perceived benefits from buying local foods were support of local sources and regional economies, freshness of foods and foods of higher quality, good public relations, student awareness about food sources and production practices, availability of safer food, and the opportunity to purchase smaller quantities. Freshness and quality were identified as very important by this type of food service operation directors, as their mission was to provide safe and nutritious foods to students whose only access to meals may come from the dining service. Barriers identified in this study related to payment procedure conflicts, reliable suppliers, and product availability year round. Other studies have also identified benefits and obstacles of marketing local food products between farmers and different sectors of food-services. Benepe, Smith, Auld, Starr, Lamm, and Wilken (2002) investigated the food purchasing patterns of restaurants and institutional food service in three Colorado regions. Researchers categorized the barriers identified by food buyers who directly purchased locally grown foods (less than one-third of the sample) as follows: lack of knowledge about local sources; inconvenient ordering procedures; and product concerns such as limited availability, variable cost, and increased service costs. Benefits associated included high customer satisfaction and the development of positive local business relations.

The Food Processing Center (2003) of the University of Nebraska conducted a mail and online survey of members of the Chefs Collaborative organization to identify attributes important to

food service establishments, and the challenges and obstacles associated with purchasing locally grown food. Advantages that members gave to initiating or continuing the purchase of locally grown products were better product quality, the importance of developing good relations with producers, access to unique or specialty products, and satisfaction of consumer requests. Seventy-three percent of the responding chefs agreed or strongly agreed with the idea that purchasing locally grown food had a positive impact on the bottom line profits of the establishment. The identified obstacles were related to distribution and delivery, concerns about the reliability and consistency of supply, complicated ordering processes, and dealing with many suppliers. The study also found that chefs identified barriers related to pricing and competitiveness when other purveyors were competing.

Starr et al. (2003) investigated local food marketing and purchasing practices between farms and restaurants in Colorado. They determined that the important factors for local restaurants when purchasing food items from local producers were supporting other local businesses and acquiring products that minimized impact on the environment and that were grown and processed locally. Strohbehn and Gregoire (2003) conducted a case study with five independently owned restaurants and five non-commercial food service operations in Iowa to assess interest in increasing local food purchasing. Results showed considerable interest by all food buyers to support local farmers because of perceptions of fresher and higher quality products and because of lower transportations costs. Some of the non-commercial food service managers noted concerns about working with local suppliers, such as time of delivery, availability of items, consistent quality, and price of products. Inwood, Sharp, Moore, and Stinner (2009) examined the characteristics of chefs and restaurants that had adopted local foods, to identify important local food attributes and the role of the restaurants in promoting local foods. All restaurants expressed that the superior taste of local food was an important factor when making purchasing decisions. Among all restaurant respondents, a perceived barrier to widespread use of local foods was inadequate distribution infrastructure.

In summary, despite several obstacles to buying locally, restaurants (mostly independently owned) have noted the benefits of local foods which are associated with its taste, freshness, quality (in general), sustainability in the local community, and even profitability.

Benefits and Obstacles Perceived by Producers

Gregoire, Arendt, and Strohbehn (2005) investigated producer perceptions of marketing to local restaurants and other food service operations in Iowa. Perceived benefits of direct marketing and selling among the producers included supporting local farmers, providing fresher food for the customer, and less travel distance for food. Researchers found that almost 44 percent of respondents had never sold to local food service operations because they could not produce the quantity year-round with the specifications needed by buyers. Other reasons offered were lack of knowledge by producers and buyers about regulations, and that some purchasers were not open to buying from them. Kelley (2006) found it important for farmers to know what to produce, and then to market it effectively to professional chefs based on an understanding of chef needs. Similarly Penrose, Smith, and Vollborn (1999) found that farmers identified assistance for extending or improving markets, farm management, natural resource management, and increase of the grazing season for ruminant livestock, as important factors. Extension information on management of production input costs, niche markets and competitive channels of distribution, information on product handling practices prior to delivery, and marketing tools were also identified by farmers as important for direct selling to restaurants (Ellis, Strohbehn, & Henroid, 2005; Strohbehn & Gregoire, 2005; Sharma & Strohbehn, 2006; Montri, Kelley, & Sanchez, 2006; Sharma, Gregoire, & Strohbehn, 2008). A number of studies have also found that establishing contact, and developing a lasting relationship with restaurants, marketing of produce, and identifying and implementing online collaborative marketing was important to farmers (Curtis, Cowee, Havercamp, Morris, & Gatzke, 2008; Gao & Bergefurd, 1998;

Gregoire, Arendt, & Strohbehn, 2005; Sustainable Agriculture Research and Education [SARE], 2008; Wright, 2005). Other studies have also recommended that growers and producers organize cooperative alliances to ensure that restaurants and other retail food services have sufficient quantities available for specific products when needed (Iowa State University Extension [ISUE], 2008).

Despite this growing research interest in local food value chains, the economic aspects of selling directly to local restaurants are still unclear. Limited peer-reviewed research has been conducted in this arena. Ken Meter's team at the Crossroads Resource Center in Minnesota has conducted numerous state and county-based reports on food production costs and sales within specific regions (see Local Food and Farm Studies at http://www.crcworks.org/?submit=fffc). Other food service focused studies have assessed consumer willingness and/or tracked actual purchase of promoted local foods (Sharma, Gregoire, & Strohbehn, 2009; Strohbehn & Ortiz, 2011). A more thorough comparative analysis of costs of production, processing, packaging, and distribution is needed to justify use of local food systems. Growers are motivated to sell locally due to the asymmetry in farm-retail price spreads: costs to farmers may change by only 16 percent, yet the price to consumers (through wholesale market channels) can go up by as much as 52 percent (Dunham, 1994). Selling locally may imply new types of processes, costs, and investments, simply because growers are approaching a different market to sell their produce (Telfer & Wall, 1996). While local farm-to-retail markets provide opportunities to reduce these price spreads and maximize benefits for growers, it is unclear whether such efforts would be economically viable for growers. Recent literature has also evaluated value chain aspects of local food selling to different types of consumers. For instance, recently Jablonski, Perez-Burgos, and Gomez (2011) evaluated the scale of marketing and distribution components of the farm value chain in selling local foods to a broad cross-section of consumers. Bloom and Hinrichs (2011) investigated approaches that would be optimal for hybrid value chains, when conventionally oriented businesses incorporate local value chains. They suggest that focusing on non-economic and informal mechanisms such as social relationships could be beneficial. Schmidt, Kolodinsky, DeSisto, and Conte (2011) investigated the marketing and distribution strategy of a Vermont-based CSA, and found several implications concerning value chain components. In particular, the study found that while the CSA had improved distribution and access of local foods to consumers, overhead costs and upfront consumer costs were a hindrance to its sustainability.

The purpose of this study was to assess qualitatively the economic costs and benefits for growers who sell their products directly to restaurants. Specifically, the objective of this study was to identify economic implications for local growers/producers who wished to establish sustainable partnerships with local restaurants. The two research questions that guided the study were:

1. What are the costs and benefits for growers to sell products directly to independently owned restaurants?
2. How can growers maximize the economic benefits and minimize costs when selling to local restaurants?

Applied Research Methods

This research used a qualitative approach to investigate the questions. As has been briefly discussed, there is, at best, scant evidence of the total costs (direct and indirect) and benefits for local growers selling directly to local restaurants. Therefore, a qualitative research design allowed us the flexibility to better understand various dynamics of costs-benefits associated with direct sales to local restaurants. Four criteria outlined by Creswell (2003) were used to carry out this qualitative study: (1) a strong literature base for the study, (2) use of questions to explore the meanings of the situation/experience being studied, (3) data collection using interviews, and (4) analysis of data by grouping the responses (termed horizontalization) to form clusters of meanings.

As shown in the introduction to this paper, recent literature on costs and benefits associated with local food value chain to restaurants was discussed. Based on literature review and the

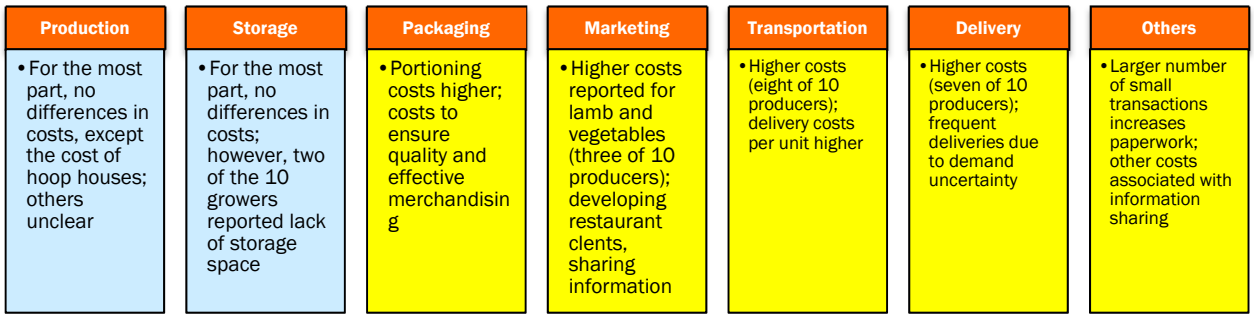
Figure 1. Proposed Value Chain Framework

authors' own experiences in the field, questions were developed to explore the meanings of costs and benefits along the value chain in directly selling locally grown produce to restaurants. Interviews, the third criteria proposed by Creswell, allowed the integration of the first two criteria by securing enough time for respondents to explore the meanings of costs and benefits. Finally, the analysis of data helped the authors to identify themes that were compiled to form clusters of meanings along each component of the value chain (see figure 1). These clusters of meanings were described and supported by verbatim comments.

The purpose was to identify incremental costs and input investments (both tangible and intangible, such as time) required by growers and producers who sell local foods to independently owned local restaurants. This study was conducted through a Midwestern university and approved by its institutional review board. Data for the study was gathered through face-to-face interviews with 10 local growers/producers who sold food to local restaurants. The criterion for selecting producers was that they currently sold produce directly to local restaurateurs. The intention of the producer survey was to understand costs and inputs involved (operating and capital costs, and labor time) in selling locally, which was achieved by interviewing producers already selling to local businesses and having understanding of these inputs. Producers were identified through a local grower directory. First contact was established via phone with a request for participation, and to develop a definition for local foods based on producers' current local selling activities. A value chain framework was adopted to assess the direct and indirect costs required by growers and producers who sold local foods directly to restaurants. The value chain components, previously used as a framework for other research, included the following: production, storage, packaging, marketing, transportation, delivery, and other (Sharma, Gregoire, & Strohbehn, 2009). The last category, 'other,' included activities such as billing and administrative aspects. See figure 1.

Face-to-face interviews were conducted with10 local growers/producers identified who were selling fruits, vegetables, dairy, chicken, pork, or beef to at least one local restaurant. This judgment sample (Marshall, 1996) of growers and producers was selected from a list of farmers obtained from a regional subsidiary of a national philanthropic organization that supports local food systems. As Marshall (1996) points out, the size of the sample for a qualitative study is primarily driven by the phenomenon of interest in the research question. Therefore a small sample size in a qualitative study is justified, because the objective is to understand the phenomenon of interest and not to generalize the findings. In this research, the phenomenon of interest was local growers and producers directly selling to restaurants. We selected a sample from the local grower and producer database in order to recruit respondents at different levels of their involvement, commitment, and interest in selling to restaurants. This was accomplished during the initial phone discussions, and through subsequent discussion among the researchers who assessing the producers' interest levels — whether they were interested in selling to local restaurants, were new to this marketing option, or had prior experience. Such sampling allowed us to ensure that we would be able to investigate our phenomenon of interest in a comprehensive manner. Local food was defined as product sold by growers and producers within a 50-mile radius, based on phone intake data. Interviews were prescheduled, and the growers were given a copy of the instrument before the interview. The instrument was based on prior studies conducted in the context of direct sales by local growers (Ellis, Strohbehn, & Henroid, 2005; Strohbehn & Gregoire, 2005). The

Figure 2. Associated Costs of the *Resultant* Value Chain Framework



instrument had three sections. Section I included questions about grower information, ownership, farm characteristics, types of products grown, number of employees, and the usual methods of advertising and marketing. Section II consisted of a series of questions about grower experience dealing with restaurants. These questions asked the growers about their experience dealing with local restaurants, challenges and benefits, types of products they sold, and whether they would be interested in continuing to increase sales to restaurants. Section III asked the growers to provide any specific cost-related information when comparing direct sales to restaurants with other sales outlets. The researchers incorporated the flexibility to allow respondents to provide additional comments that were related to these questions. The discussions were semi-structured and conducted by at least two research team members. One researcher recorded the responses during the interview. A debriefing session followed in which both members of the research team verified responses. Frequency of responses and other descriptive and non-parametric statistics were used to analyze the data. Responses were also grouped (horizontalization) to form clusters of meanings. Researchers also collected cost information, perceptions of benefits, and descriptive documentation of current practices.

Results

Grower responses were categorized into three distinct areas: grower information, issues concerning sales to local restaurants, and value chain component information about costs and benefits. Results pertaining to costs and benefits that growers identified in the respective value chain activities are presented below. These results are also supported by statements pertaining to the appropriate costs and benefits from interviews concerning sales to local restaurants.

Costs and Benefits for Growers

Each value chain activity was investigated for its reported costs and benefits.

Production costs: As shown in figure 2, most of the producers (n=8) noted that there were no differences in production cost between food for local restaurants and for conventional markets. However, two of the growers interviewed did report that there could be differences in production costs. One of these growers was not monitoring such costs, and therefore was unable to identify cost differences clearly. The other producer noted that selling to restaurants would require investing in a hoop house, which could require significant investment, of up to USD6,000. The hoop house would ensure that off-season produce could be made available to restaurants, or at a minimum extend the growing season and availability of produce to restaurants.

Storage costs: As for production costs, most growers noted that *storage* activity also did not result in higher costs when marketing and selling directly to local restaurants over costs when selling to conventional markets. However, two of the 10 growers suggested that their current storage capacity was limited. Thus, an implication may be that additional storage would cost more, thereby increasing transaction costs for local independent restaurant markets.

Packaging costs: Two of the 10 growers reported that *packaging* costs for tomatoes, aspara-

gus, and corn were higher, due to portioning specifications of their buyer restaurants, than when products were sold directly to consumers at conventional markets. Another three growers reported that the cost of ensuring quality, whether through processing or packaging, would be higher when selling to restaurants. Growers and producers also reported that packing and merchandising skills appeared to be lacking among other growers interested in direct sales to local restaurants. This lack of skills could also increase inefficiencies, thereby increasing costs to growers and producers.

Marketing costs: Lamb producers and vegetable growers reported higher *marketing* costs for establishing initial contact and later relationship building with restaurants. Three other growers reported that marketing costs of communicating essential product, price, and other sales and merchandising information to restaurants would be higher than if they were to sell to conventional market outlets such as farmers' markets, roadside stands, food distributors, grocery stores, and middlemen. Furthermore, aligning market needs to ensure adequate supply of their products to restaurants also created uncertainties, particularly because of noncommittal ordering from restaurants. On the other hand, seven respondents also reported several marketing benefits of selling directly to local restaurants. For instance, they felt that local restaurants could provide effective advertising for their products. This was found particularly attractive given the potential price premium for their products associated with consumers visiting such restaurants. Furthermore, eight felt that restaurants provided them with an alternative market, thereby allowing them to diversify their marketing strategy.

Transportation and delivery costs: Most important, all 10 growers agreed that *transportation* and *delivery* costs were higher selling directly to restaurants rather than selling through wholesalers, CSAs, and other marketing outlets such as farmers' markets. Transportation costs were reported as higher due to several factors. The biggest contributor to transportation costs, as identified by seven of the 10 producers, seemed to be the uncertainty attached to both the restaurant demand pertaining to specific products, as well as the quantities required of these products. This would imply that growers and producers would have to make frequent trips to the restaurants, sometimes more than once or twice a week. While this helped them in establishing relationships, the unit costs were sometimes prohibitive. For instance, when delivering asparagus rather than corn, usually corn would be ordered in higher quantities; therefore the growers could justify this based on unit costs. Six growers also reported that they did not effectively communicate product and pricing information to restaurants. This created uncertainty of product availability from the producer/grower end for the restaurant, further impacting the restaurant's ability to plan menu items using local ingredients. Restaurants lack of forecasting and planning further fueled the uncertainty of product demand for producers and growers.

Other: Additional factors that had potentially higher costs included billing and the amount of paper work involved in the number of transactions, due to restaurants requiring smaller amounts of product in each transaction, compared with amounts sold with wholesaler transactions. However, producers were uncertain as to how much this difference in cost would be. Most important, nine of the 10 producers and growers felt that they must differentiate their products in order to maximize their returns from the restaurant market. Several obstacles were noted in this regard, such as a general lack of training to create product differentiation, and of course the additional costs involved in doing so. Communication between growers/producers and restaurants was also cited as an important obstacle that was likely increasing transaction costs. On the other hand, several growers and producers noted that they could charge a price premium to local restaurants. Nine of the 10 growers agreed that restaurants would be willing to or did pay a price premium for their products. Furthermore, sales to restaurants could improve growers' and producers' financial liquidity and improve cash flows.

There were other factors identified by growers and producers as potentially influencing their costs and benefits. Some quotes from respondents are listed by category in table 1.

Table 1. Costs and Benefits of Local Food Value Chain to Restaurants: Respondent Quotes

Value Chain	Costs	Benefits
Production	"Product costs will differ but we don't track those." "Hoop house[s] [are] necessary for most growing. [This would let us] better control…weather [effects]…[improve] yields, [and also allow us to] change crops easily."	
Storage	"[There is also] not much storage." "Potentially [there could be a shortage of] storage space, coolers, [and higher] labor production costs."	
Packaging	"[Restaurants] need product portion controlled." "Cost of processing-cuts, [and] cost of packaging." "Cost of processing, quality of workmanship, and package."	
Marketing	"Restaurants and growers [could] come together and talk, at least [from time to time]…[and] share information [related to] products, prices, timing [of deliveries]." "We seem to be afraid of rejection." "Demand/supply [mis] match [exists]. [For instance], when they need it we don't have it, [and] when we have it, they don't need it."	"Advertising through the restaurant is good. Upper market gets to know us." "[Restaurants can be an] alternative market [so that we are] not totally dependent on farmers' market." "Can't prove that [restaurant sales] does marketing. [Though] can be steady customers if we monitor quality, develop relationships…" "Celebrity chefs…are our spokesmen [for] marketing in general."
Transportation	"[We experience] hard time of on delivery…[that] may be not the same day." "Transport, delivery, coordination, and communication is key, [as is] relationship… because product knowledge is critical for chefs."	
Delivery	"[Restaurants require] services [such as] delivery [of products]- order processing." See additional comments in Transportation. "Delivery costs, [because it] takes time for initial costs [of establishing restaurant clients] and delivery time. [For instance,] asparagus is worth the time but not corn as much, unless they take quantities."	
Others	"[Need to] differentiate the products by name." "Restaurant demand is down in summer when we have more." "Restaurants don't even know what is available, so farmers must provide this information [related to] products, quantities, and prices. [While restaurants] could be a good option… [we need]… some help to provide reliable communication. [For instance] provide internet capabilities for farmers; education capability and network[ing]."	"[Restaurant] could be premium price market [could] take time [to reach that stage]; [restaurants also require] higher volume." "We charge higher to restaurants (10-20 percent) because consumers can pay more." "[I] found it more satisfying to have relationship with buyers… [especially when] something [was] requested. [Also it was] more interesting to grow summer baby squash and deliver to consumers." "[Selling to customers could] solve some cash flow problems." "Could get extra revenue by differentiating price by market, but haven't done so, supply in small community."

1. As noted earlier, restaurants were usually unable to commit in advance for orders. This created uncertainty for the producers, and therefore placed a constraint on planning their production. For instance, some growers commented that advance orders would allow the producers to invest in hoop houses, thereby ensuring that off-season products such as tomatoes and other vegetables would be available.
2. There was a perceived lack of commitment from farmers to sell directly to restaurants. Some of the farmers (producers) interviewed argued, however, that this commitment was also a function of restaurant commitment to purchase from local growers and producers.
3. On the other hand, growers felt that some restaurants (along with their chefs**)** were considerably better than other types of retail food services, such as schools, in offering flexible purchasing policies, allowing growers to increase sales to such restaurants. Surprisingly, the growers who felt this way were also the most active in directly selling locally to local independently owned restaurants.
4. Other growers observed that restaurant chefs needed to be better informed and trained to work with different types of products, allowing growers to market a variety of products.
5. A need was also identified for growers to engage in interactions and establish relationships with restaurant buyers, in order to sell their products.

Discussion

Fewer growers and producers noted higher production and storage costs for selling to local restaurants. There were clearly higher costs to growers for packaging, transportation, and delivery when selling to local restaurants than when selling directly to consumers. Restaurants are used to standard packaging of products; organizational recipes are often written to reflect these units. Thus, in some cases, producers are expected to comply with the current status. In other situations, restaurant chefs and buyers, particularly those that are single-unit and independently owned, are more flexible and willing to showcase local products as part of menu specials or new house recipes. Restaurants that are part of a chain, or institutional food services, are often bound by organizational procurement policies to purchase foods from an approved vendor; thus, there is not the flexibility to procure locally. CSAs often require shareholders to pick up product, thus omitting producer inputs related to transportation and delivery as this cost is borne by the consumer. Farmers' market sales require less expensive packaging (clear plastic bags versus standard food package fiberboard containers, for example) and transportation is limited to one location. The flip side of restaurant purchasing flexibility is lack of commitment to purchasing from local producers. This impacted grower ability to plan effectively. Inability to plan production resulted in inefficient use of production capacity or higher inventories that have to be sold at relatively lower prices or accounted for as wastage, resulting in increased production and inventory storage costs. Thus, the average price that farmers could get from selling locally was lowered. In addition, producers were not clearly committed to the retail food service market, which may have impacted some farm improvement decisions, such as investing in a hoop house to extend the growing season and broaden variety of produce available year round or developing marketing and communication systems specific for a sector of the market. Lack of investments in production technology could also impact potential costs or benefits to the growers. These impacts could influence independent restaurants' decisions to buy from local farmers. There were other reasons for the lack of commitment by growers to further investigate sales to restaurants. For instance, one grower felt that direct marketing was too complicated and they were satisfied simply selling directly to the wholesaler, while others enjoyed the farmers' market and CSA connection to customers. In another instance, the grower did not feel that restaurants were appreciative of local produce, and thus were reluctant to pay a premium. Other studies have found retail food services, most notably institutional sectors such as hospitals, are cautious about purchasing from local producers due to uncertainty about regulations

('Are we allowed to?'), taking extra time to search the market and communicate food specifications to the producer, and considering food safety (Gregoire & Strohbehn, 2002; Starr et al., 2003; Strohbehn & Gregoire, 2003). Most growers also identified benefits of selling to local restaurants, such as price premiums. Further exploration of quantification of the premium and the profit when all input costs are considered is needed to aid producers and restaurants in the decision- making process (Sharma, Gregoire, & Strohbehn, 2009; Strohbehn & Ortiz, 2011). In this study, restaurants were also considered an effective ally in advertising and marketing products to a wider market of consumers, potentially those able to pay a price premium for such products. However, growers expressed a need for increased communications and interactions with restaurants. Such interactions would help growers showcase their products to restaurants. Growers also suggested that a roundtable discussion amongst restaurants and growers would help establish contacts and develop professional relationships.

There are a number of areas where interventions (through community-based regional food systems and government agencies such as the USDA and Cooperative Extension) can play a role in supporting direct marketing of local foods to local food service establishments, such as local independently owned restaurants. This is one sector of the retail food industry with the most flexibility in terms of procurement decisions, unlike federal child nutrition programs or other institutional food services that may serve at-risk clients. Yet all sectors of the food service industry have expressed interest in local foods; for example, the Child Reauthorization Act of 2010 (also known as the Healthy Hunger Free Kids Act) formalized Farm to School programs. Inputs related to ensuring food safety are increasing in importance; some producers may need to comply with new Food Safety Modernization Act standards (fresh produce standards are currently in development), or find that restaurant organizational procurement policies are driving new producer requirements, which may increase their costs. Costs related to GAPs (good agricultural practices) certification or farmer documentation of on-farm food safety practices may be incurred. Independent restaurants have greater flexibility in the procurement process; yet all sectors of the food service industry have expressed interest in local foods. Guidance for both restaurants and producers (buyers and sellers) is needed to address regulation questions, production standards, and third-party certification requirements.

The results of this study suggest in a descriptive manner that support programs related to transportation and delivery activities would likely be the most popular ones to impact producer costs. Other programs that may impact costs involve packaging, marketing, and contracts (Ellis & Strohbehn, 2006). Tools to aid producers in the decision-making process are available (see the Production Calculator Tool at http://www.iastatelocalfoods.org). Outreach education is readily available from most land grant universities through Cooperative Extension, such as the MarketReady Training Program offered by the Food Systems Innovation Center at the University of Kentucky or the University of Nebraska-Lincoln Food Processing Center. Local foods work is also emerging as an interdisciplinary area of inquiry with centers such as the Sustainable Agriculture and Food Systems Center at the Michigan State University and the Leopold Center for Sustainable Agriculture at Iowa State University which coordinate research and projects and disseminate information. Among the factors noted by growers that influenced costs and benefits, it would appear that several types of intervention strategies and programs could help initiate and develop relationships with restaurants and other sectors of the food service establishments in their communities. For instance, what approaches could be used to address sustainability of food production and consumption locally? What appropriate delivery mechanisms are needed, especially in the area of costs and benefits (value chain framework) to approach these unique audiences? As suggested by Thomson, Radhakrishna, Maretzki, and Inciong (2006), the broader context of food system programming at the local level and impacts on regional economies should be further explored.

The findings of this study also offer a myriad of potential opportunities and issues to address

local food systems. These are grouped under educational programming, further research, and policy.

For Educational Programming:

1. Educational programs relative to food systems at the local level should target a new set of audiences such as small growers, restaurant owners, institutional or non-commercial food services, farmers' market groups, etc. Targeting new audiences will broaden focus and outreach at the community level.
2. Workshops emphasizing cost-benefit analysis models for both producers and independent restaurants, as well as noncommercial food services in the local food system, could be offered and evaluated periodically.
3. The need exists for collaborative efforts with local and state agencies, food service establishments including restaurants, and other stakeholders interested in advancing local/regional food systems.
4. Local food system efforts could be integrated with regional economic development and rural entrepreneurship activities, education center curricula, and community health and wellness programs; thus stakeholders concerned about economic, environmental, and social justice could engage in partnerships.
5. The findings of this study have potential for developing educational materials relative to value chain framework and cost-benefit analysis. Restaurant buyers and other food service managers would benefit from knowing the return on investment -in featuring local food items on menus. While limited research has been conducted (Sharma et al, 2009; Strohbehn & Ortiz, 2011), more is needed. Program/information materials should address needs of growers and local service establishments relative to creating awareness and understanding, and aiding in decision-making, which is of vital importance in this era of accountability.
6. Training programs on how to target restaurants and other sectors of retail food services for marketing and selling products should be offered. Producers and growers will find this information useful in marketing and selling their products to restaurants effectively. For instance, chef and manager commitments would be a good beginning, but this information should emphasize to the producer that for a sustainable relationship the restaurant must make local food usage profitable by appropriately planning and marketing menu items. Producers and restaurants should also become conscious of the usual information asymmetry that exists between the two parties. If somehow information sharing can be streamlined and made more available from each to the other, then it is likely that growers and local restaurants may enjoy a more sustainable and long-term partnership.

For Further Research:

The findings of this study based on qualitative research methodology have provided valuable information in understanding grower and producer perceptions of the costs and benefits of direct sales to restaurants, and of the value chain framework. Similar studies should be conducted in other states to identify similarities and differences. In addition, future researchers in this area should consider the use of mixed methods approaches (qualitative and quantitative data collection) to further understand the complex nature of costs and benefits and their relationships to the value chain framework.

For Policy:

These findings should be shared with all stakeholders and decision makers involved in food procurement, particularly community planners and food assistance programs. Local food systems have implications for environmental stewardship, land use, transportation networks, procurement, biosecurity, community development, social justice, and immigrant rights, among other broader community concerns. Such sharing will help make informed decisions relative to local food system policy formation at the local, state, regional, and national levels. Better policy decisions will strengthen direct marketing and selling efforts by growers and producers. This would enhance the marketability of locally grown and produced foods, and potentially improve economic margins of the sellers. Consumers would also have more frequent

choice of a variety of locally grown and produced foods. Research shows that older consumers prefer local foods. Current demographics suggest an increasing number of consumers in this age group. Improved access (and supply) of local foods, particularly in restaurants, would be preferred by this consumer group.

Conclusions

There were clearly higher costs for growers in several components of the value chain process for directly selling produce to restaurants. However, most growers also identified benefits, such as price premiums. Further, growers expressed a need for increased communication and interaction between growers and restaurants, in order to help growers showcase their products to restaurants and restaurant patrons, and further professional relationships.

The research design used in this study with a value chain framework has potential application for the assessment of operating costs and benefits of restaurants and other retail food services. Information for evaluating costs and benefits were found to be extremely fragmented, and the process of doing these evaluations were highly heterogeneous. Qualitative research by nature is richly descriptive, and allows for unique characteristics of local growers and local restaurants to be fully explored. A small sample size and case study approach here provided meaningful findings, more so than attempting large-sample data collection using a "shotgun" approach. Empirical research among producer groups and sectors of retail food services have yielded useful information relative to attitudes and perceived benefits of local food connections (Gregoire & Strohbehn, 2002; Gregoire, Arendt, & Strohbehn, 2005; Strohbehn & Gregoire, 2005). Yet research questions which address "why" and "how" questions can be explored with qualitative approaches, as local food systems engage multiple stakeholders and provide all members of the community with a voice in the process. Even in small sample sizes, investigations can be more focused than attempting to generalize the study findings. In all, research in operational analysis and decision-making processes will find the results of this study useful and relevant.

This study's contributions to the practice of community-based agricultural and food system developments are numerous. The study results offer valuable insights in understanding the processes involved in distribution of produce from farm to the restaurants. Community-based agricultural practitioners and Extension educators can provide a link for better understanding the processes involved in distribution of produce from farm to restaurant. Perhaps a networking group of local food producers and restaurants could be formed to make informed decisions about the processes involved. Such engagement will provide opportunities for building trust, open and honest communicating, determining needs, and reducing uncertainties.

Conversation between local food producers and restaurants could help create dynamic menus that accommodate seasonally grown foods. Such conversations may help local food producers produce fruits and vegetables that have a longer shelf life. In other words, producers can plan ahead of time based on the needs of restaurants. Finally, these findings have shed light on the viability of selling directly from farmers to restaurants. A need exists for a conversation between producer groups and restaurants regarding the costs associated with direct selling. A crucial point here is communication via conversation for mutual benefit.

As stated earlier, the purpose of this research was to conduct a qualitative assessment of costs-benefits associated with selling locally grown and produced foods directly to independent restaurants. This study explored the factors that are critical for local growers and producers to consider when attempting to sell directly to independently owned restaurants. We identify factors that may in the future be quantified for wider generalizability.

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Examining the economic benefits of agritourism: The case of New Jersey

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Abstract

Many small American farms struggle to remain economically viable due to a confluence of global market dynamics, rising costs, and urbanization pressure. Agritourism is an increasingly popular form of alternative agriculture enterprise development designed to expand farm income, generally through fuller employment of existing farm resources. The economic significance of agritourism within the farm community, however, is not well understood. Existing literature is inconclusive about the importance of agritourism as a component of farm income. This paper examines the economic benefits of agritourism, using data from a statewide economic impact assessment in New Jersey. Results show broad

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variability across farm scales in terms of the relative reliance on agritourism as a source of farm revenue. A significant percentage of farms hosting agritourism were found to earn no immediate income from such activities, suggesting that some farmers may be motivated by either nonmonetary or deferred economic benefits from hosting agritourism.

Keywords
agritourism, deferred economic benefits, economic impact, multifunctionality, nonmonetary benefits

Introduction

Many small family farms in the United States struggle to remain economically viable in the face of changing global markets, urbanization pressures, structural changes in the food retailing system, and the perpetual vagaries of weather, diseases, and pests. Confronted with declining profitability, operators of small farms commonly face the options of exiting agriculture, expanding off-farm employment to supplement household earnings, or developing alternative agricultural enterprises (McGehee, 2007; Ollenburg & Buckley, 2007). Agritourism has emerged as one form of alternative enterprise development for a growing number of farmers. Agritourism provides opportunity to increase farm income and diversify product lines, while simultaneously educating the nonfarm public about farming and enhancing community engagement (Busby & Rendle, 2000; Che, Veeck & Veeck, 2005; Ilbery, Bowler, Clark, Crockett & Shaw, 1998; McGehee & Kim, 2004; Mitchell & Turner, 2010; Nickerson, Black & McCool, 2001; Ollenburg & Buckley, 2007; Tew & Barbieri, 2012).

While several authors point to its long history in Europe (Busby & Rendle, 2000; Hill & Busby, 2002; Sharpley & Vass, 2006), agritourism is a relatively new addition to agricultural economic development and policy discourse in the United States. While it is receiving a surge of attention among farmers and scholars, there is presently no standard definition of agritourism, nor is there consensus on the types of activities that constitute agritourism (Carpio, Wohlgenant & Boonsaeng, 2008; Fleischer & Tchetchik, 2005; McGehee & Kim, 2004; Nickerson et al., 2001; Phillip, Hunter & Blackstock, 2010; Schilling, Marxen, Heinrich & Brooks, 2006; Tew & Barbieri, 2012; Veeck, Che & Veeck, 2006). More than a decade ago, Busby and Rendle (2000) identified 13 definitions of agritourism in the literature. Nomenclature intended to reflect the practice of creating farm visitations for educational or recreational purposes is similarly variable, encompassing a range of terms including farm tourism, agritourism, agritainment, agricultural tourism, and rural tourism (Mitchell & Turner, 2010; Phillip et al., 2010).

Defined in the current context as the business of establishing farms as travel destinations for educational and recreational purposes, agritourism encompasses a variety of on-farm activities, including direct marketing (e.g., farm markets and pick-your-own operations), educational activities (e.g., school tours and winery tours), entertainment (e.g., corn mazes and hayrides), outdoor recreation (e.g., hunting and fishing), and accommodations (e.g., bed and breakfasts) (Schilling et al., 2006; Schilling, Sullivan & Marxen, 2007). These activities have attracted the nonfarm public to farms in impressive numbers. Barry and Hellerstein (2004) estimate that 62 million American adults visited a farm at least once between 2000 and 2001.

Beyond noting definitional challenges, over the past two decades various authors have commented on the lack of a coherent and comprehensive body of literature on agritourism development and its impact on farm operations (Busby & Rendle, 2000; Opperman, 1995; Tew & Barbieri, 2012). The characterization and perceptions of agritourism operators (Barbieri & Mshenga, 2008; Sharpley & Vass, 2006; Tew & Barbieri, 2012), gender roles in agritourism (McGehee, Kim & Jennings, 2007; Nilsson, 2002), and farmer motivations for developing agritourism enterprises (McGehee & Kim, 2004; Nickerson et al., 2001; Ollenburg & Buckley, 2007) are areas of inquiry that have received more focused research consideration in recent years. Income generation and diversification potential has been found to be a primary motivation for agritourism development on farms (see, for example, McGehee & Kim, 2004; Schilling et al., 2006); however, some studies have found, perhaps paradoxically, that agritourism income tends to be relatively insubstantial in relation to

total farm income (Busby & Rendle, 2000; Hjalager, 1996; Oppermann, 1995; Sharpley & Vass, 2006). Tew and Barbieri (2012) therefore deem the literature inconclusive in terms of the economic benefits of agritourism. The current dearth of information on the extent of U.S. farmer participation in agritourism and its economic rewards is attributed in large part to aforementioned inconsistencies in terminology and definitions, as well as related data deficiencies (Busby & Rendle, 2000; Carpio et al., 2008; Oppermann, 1995; Phillip et al., 2010).

Tew and Barbieri (2012) point to the existence of nonmonetary benefits of agritourism, primarily in the context of farm family motivations for enterprise development, as another rationale for agritourism development. These include personal entrepreneurial or lifestyle goals, expansion of farm employment opportunities for family members, preservation of rural lifestyle, and social interaction with guests (see McGehee et al., 2007; Mitchell & Turner, 2010). The education of the nonfarm public about agriculture has also been identified as an important impetus behind agritourism development (Alonso, 2010; Barbieri & Mshenga, 2008).

Consideration of existing literature suggests the need for more targeted empirical research to clearly articulate the economic benefits of agritourism in the U.S., particularly at state or regional scales. Using New Jersey as a case study, this article presents a statewide agritourism assessment conducted to better understand the industry's revenue and its distribution across farms of different economic scales. First we examine drivers of industry growth and available statistics on the distribution of agritourism in the United States. Next we describe the framework for the empirical assessment and the implementation of a survey to a random sample of 1,500 New Jersey farmers. We then present and discuss study results on the magnitude of the economic benefits (revenues) realized by New Jersey farmers and differences in the reliance on agritourism across farm scales.

Context for Agritourism Growth in the United States

A convergence of supply- and demand-side factors contribute to the current popularity of agritourism in the U.S. and portend continued growth in this industry (Carpio et al., 2008). From an agricultural perspective, farmers face challenges to their sustained economic viability due to increasingly global competition in domestic and export markets, and ensuing price uncertainties (Dimitri, Effland & Conklin, 2005). Farmers in many regions also face urbanization pressures that divert land from production agriculture, raise farmland prices, fragment the farmland base, and lead to less farm-friendly business environments (Berry, 1978; Lopez, Adelaja & Andrews, 1988; Schilling, 2009). However, the urbanization of rural areas also brings potential opportunities for new alternative agricultural enterprises and market access. Agritourism is a particularly attractive economic growth and diversification strategy because it allows farmers to generate additional income from existing farm assets (land, labor, and machinery) that may be underutilized or idle for significant periods of time, moderates seasonal fluctuations in farm cash flow, and expands on-farm employment opportunities for family members (Barbieri, Mahoney & Butler, 2008; Schilling et al., 2007; Tew & Barbieri, 2012).

On the demand side, American consumers are expressing greater preference for local food purchasing options and reconnecting to an agrarian heritage from which most are now several generations removed (Alonso, 2010; Kortright & Wakefield, 2011; Martinez, et al., 2010; Veeck et al., 2006). The term "locavore" has recently entered the common vernacular as many Americans shorten their food supply chains by patronizing farmers' markets, joining community supported agriculture enterprises, or expanding home gardening. These activities offer consumers the ability to rekindle their connection to food production, while blending recreational and educational experiences.

Support for the growth of agritourism also stems from its ancillary economic and nonmarket benefits. Although not well quantified in the literature, agritourism is often cited as a rural economic development strategy as it generates direct economic opportunities for other businesses within a local economy (Tew & Barbieri, 2012). As a multifunctional resource, farmland supports

production of various food, fiber, and other market-based goods and services. It also confers rural amenities and other positive externalities not fully valued in private markets (Abler, 2004; Batie, 2003; Hellerstein et al., 2002). Examples include exposure to agrarian culture, scenic views, ecosystem services (e.g., wildlife habitat, and air and water recharge areas), and outdoor recreation options. Properly developed agritourism operations provide an opportunity for the public to access these amenities, which are especially valued as a contrast to the undesired accompaniments to urbanization (e.g., congestion, noise, pollution, and the homogeneity of built landscapes).[1]

Agritourism in the Northeastern United States

Carpio et al. (2008) summarize estimates of annual agritourism income in the U.S. that vary widely, from USD800 million to USD3 billion. The National Agricultural Statistics Service (NASS) began collecting information on "recreational services" under the section on "income from farm-related sources" in the 2002 Census of Agriculture. Examples provided in the census form instructions included only hunting and fishing. In the 2007 census, the inquiry was expanded to include income from "agri-tourism and recreational services." Specific examples provided were farm or winery tours, hay rides, corn maze fees, hunting, and fishing. This expansion of the definition limits comparability of data between the two census periods.

The 2007 Census of Agriculture reports that 23,350 U.S. farms offer agritourism, earning USD566.8 million from these activities (USDA-NASS, 2009). The authors of this paper argue that NASS's agritourism statistics provide only a partial perspective on the extent of such activities in the U.S. farm sector due to the rather narrow definition employed. Significantly, in each of the last two censuses, the value of farm products sold through direct marketing was enumerated separately from agritourism and recreational services income.[2] Further, the authors' experience with previous agritourism research (Schilling et al., 2006) suggests that farmers do not readily identify with the term "agritourism" and may not associate their agritourism activities with that label.

Despite these limits, the Census of Agriculture provides a useful perspective on the current geographic distribution of agritourism in the United States. The most recent census data show that a disproportionately high concentration of direct marketing and agritourism activity is centered in the northeastern region of the U.S. Whereas that region produces less than 5 percent of total national farm revenue, it accounts for more than one-quarter of farm direct marketing sales and nearly 14 percent of agritourism income (table 1). All nine northeastern states rank significantly higher in direct marketing sales as compared to their respective ranks based upon total farm sales. In all but three northeastern states (Maine, Rhode Island and Vermont), national rankings based on agritourism revenue are higher than their respective ranks by total farm sales.

The importance of direct marketing and agritourism in the Northeast is more starkly shown by the percentage of total farm income derived from these activities (table 2). In 2007, the shares of farm revenue derived from agritourism and direct marketing in the Northeast were 0.56 per-

[1] Ryan and Walker (2004) find that the dwindling open spaces and natural landscapes in more urban regions of the country are often under private ownership (see, also, Lindsey and Knaap, 1999). Farms are an increasingly important component of existing and planned trail or greenway networks. In New Jersey, for example, recent years have witnessed increased coordination between the state's open space and farmland preservation programs for the purpose of expanding and interconnecting greenways and stream corridors to fulfill environmental goals and provide nature recreation opportunities.

[2] A more complete enumeration of the prevalence and magnitude of agritourism arguably could be achieved through summation of agritourism and direct marketing data collected in the Census of Agriculture. However, farm direct marketing statistics suffer, in the authors' opinion, from two deficiencies when viewed for such purposes. First, the data reflect only farm products sold "directly to individual consumers for human consumption" and exclude a range of ornamental products (for example, nursery stock, flowers, Christmas trees) that are significant components of agriculture in many states, particularly New Jersey. Second, the data include direct marketing income derived from the sale of farm products through off-farm venues (e.g., community farmers' markets), which are not included in most definitions of agritourism.

Table 1. Agritourism and Direct Marketing Income in the Northeast: Ranks Among Coterminous States (2007)

State	Income from Agritourism & Recreational Services (USD1000)	National Rank	Income from Direct Marketing of Farm Products (USD1000)	National Rank	Total Farm Sales (USD1000)	National Rank
Connecticut	8,582	18	29,752	13	551,553	44
Maine	1,012	44	18,419	23	617,190	42
Massachusetts	5,306	33	42,065	9	489,820	46
New Hampshire	2,316	41	16,021	25	199,051	47
New Jersey	24,700	4	30,106	12	986,885	40
New York	17,985	7	77,464	2	4,418,634	26
Pennsylvania	14,926	11	75,893	3	5,808,803	20
Rhode Island	689	48	6,292	41	65,908	48
Vermont	1,490	42	22,863	17	673,713	41
United States	566,834		1,211,268		297,220,489	
Northeast	77,006		318,875		13,811,557	
Northeast States as % of U.S.	13.6%		26.3%		4.6%	

Source: USDA-NASS, 2007 Census of Agriculture.

cent and 2.31 percent, respectively. Comparable figures for the United States are 0.19 percent and 0.41 percent. Individually, the Northeast states rank ahead of all other U.S. states in terms of the percentage of farm income derived from direct marketing. While relatively low, the proportion of income derived from agritourism and recreational activities also tends to be higher among northeastern states than in other regions of the U.S. New Jersey ranked first among the coterminous 48 states in the percentage of farm revenue generated from agritourism (2.5 percent).

Table 2. Relative Reliance on Agritourism and Direct Marketing Income in the Northeast: Ranks Among Coterminous States (2007)

State	% of Total Farm Sales from Agritourism & Recreational Services	National Rank	% of Total Farm Sales from Direct Marketing of Farm Products	National Rank
Connecticut	1.56	2	5.39	4
Maine	0.16	24	2.98	7
Massachusetts	1.08	5	8.59	2
New Hampshire	1.16	4	8.05	3
New Jersey	2.50	1	3.05	6
New York	0.41	13	1.75	8
Pennsylvania	0.26	17	1.31	9
Rhode Island	1.05	6	9.55	1
Vermont	0.22	20	3.39	5
United States	0.19		0.41	
Northeast	0.56		2.31	

Source: USDA-NASS, 2007 Census of Agriculture.

Evaluation Framework and Study Methods

Evaluation Framework

The preceding review of existing research proffers that agritourism development can be beneficial to farmers, farm visitors, and communities. A broad categorization of these benefits is summarized in table 3. For farmers, an obvious benefit of agritourism is the potential for additional revenue. However, past research has uncovered other motives for offering agritourism, including entrepreneurism, expansion of family farm employment, and strong desires to maintain agrarian lifestyles (Nickerson et al., 2001; Ollenburg & Buckley, 2007; Tew and Barbieri, 2012). Interview-based research

Table 3. Benefits of Agritourism

Farmers	Farm Visitors	Community
• Revenue enhancement and diversification • Public engagement and education about agriculture • Expansion of on-farm employment opportunities for family members • Fulfillment of entrepreneurial goals • Maintenance of rural/agrarian lifestyles	• Exposure to rural amenities • Recreation outlets • Connection to food production and agrarian culture • Maintenance of local food production	• Economic development and diversity/jobs/taxes • Preservation of farm-based rural amenities • Management of disamenities of nonagricultural development • Retention of cultural and historic values • Defined sense of place/local identity

with New Jersey farmers also suggests a willingness to engage in agritourism without immediate financial gain due to a belief that public engagement pays dividends in the long term through, for example, the fostering of a more favorable political or local business climate (Schilling et al., 2006).

The demand-side (consumer) drivers of agritourism growth were previously summarized. As most Americans continue to drift farther away from their agricultural heritage, the novelty of reconnecting with rural lifestyles, experiencing farm amenities, engaging in farm-based recreational opportunities, and learning about food production is an attractive departure from a more urban existence. The significant value the American public places on farm-based amenities, many of which are public goods not appropriately valued in private markets, has been the subject of extensive research for more than two decades (see Bergstrom & Ready (2011) or Hellerstein et al. (2002) for excellent reviews). The retention of farming through farmland preservation, differential taxation programs, legal (right-to-farm) protections, agricultural economic development initiatives, and other public interventions has been rationalized largely on the basis of food security, growth management, and the perpetuation of rural amenities (Hellerstein et al., 2002). If agritourism can make farms more economically viable and sustainable, it contributes positively to the advancement of these same public goals.

The last broadly defined beneficiary of agritourism is the community to which the activity is linked. Many authors note the economic multiplier effects of agritourism, namely the impact on other local businesses, local employment, and tax revenues.[3] The preservation of rural amenities, as well as historic and cultural values, also contributes to the desirability of a community to potential residents and businesses by creating a sense of place (Adelaja, Hailu, Wyckoff & Bailey, 2008). Through its contribution to farm retention, agritourism similarly helps communities manage or limit disamenities that may be associated with uncontrolled development (e.g., congestion, pollution, loss of scenic viewscapes).

Study Methods

Our study objective is to measure total statewide agritourism revenue earned by farmers in New Jersey, a state in which census of agriculture data suggest such activities are occurring to a significant extent. The study population was defined as all New Jersey farms. A random sample of 1,500 New Jersey farm operations, stratified by sales class, was selected from the National Agricultural Statistics Service list frame of farms active in the beginning of the 2007 calendar year. The decision to survey the general farming population served to avoid the difficulties of drawing a random sample from a poorly defined population of farms with agritourism.[4] This approach allowed the study team to

[3] Das and Rainey (2010), based on their assessment of agritourism impacts in Arkansas, question the job-generation impacts of agritourism due to the industry's reliance on family labor.

[4] Veeck et al. (2006) note the challenge of making generalizations about a given population of agritourism operations because of the diversity of operations encompassed, but also due to the lack of firm population characteristics necessary for drawing a representative, random sample. In the context of their study in Michigan, they state "no determination can be made of exactly how many family farms engage in agritourism

establish the prevalence of agritourism within the New Jersey farming community and have the statistical power needed to make an informed estimate of its direct economic contributions to the farm economy.

The questionnaire was developed jointly by the study team and NASS staff members and was modeled after agritourism economic impact assessments conducted by NASS in Vermont in 2000 and 2002 (New England Agricultural Statistics Service, 2004). The survey comprised nine substantive questions. Six were open-ended questions (acreage of the farm operation and revenues earned in each of five categories of agritourism activity), two questions contained categorical responses (the percentage of farm income earned from agritourism and farm sales class), and one question had a dichotomous response scale (was the farm engaged in agritourism?). All questions directed respondents to focus on the 2006 production year.

The survey defined agritourism broadly as *the business of establishing farms as travel destinations for educational and recreational purposes,* consistent with policy language promulgated by the New Jersey Department of Agriculture and previous statewide research by Schilling et al. (2006). Five broad types of agritourism activity were defined:

- On-farm direct-to-consumer sales of agricultural products (e.g., pick-your own, U-cut Christmas trees, on-farm markets);
- Educational tourism (e.g., school tours, winery tours, farm work experiences);
- Entertainment (e.g., hay rides, corn mazes, petting zoos, haunted barns);
- Accommodations (e.g., birthday parties, picnicking, bed and breakfasts); and
- Outdoor recreation (e.g., horseback riding, hunting, fishing, hiking, bird watching).

The exclusion of off-farm agriculturally themed venues (for example, community farmers' markets, county farm fairs, and living history farms) was predicated on the increasingly prevalent position in the academic literature that agritourism is defined by its link to a working farm (Phillip et al., 2010; Barbieri & Mahoney, 2009).

The questionnaire was mailed to the random sample of farms by the New Jersey Field Office of the National Agricultural Statistics Service between April and July 2007. A modified Dillman method was employed. Data collection consisted of two survey mailings and telephone follow-up prompts (Dillman, 2007). A total of 1,043 completed surveys were returned, yielding a response rate of 69.5 percent. The relatively high response rate for a survey soliciting information on farm financial characteristics is attributed to NASS's credibility within the farming community and the agency's safeguards to ensure the confidentiality and anonymity of survey participants.

Descriptive statistical analysis was conducted in SAS to evaluate the distribution of agritourism activity across size classes within the sample of farms participating in the study. Chi-square tests of independence were used to evaluate associations among categorical data. Inferences to the population of New Jersey farms (e.g., total industry wide agritourism revenue) were made through use of expansion factors.[5]

Results

Prevalence and Distribution of Agritourism Activity Across Farm Sizes

Descriptive analysis revealed that 21 percent of New Jersey farms offer some form of agritourism in 2006 (table 4). Participation in agritourism activities was found to vary across farm sizes, as defined by sales volume. For ease of presentation, results are summarized for two size classes of farms: (1) farms earning at least USD250,000 in

activities" (p. 241). Admittedly their study predated the release of the 2007 Census of Agriculture, which for the first time collected data on agritourism. But for the reasons previously stated in this paper, the authors maintain that census data do not reflect fully the population of agritourism operators, thereby resulting in a continued lack of certainty when developing sampling frames.

[5] Expansion factors were derived for each stratum by dividing the strata population sizes by strata sample sizes. These expansion factors were developed in conjunction with NASS so that the summation of expanded data for all sampling units is the direct expansion estimate of the population.

Table 4. Involvement in Agritourism by Farm Sales Class (2006 Data, New Jersey)

Farm Size (Gross farm sales)	Percent of Farms Reporting Agritourism	No. of NJ Farms in Sales Class[a]
All Farms	**21.5**	**10,327**
More than USD250,000	38.0	686
Less than USD250,000	20.4	9,641
USD100,000 to USD249,999	21.7	923
USD50,000 to USD99,999	25.5	462
USD10,000 to USD49,999	28.7	1,764
< USD10,000	17.0	6,954

[a] Source: USDA-NASS (2009).

farms suggests its importance within the economic heart of the state's farming industry.

Statewide agritourism revenue was estimated to be USD57.52 million in 2006. As a point of reference, reported farm sales in New Jersey totaled USD986.9 million in 2007 (USDA-NASS, 2009). Agritourism revenue was split nearly evenly between farms earning at least USD250,000 in farm income and those earning less (table 5). Agritourism revenue averaged USD17,870 (n = 153, SD = USD53,992) for small agritourism farms; the 95 percent confidence interval is [USD9,246, USD26,494].

Table 5. Reliance on Agritourism as a Source of Farm Income, by Farm Sales Class, New Jersey

Farm Size (Gross Sales)	No. of Farms in Sample	Pct. of Farm Income from Agritourism[a,b]				Avg. Agritourism Revenue per Farm[a,c]	Estimated Total NJ Agritourism Revenue
		0%	1–49%	50–99%	100%		
< USD250,000 (Small farms)	189	17%	25%	17%	40%	USD17,870	USD28.47 million
USD250,000+ (Large farms)	25	32%	60%	0%	8%	USD191,607	USD29.05 million
All Farms	214	19%	29%	15%	36%	USD33,382	USD57.53 million

[a] Frequencies and means are based on a sample of 214 New Jersey farms reporting some form of agritourism.
[b] Percentages may not add to 100% due to rounding error.
[c] Means are calculated only for farms reporting revenue from agritourism.

annual sales (defined by the USDA as "large scale" farms and referred to in this paper as "large farms") and (2) farms earning less than USD250,000 (defined by the USDA and referred to in this paper as "small farms").[6]

Large farms were 1.7 times more likely (38 percent compared to 20 percent) to report hosting agritourism than small farms. A Chi-square test of independence confirms that this difference is significant at the 5 percent level ($\chi^2 = 8.82$, df = 1, $p = .003$). This finding is noteworthy since farms in the USD250,000+ sales class account for less than 7 percent of New Jersey farms, but generate 84 percent of the state's total farm industry revenue. The prevalence of agritourism in this size class of farms suggests its importance within the economic heart of the state's farming industry.

For large agritourism farms, mean agritourism revenue was USD191,607 (SD = USD224,348); however, the small sample size (n = 15) resulted in a wide 95 percent confidence interval [USD67,366, USD315,847].

Reliance on agritourism income (measured as a percentage of total farm income) differed markedly across farm sizes. Small agritourism farms were 5 times more likely (40 percent versus 8 percent) to earn all of their farm income from agritourism activities than large agritourism farms ($\chi^2 = 9.89$, df = 1, $p = .002$). Similarly, small agritourism farms were 7.2 times more likely (57 percent versus 8 percent) to report deriving at least 50 percent of their total farm income from agritourism than large agritourism farms ($\chi^2 = 21.82$, df = 1, $p < 0.001$).

[6] Small farms reporting agritourism activities are herein referred to as "small agritourism farms." Large farms reporting agritourism are referred to as "large agritourism farms."

Table 6. New Jersey Agritourism Revenue, by Type of Activity (2006)

Type of agritourism activity	Percent of farms with agritourism revenue that offer activity	Statewide revenue (USD millions)	Percent of total agritourism revenue
On-farm sales of agricultural products	92.3%	40.54	70.5%
Outdoor recreation	11.9%	9.19	16.0%
Entertainment	6.5%	5.42	9.4%
Educational tourism	7.1%	1.88	3.3%
Accommodations	3.6%	0.50	0.9%
Total	N/A	57.53	100.0%

Sources of Agritourism Revenue

Table 6 decomposes estimated agritourism revenue by activity. The most common activity reported by New Jersey operators is on-farm direct marketing, which was offered by 92 percent of agritourism operators and accounted for 70 percent of all agritourism revenue. Farm retail markets, pick-your-own produce operations, U-cut Christmas tree farms, and community supported agriculture enterprises are examples of common farm direct marketing businesses.

The authors acknowledge that there is no consensus on the inclusion of direct marketing as a subset of agritourism. Its inclusion in this assessment is based on the view that on-farm direct markets are experiential, often comprising educational and recreational elements. While consensus is also lacking on an exact definition of "local," there is little ambiguity over the growing consumer demand for local food systems (Martinez et al., 2010).[7] This consumer interest has multiple roots, including demand for product freshness, concerns over food safety or the environmental impacts of food production and distribution, and a desire to support local farmers and contribute to farm retention (Dukeshire, Garbes, Kennedy, Boudreau & Osborne, 2011). Farm-direct marketing affords American consumers the opportunity to reconnect with the source of their food and agrarian culture. This concept is embodied in the USDA *Know Your Farmer, Know Your Food* campaign, which is designed to strengthen farmer-consumer connections and redevelop local and regional food systems.

Outdoor recreational activities were offered to the public by 12 percent of New Jersey agritourism farms and accounted for 16 percent of total agritourism revenue. As the amount of open space and natural landscapes dwindle, opportunities for farmers to offer fee-based or free hunting, fishing, birding, hiking, horseback riding, and other forms of passive or active outdoor recreational pursuits will continue to grow. Entertainment activities (common examples include hay mazes, hayrides, petting or looking zoos, and haunts) are often most synonymous with the public image of agritourism. Interestingly, fewer than 7 percent of agritourism farms engaged in entertainment activities, and this category of agritourism represented 9 percent of total revenue. Educational tourism, comprising farm tours for schoolchildren and the general public, winery tours, and to a lesser extent farm work experiences, was reported by seven percent of agritourism operators. These activities accounted for only three percent of state agritourism revenue. Larger tours (for instance, tours for schoolchildren designed to advance core curriculum standards) are generally fee-based. However, interviews with farmers reveal that some provide free farm tours to legislators or community members as a means to facilitate awareness and understanding of their operation and broader industry issues. Lastly, farm accommodations accounted for less than one percent of agritourism revenue in

[7] Martinez et al. (2010) note considerable variability in geography-based definitions of local. Vermont state law defines local as originating within 30 miles (48 km) of the point of product sale. The 2008 farm bill defines a local food product more liberally as one that is transported less than 400 miles (644 km) of its origin within only the state within which it is produced.

New Jersey and often comprise low or no-fee picnicking options or special event hosting (e.g., birthday parties). Overnight accommodation (e.g., bed and breakfast operations) is presently uncommon on New Jersey farms.

Evidence of Agritourism Operators' Nonmonetary Motivations and Expectations of Deferred Economic Gains?

Survey data revealed that 19 percent of farms engaged in agritourism during 2006 did not earn revenue from these activities. Large agritourism farms were more likely than small agritourism farms (32 percent versus 17 percent) to not earn revenue directly from agritourism activities ($\chi^2 = 3.01$, df = 1, $p = 0.083$). These results raise the question, why would a business invest in the development of an activity that does not yield a positive return on investment? In some instances, agritourism may be perceived by farmers as a cost of doing business, something offered to satisfy customer expectations regarding the farm experience or connectivity to the farmer. However, past studies provide evidence that farmers are also motivated by nonpecuniary benefits that relate to their personal or familial circumstances (see, for example, McGehee & Kim, 2004; Tew & Barbieri, 2012). Farmers' interest in educating the nonfarm public about farming and agricultural issues is also well established as a motivation for farm-based tourism development (McGehee et al., 2007; Nickerson et al., 2001; Tew & Barbieri, 2012). Past research is surprisingly silent, however, regarding the farmers' purpose for public education.

Educational interactions with customers may confer benefits to agritourism operators if, for example, they reduce conflicts with nonfarm neighbors, spur demand for local farm products, or strengthen public support for farm retention. Our survey found that 43 percent of New Jersey's farmland acreage (more than 300,000 acres or 121,000 ha) is associated with farms offering agritourism.[8] Agritourism farms therefore represent a significant exposure point for residents to learn about farming. They also allow nonfarmers to experience the multifunctionality of agricultural lands, a well established basis underlying public support for farm retention (Hellerstein et al., 2002; Kline & Wichelns, 1994, 1996; Matthews, 2012). In fact, Adelaja, Colunga-Garcia, Gibson & Graebert (2009) argue that the continuation of public funding for farmland preservation will be predicated largely upon the farm sector's ability to satisfy the plurality of interests that nonfarm residents maintain in farms and farmland. Whether agritourism effectively influences public support for farm retention, and the extent to which farmers' decisions to develop agritourism enterprises are motivated by goals associated with positive public relations, are interesting issues worthy of further research.

Discussion

Agritourism data from the census of agriculture suffer from limited scope and longitudinal perspective, but do document national growth in this sector. Agritourism development is particularly advanced in many northeastern states, where urbanization pressures have combined with macroeconomic and global factors over recent decades to steadily transform agricultural regions. Previous studies examining farmer motivations for engaging in agritourism conclude that both economic and non-economic factors motivate farmers to develop agritourism enterprises. Despite its growing popularity as an agricultural and rural community economic development strategy, the economic benefits of farmer participation in agritourism remain poorly quantified in the United States.

Economic motives are cited as a common reason farmers establish agritourism activities on their farms; however, some past research has reached the paradoxical conclusion that agritourism does not contribute substantially to farm revenue (see, for example, Busby & Rendle, 2000; Oppermann, 1995). Tew and Barbieri's study of Missouri agritourism operations, for example, found that agritourism did not contribute to farm

[8] Recall that roughly one in five New Jersey farms offers agritourism. The much higher percentage of farmland operated by agritourism farms results from the fact that, on average, agritourism farms are significantly larger than non-agritourism farms; 150 acres (61 ha) and 71 acres (29 ha), respectively ($p = .045$).

income in 62 percent of cases examined; however, their definition excluded farm direct marketing as a subset of agritourism. Our study demonstrates that the economic contributions of agritourism to farm income are, in fact, quite variable and suggests several potential types of motivations for its development. For some farmers, agritourism is a primary source of farm income, while for others it supplements income from traditional production. Like Tew and Barbieri, our research also identified many farmers who do not earn income from their agritourism enterprises.

Our survey found that 51 percent of New Jersey agritourism farms earned at least half of their farm income from agritourism; 36 percent earned all of their income from agritourism. Farms earning a majority of their income from agritourism tend to be smaller in scale. This propensity is also evidenced by the fact that, nationally, small farms account for only 14 percent of the value of farm products sold by U.S. farmers, but 54 percent of agritourism receipts and 57 percent of farm direct marketing revenue (USDA-NASS, 2009). Small farms often find it challenging to compete effectively in increasingly global markets (Dougherty & Green, 2011). They also tend to have less access to domestic wholesale marketing channels due to the consolidation of food retail activity among large firms that rely on 52-week supply chains. These factors, coupled with an inability to achieve the economies of scale necessary to offset high fixed costs (e.g., farmland and equipment acquisition) force many small farms to intensify production, find higher margin market channels, or develop alternative farm enterprises.

Any discussion of the economics of agritourism among "small farms" needs to be tempered by the reality that this farm typology encompasses several inherently different motives for farming. For example, 93 percent of New Jersey's farms are small farms, of which the USDA's Economic Research Service classifies two-thirds (66 percent) as either retirement farms or residential/lifestyle farms (USDA-NASS, 2009). Census of Agriculture data further show that while these small-farm operators may look to farming as a supplement to household wages or retirement income, it rarely contributes significantly to total household income. Fewer than one-third of New Jersey's residential/lifestyle farms reported positive net cash flow from farming in 2007. In these cases, income may be a less consequential motive for farming than the enjoyment of a rural lifestyle. Revenue from agricultural production may only offset farm ownership and maintenance costs (for example, by generating agricultural revenue sufficient to qualify land for the tax benefits afforded by differential assessment). In contrast, small-farm operators for whom farming is a primary occupation (particularly those earning at least USD100,000 in farm revenue) are more driven by a profit motive.

The economic viability of small farms can therefore not be predicted based solely upon the magnitude of farm income generated, but rather by the extent to which farming income enables farm households to meet their varied financial objectives. Our study shows that agritourism is often a significant contributor to small-farm income and an important part of the equation for small-farm viability in New Jersey. This observation has important implications for individual farm operators, but also has broader social importance. While small farms are not a major contributor to total farm sales in the state (only about 16 percent), they control 61 percent of the state's farmland base. By contributing to the economic well-being of small farms, agritourism also contributes to the retention of substantial farmland resources and therefore the preservation of associated rural amenities.

Our study found that nearly four out of 10 large New Jersey farms engaged in some form of agritourism, but that they tended to be less reliant on agritourism as a percentage of total farm income. In fact, 92 percent earned less than half of their farm income from agritourism. More interesting is the fact that 32 percent of large agritourism farms did not earn income from agritourism activities. Reflecting the noted lack of uniformity in definitions, some past studies have defined agritourism in a manner that separates direct marketing activities (e.g., farm stands) from educationally or recreationally based activities. However, our economic impact assessment explicitly included

on-farm direct marketing under the definition of agritourism. The finding that nearly one third of large agritourism farms (and 19 percent of all agritourism farms) do not earn agritourism revenue cannot therefore be explained in this manner.

As previously discussed, farmers recognize nonmonetary values of agritourism that serve as motivators for alternative enterprise development. Rather than immediate monetary gain, motivation for developing agritourism may be found in fulfillment of entrepreneurial goals, needs for social contact, rural lifestyle pursuits, and expansion of employment opportunities for farm family members. Accounts from New Jersey farmers reveal additional benefits from agritourism that may confer deferred economic benefits (Schilling et al., 2006). For example, as a pragmatic matter, the allowance of non–fee-based hunting may reduce farm expenses associated with culling wildlife or revenue losses from crop damage caused by wildlife. Past research also identifies public education as a common impetus behind agritourism development; however, as previously noted the intended purpose of such interactions remains unclear. Interviews with New Jersey farmers suggest that such interaction may result in benefits accruing at the individual farm and industry levels. At the farm level, inviting the public onto farms facilitates messaging about the quality, freshness, safety, and environmentally beneficial nature of local food sourcing. It also provides farmers with customer feedback and insight on local demand for various products needed to appropriately tailor marketing efforts.

More broadly, New Jersey agritourism operations (particularly larger operators) recognize the importance of garnering sociopolitical support for farming as an industry (Schilling et al., 2006). As a case in point, public support for farmland retention has been amply revealed through the passage of 11 funding referenda since the early 1960s and the adoption over the past two decades of more than 330 local dedicated property taxes. State funding referenda in 2007 and 2009 were passed despite a climate of dramatic economic decline and fiscal austerity. Through the end of 2011, USD1.5 billion in public expenditures have supported fee simple and easement acquisition programs. Farmers attest that direct farmer-customer (voter) interaction is an effective tool for farming advocacy.[9]

The 2006 research also showed agritourism operators' interest in improving relations within their communities. Compounding the direct economic challenges that urbanization pressures impose upon the agricultural industry are the shifting sociopolitical and demographic conditions that often result in conflicts between farmers and new nonfarm neighbors. From a farmer's perspective, such conflicts may include trespass, vandalism, crop damage or theft, and livestock harassment. Nonfarm residents may object to undesirable realities of commercial farming, including odors, noise, dust, and application of fertilizers or other chemicals. Tensions between farmers and residential neighbors can rise to the level of legal conflict over perceived nuisances, or the passage of regulations that are less sensitive to the needs of the farming community. Often dubbed "right-to-farm" issues, these legal conflicts can be costly and emotionally disruptive to both parties.

The field of psychology offers the "contact hypothesis," which predicts that intergroup contact and communication may foster greater mutual acceptance and tolerance between groups constituting majority and minority social positions (Allport, 1954). Application of this theory in the agritourism context suggests that interactions between farmers and nonfarmers in a positive environment may contribute to a culture of understanding and mutual respect for the concerns of each party. That is, rather than relating as antagonists in a legal dispute or policy formation process, these actors can interact in a more mutually rewarding product/service provider-customer relationship. The extent to which farmer engagement in agritourism is consciously motivated by the objective of preempting or mitigating right-to-farm problems requires further investigation, as do the conditions influencing the efficacy of agri-

[9] In less formal interviews, farmers allowed that the public outcry over a 2008 gubernatorial proposal to eliminate the state department of agriculture was amplified as a result of direct interaction with farmers.

tourism as a strategy for building positive community relations.

Conclusions

While not a panacea for the issue of American farm viability, there is converging statistical and anecdotal evidence that agritourism is an important opportunity for farmers, especially those operating at the urban fringe, to increase their viability. Agritourism may bolster the profitability of small family farms, and help communities retain the economic, employment, resource stewardship, and lifestyle benefits conferred by farms. Busby and Rendle (2000), however, note the absence of national studies examining the growth of agritourism. This paper was motivated by this gap in the literature and examines the economic significance of this emerging industry in a leading agritourism state.

Our research shows that the economic benefits of agritourism do not accrue equally across all farm size classes, suggesting that these activities fulfill different objectives or motivations within farm business models. Our study also reveals that a significant number of New Jersey farmers offer agritourism without charge. This observation highlights the need for further research on the non-monetary motivations farmers have for developing agritourism enterprises. For example, whether farmers offer agritourism with the expectation that it effectuates good public relations or support for farm retention policy is a particularly intriguing research question. A companion inquiry is whether agritourism *actually* accomplishes these objectives.

As the amount of rural land dwindles in the nation's most urbanized regions, agritourism farms will become an increasingly important access point for nonfarm residents to enjoy rural amenities, recreation opportunities, and ecosystem values. Agritourism may become the *de facto* "face" of agriculture in many locales where farming has been displaced as a dominant part of the economic or physical landscape. Beyond protecting local capacity for food and fiber production, interest in retaining the social, environmental, and cultural benefits of farms is an important factor behind public commitments to farm retention. Properly developed agritourism enterprises can serve to reinforce this interest as they provide venues for educating the public about agricultural issues, fostering positive community relations, and exposing individuals to the multifunctional benefits of farms.

A farmer's success in reaching goals defined for an agritourism enterprise will depend upon many factors, including target market characteristics, the farm's natural or cultivated endowment of amenities, and the farmer's own entrepreneurial and business skills. Cooperative extension educators and other agricultural professionals can play an important support role as farmers transition to farm-based recreation, education, or marketing. A Northeast Sustainable Agriculture Research and Education (NESARE) professional development grant is supporting programming in the areas of marketing and risk management to help farmers meet the challenges arising when farmers shift from a production-wholesale business to one focused on retail, service, and hospitality.

Effective marketing, including product definition, pricing, and promotion, is an essential element of agritourism success. Yet marketing is commonly cited as being among the most significant business impediments reported by agritourism operators (Ryan, DeBord & McClellan, 2006; Schilling, et al., 2006). Resources are needed to help farmers more clearly elucidate the amenities and services composing their agritourism enterprises. Agritourism is experiential, and the farm experience is multifaceted. It includes, for example, the friendliness and customer-service orientation of the farm proprietor and employees, the type of rural amenities and activities customers encounter, and the safety and visual appeal of the farm. To enhance the positive public engagement value of agritourism, there needs to be harmonization between the products farmers think they are providing, and those the customer is consuming.

A second area of programming supported by the NESARE grant is agritourism risk management. Farmers acknowledge the importance of ensuring farm visitor safety and managing legal liabilities associated with farm visitations (Schilling, et al., 2006). Farmers require guidance on strategies to reduce, transfer, and/or insure against the heigh-

tened legal exposure that accompanies agritourists (Centner, 2009). Cooperative extension and other agricultural service providers can provide valuable insights on conducting farm safety inspections, planning for on-farm emergencies, and adopting best practices for specific agritourism activities. Resources on enterprise budgeting and financial analysis of agritourism alternatives can similarly help farmers manage financial risk.

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Surveying agrifood stakeholders to identify priorities as part of a Virginia food system assessment

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Abstract

Throughout Virginia there are a multitude of social, environmental, and economic challenges facing farmers and communities. In 2010 and 2011, an interdisciplinary team of faculty, practitioners, and graduate students collaborated to address these challenges through the creation of the Virginia Farm to Table Plan. As part of the plan, the team completed a comprehensive food system assessment. Comprehensive food system assessments use qualitative and quantitative methodologies to analyze the systematic nature of a local, state, or regional food system to address the interactions of food with social, environmental, and economic concerns. The overall purpose of this article is to present the results of an online survey of Virginia agrifood system stakeholders that investigated their priorities for strengthening Virginia's local and regional food systems. A total of 1,134 Virginia respondents completed the online survey.

Respondents were asked to rank 34 items in four major categories in terms of their level of importance for strengthening Virginia's food systems. Respondents rated increasing the "understanding by government officials of the economic, environmental, and social issues surrounding local food systems" as the most important priority among all of the items listed. The category with the most highly rated items was "food system planning, management, and policy." This survey provided key information for developing the Virginia Farm to Table Plan.

Keywords
community food systems, comprehensive food system assessment, food system planning, survey, Virginia

Introduction

Throughout Virginia, there are a multitude of social, environmental, and economic challenges facing farmers and communities. Many of Virginia's 47,000 farms, particularly its small and midlevel farms, are struggling to maintain market share and profitability (United States Department of Agriculture, 2010). In 2007, 53 percent of Virginia farms reported a net loss from their farming operations (United States Department of Agriculture, 2009). Coupled with suburban expansion, these economic conditions resulted in a loss of over 520,000 acres (210,000 hectares) of farmland across the state between 2002 and 2007 (United States Department of Agriculture, 2009). In addition to economic struggles for producers and loss of farmland, many individuals and communities throughout Virginia, especially those outside of northern Virginia, face high rates of poverty and low levels of food security. In 2010, approximately 16.7 percent of Virginia's rural population and 10.2 percent of Virginia's urban population lived in poverty (United States Department of Agriculture, 2012a). In addition, 12.9 percent of Virginia's population, or over 620,000 residents, are food insecure or have very low food security (United States Department of Agriculture, 2012a).

Across the nation, a variety of approaches and strategies are being developed to address these, and similar challenges. One strategy utilized in Virginia as well as throughout the nation has been exploring ways to revitalize agrifood systems through the enhancement of community food systems.[1] A number of examples can be found that explore the role community food systems play in fostering community and economic development in Virginia. For example, food systems analyst Ken Meter conducted a study of Virginia's agriculture and food system in 2007 and found that "if Virginia consumers bought 15 percent of their food directly from local farms, farms would earn USD2.2 billion of new income" (Meter, 2007a, p. 35). Similarly, a 2007 study conducted by Virginia Cooperative Extension found that if each household in Virginia spent USD10 per week of their food budget on locally grown Virginia food, USD1.65 billion would be generated annually in direct economic impact (Benson & Bendfeldt, 2007). Additionally, the 2007 Census of Agriculture found that Virginia's direct-to-consumer sales grew approximately 72 percent between 2002 and 2007, from USD16.8 million to USD28.9 million (United States Department of Agriculture, 2009). Over the last several years, Virginia has also seen dramatic increases in small and midlevel farm marketing opportunities. In August 2009, Virginia had 171 farmers' markets, nearly a doubling from 2005 when there were only 88 farmers' markets in the Commonwealth of Virginia (Benson, 2009). The United States Department of Agriculture working list of food hubs shows that Virginia is home to 17 food hubs, the most of any state in the country (United States Department of Agriculture, 2012b).

In 2010 and 2011, an interdisciplinary team of faculty, practitioners, and graduate students collaborated with the goal of completing a Virginia food system assessment and developing a Virginia Farm to Table Plan to strengthen Virginia's local and regional food systems. This team included faculty and graduate students at Virginia Tech, Virginia State University, the University of Virginia,

[1] A community food system is commonly described as "one in which sustainable food production, processing, distribution and consumption are integrated to enhance the environmental, economic, social, and nutritional health of a particular place" (Garrett & Feenstra, 1999, p. 2).

and members of the Virginia Food System Council. A Virginia Tech College of Agriculture and Life Sciences grant provided funds to help these groups collaborate with the goal of completing a Virginia Farm to Table Plan. Team members came from diverse backgrounds related to the food system, including agricultural production, agricultural economics, local government, health and nutrition, food safety, and agricultural education. Two key tenets of the Virginia food system assessment and subsequent Virginia Farm to Table Plan were that: (1) everyone should be educated about the social, environmental, and economic importance of Virginia's food system, and (2) quality food should be affordable and accessible to everyone in Virginia regardless of their socioeconomic status. Virginia Cooperative Extension, through its Community Viability program, served as an intermediary of the land-grant universities and helped to coordinate the development of the Virginia Farm to Table Plan in close collaboration with the Virginia Food System Council and its participating organizations.

A key component of the development process for the Virginia food system assessment and Virginia Farm to Table Plan was the creation and distribution of an online survey that gathered public input from agrifood stakeholder groups within the state. The goal of the survey was to identify priority strategies for strengthening Virginia's local and regional food systems in the areas of (1) production and business management; (2) market development; (3) food system planning, management, and policy; and (4) food security, food safety, diet, and health. The overall purpose of this article is to present the results of an online survey of Virginia agrifood system stakeholders that investigated their priorities for strengthening Virginia's local and regional food systems. In doing so, we review the use of surveys in statewide food system assessments and planning processes to contextualize our particular approach and findings. Following this, a discussion is offered of what the research team learned concerning the use of surveys as part of a Virginia food system assessment and planning process.

The 2007 Virginia Food Security Summit offered the opportunity for individuals from diverse food system backgrounds in Virginia to openly discuss issues affecting the sustainability of its food system (Virginia Food Security Summit, 2007). In addition to other national experts, Ken Meter of the Crossroads Resource Center was a speaker at the summit and provided participants with a comprehensive overview of Virginia's food system, as well as an in-depth macroeconomic analysis of Virginia's food imports, food exports, and economic leakages (Virginia Food Security Summit, 2007). Following this summit, a number of different organizations and groups began to work both independently and collaboratively on initiatives that would strengthen Virginia's local and regional food systems. Virginia Cooperative Extension began to offer a series of educational programs on community food systems (Virginia Cooperative Extension, 2012), a Virginia Food System Council was initiated (Virginia Food System Council, 2012), and numerous groups and organizations began to create local and regional "Buy Fresh Buy Local" chapters across Virginia (Piedmont Environmental Council, 2007-2008).

Additionally, many organizations and groups began to compile statistics related to Virginia's food systems. The purpose of these activities was to gain a more complete understanding of the conditions surrounding Virginia's food systems and to help make the case for strengthening community food systems. Although imperfectly developed and articulated, this work could be classified as completing part of a local food economy assessment as described by Freedgood, Pierce-Quiñonez, and Meter (2011). In addition to other research activities, this included asking Ken Meter to complete two local food economy assessments in the Martinsville City and Henry County region (Meter, 2011a), and a 10-county cluster in Shenandoah Valley (Meter, 2010b). A previous local food economy assessment had been completed by Ken in 2007 for the East Chesapeake Bay region (Maryland and Virginia) (Meter, 2007b). Building on these activities, several Virginia groups and organizations decided to collaboratively implement a statewide food system planning process with the hopes of completing a Virginia food system assessment leading to the development of a Virginia Farm to Table Plan.

Literature Review

Comprehensive Food System Assessments

A food system is commonly thought of as all of the processes involved with keeping us fed, including the growing, harvesting, processing, packaging, transporting, marketing, consuming, and disposing of food and food packages (Wilkins & Eames-Sheavly, 2003). The purpose of a food system is to build health, wealth, connection, and capacity in our communities, but the current food system is failing on these counts (Meter, 2010a). Food system planning is an emerging field that can address these issues by engaging citizens, food policy councils, planning professionals, civic officials, and other interested individuals in a process to create more sustainable local, state, and regional food systems (Freedgood et al., 2011). Several tools can be employed by these individuals and groups to support food system planning efforts (Freedgood et al., 2011). While some of the tools use similar methodologies, the purpose of each approach is unique (Freedgood et al., 2011). One of the newest tools being employed in the United States is the implementation of a comprehensive food system assessment (Freedgood et al., 2011).

According to Freedgood, Pierce-Quiñonez, and Meter (2011), comprehensive food system assessments are an emerging technique that analyzes the systematic nature of a local, state or regional food system to address the interactions of food with social, environmental, and economic concerns. Comprehensive food system assessments oftentimes use a combination of qualitative and quantitative methodologies, such as stakeholder focus groups, interviews, and surveys, as well as geospatial analysis (Freedgood et al., 2011). Over the past decade, a number of individuals and organizations have completed these kinds of assessments that have been focused at a statewide level. Statewide food system assessments include those completed in California (American Farmland Trust, 2010; Brady, 2005), Colorado (LiveWell Colorado, 2010), Indiana (Meter, 2012), Iowa (Leopold Center for Sustainable Agriculture, 2011; Tagtow & Roberts, 2011), Minnesota (Meter, 2009), Ohio (Meter, 2011b), and Vermont (Vermont Sustainable Jobs Fund, 2011). While the format and focus of each of these assessments are unique, each included the collection of primary data through various qualitative or quantitative research methods. Other states such as North Carolina (Curtis, Creamer, & Thraves, 2010) and Illinois (Illinois Local and Organic Food and Farm Task Force, 2009) incorporated public feedback in the development of their statewide plans, but provide a limited description of how this information was collected and analyzed. For the purpose of this paper, we focus on three food system assessment cases that specifically use surveys as an integral component of their methodology. We now refer to these processes as comprehensive food system assessments following the criteria put forth by Freedgood, Pierce-Quiñonez, and Meter (2011).

The Use of Surveys in Comprehensive Food System Assessments

A survey was employed as part of a comprehensive food system assessment in Colorado (LiveWell Colorado, 2010), Iowa (Leopold Center for Sustainable Agriculture, 2011), and Vermont (Vermont Sustainable Jobs Fund, 2011). While the focus and goal of these surveys were different, they all collected data to identify and, in some cases, prioritize issues for strengthening the states' food systems. In turn, these issues helped shape each of the state's strategic plans or policy reports. Exploring the Colorado, Iowa, and Vermont food system plans can offer insights into how surveys can be used as one part of a comprehensive food system assessment. Table 1 details the use of surveys in each of these statewide assessments, and includes information about the survey delivery method, the type of respondents, and the number of respondents. An overview of the Colorado, Iowa, and Vermont food system assessments is described. Additionally, how these surveys gathered input to aid the development of a state food system plan is also detailed.

Surveys for the Colorado Food System Assessment

The Colorado food system assessment, and subsequent Food Policy Blueprint, was led by the nonprofit organization LiveWell Colorado (LWC). The goal of LWC is to reduce obesity in the state by promoting "healthy eating and active living" (LWC,

Table 1. Use of Surveys in the Colorado, Iowa, and Vermont Food System Assessments

State	Plan Title	Survey Delivery Method	Type of Respondents	Number of Respondents
Colorado	Food Policy Blueprint [a]	Online survey	Local, regional, and state-level organizations	130
Iowa	Iowa Local Food & Farm Plan [b]	Online survey	Key stakeholders and Iowa residents	586
Vermont	Farm to Plate Strategic Plan [c]	Online survey	Vermont residents	Unknown

[a] http://about.livewellcolorado.org/sites/default/files/final-food-policy-blueprint.pdf
[b] http://www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2011-01-iowa-local-food-and-farm-plan.pdf
[c] http://www.vsjf.org/project-details/5/farm-to-plate-strategic-plan

2010, p. 1). LWC became interested in assessing the state's food system as a way to identify key nutrition and food policy changes that would build a more resilient and healthy food system (LWC, 2010). LWC used several surveys to gather information from local, regional, and state organizations concerning how these organizations were strengthening the food system and the challenges they faced in these efforts (LWC, 2010). Two online surveys were conducted as part of the Colorado food system assessment and plan development process. One targeted state-level organizations involved in the food system such as the Colorado Department of Education, organizations representing commodity producers, and the Colorado Department of Health. The second targeted local and regional organizations involved in the food system, such as food banks, higher education institutions, and farms. Approximately 130 organizations were represented in responses to the two surveys.

The surveys asked a number of questions concerning the existence of programs focused on increasing access to healthy food. Survey results found that organizations throughout the state were involved in numerous projects and activities, such as expanding "fresh and nutritious foods provided through emergency food services" and "developing or supporting community gardens" (LWC, 2010, p. 36). Respondents also stated that the top three strategies they would like to see in Colorado were (1) developing a "community project to connect CSA shares with lower-income residents," (2) "enhanced transportation…to connect residents to sources of healthy food," and (3) "governmental institution purchasing policies for local and/or healthy foods" (LWC, 2010, p. 36). The strategies respondents identified are focused on improving access to healthy food for all persons, especially lower-income individuals, through new infrastructure projects, public policies, and targeted programs (LWC, 2010). Each of the strategies identified in the survey provides a starting place for helping LWC and its organizational partners achieve their goal of reducing obesity in the state and promoting an environment of healthy eating.

Surveys for the Iowa Food System Assessment

The Leopold Center for Sustainable Agriculture at Iowa State University led the development of the Iowa Food and Farm Plan, which relied on public input to inform every step of the development process (Leopold Center for Sustainable Agriculture, 2011). The Iowa Local Farm and Food Plan was commissioned by the state legislature with the hope of developing policy recommendations that could easily be enacted when the session opened in January 2011 (Leopold Center for Sustainable Agriculture, 2011). The goal of the Iowa Food and Farm Plan was to develop policy recommendations and key actionable items that could strengthen Iowa's "local food economy" in a sustainable manner (Leopold Center for Sustainable Agriculture, 2011, p. 3). To achieve this goal, in addition to completing a local food economy assessment, the project team and its partners completed a comprehensive food system assessment (Freedgood et al., 2011). The comprehensive food system assessment gathered public input through an initial workshop, listening sessions, and an online survey (Leopold Center for Sustainable Agriculture, 2011).

The Iowa surveys asked respondents to identify obstacles to achieving strong local and regional food systems, and then to provide possible strategies to overcome these obstacles. The first survey was sent to 1,608 food system stakeholders. A purposive sample of stakeholders was selected to participate in the survey, representing a range of interests such as farmers, producer associations, distributors, and elected officials. The first survey received 256 responses. A second survey was sent to the general public. Approximately 1,000 Iowa residents who were on the Leopold Center for Sustainable Agriculture mailing list were sent the survey. From this survey, another 330 usable responses were collected (Leopold Center for Sustainable Agriculture, 2011).

The majority of survey respondents (57 percent) were between the ages of 45 and 64 years old. The largest group of respondents (39 percent) identified themselves as farmers, ranchers, and farm-related business owners and employees. Survey results found that Iowa respondents had a high level of knowledge concerning consumer issues, crop production, and marketing. Survey respondents had little knowledge about aggregation and distribution, and processing. Survey respondents were asked to identify the top obstacles facing the sector in which they had expertise. The top obstacles identified by the largest percentage of respondents were (1) processing barriers for small producers (76 percent), (2) lack of awareness of local food systems by local governments (67 percent), and (3) one-size-fits-all standards difficult for small producers and processors to achieve (66 percent) (Leopold Center for Sustainable Agriculture, 2011, p. 42). The top obstacles identified by survey respondents can be viewed as priority areas for strengthening Iowa's local food economy in a sustainable manner.

Surveys for the Vermont Food System Assessment

The Vermont food system assessment and plan was commissioned by the Vermont legislature and the governor as part of the 2009 Farm-to-Plate Initiative (Vermont Sustainable Jobs Fund, 2012). The assessment was led by the Vermont Sustainable Jobs Fund, a government program focusing on strengthening businesses involved in the green economy (Vermont Sustainable Jobs Fund, 2012). The report *Farm to Plate Strategic Plan: A 10-year Strategic Plan for Vermont's Food System* (2011) was developed as one way to inform the Vermont legislature on key policy initiatives that could be implemented to strengthen economic growth in agricultural industries and improve health across the state (Vermont Sustainable Jobs Fund, 2012).

Public input was obtained through interviews, focus groups, food summits, working sessions, and meetings, as well as online surveys. Overall, "strengths, weaknesses, opportunities, threats, gaps, barriers, and needs affecting Vermont's food system" were identified (Vermont Sustainable Jobs Fund, 2011, p. 36). The Vermont food system assessment project directors and authors of the Vermont Farm to Plate Strategic Plan did not delineate the findings by each data collection method employed. This makes it difficult to determine the exact findings of the surveys. The plan lists a series of objectives and strategies focused on elements of the food system, including (1) consumer demand, (2) farm inputs, (3) production, (4) processing, (5) wholesale distribution, (6) retail distribution, and (7) nutrient management (Vermont Sustainable Jobs Fund, 2011). In total, 51 objectives and 59 strategies were developed to "overcome obstacles, realize opportunities, and strengthen Vermont's food system" (Vermont Sustainable Jobs Fund, 2011, p. 36). For the full list of objectives and strategies, refer to the Vermont Farm to Plate Strategic Plan.

Differences Among the Colorado, Iowa, and Vermont Food System Assessment Surveys

While the Colorado, Iowa, and Vermont food system assessments all incorporated online surveys, the goals and sampling strategies for each were different. The goal of the Colorado survey was to determine the "effectiveness of various interventions to promote access to healthy food, what appears to be immediate and winnable policy opportunities, and what they [stakeholders] would like to see advanced in Colorado" (LWC, 2010, p. 3). The primary goal of the Iowa survey was to identify obstacles that prevent Iowa from having a strong local and regional food business sector, and identify strategies needed to address these obstacles

(Leopold Center for Sustainable Agriculture, 2011). Similarly, the primary goal of the Vermont survey was to identify goals, objectives, and strategies for increasing food system development across the state (Vermont Sustainable Jobs Fund, 2011). In terms of the sampling procedure, Colorado used a purposive sample of individuals from specific local, regional, and state organizations (LWC, 2010). Iowa employed a two-stage sampling strategy, which included a purposive sample of individuals in various agrifood occupations and organizations, and a convenient sample of individuals on the Leopold Center e-newsletter mailing list (Leopold Center for Sustainable Agriculture, 2011). Authors of the Vermont study did not identify the sampling strategy they employed (Vermont Sustainable Jobs Fund, 2011).

The Virginia Food System Assessment: A Focus on the Survey

The overall goal of the Virginia project was to create a farm to table plan that prioritized strategies for strengthening Virginia's local and regional food systems. To complete this goal, five objectives were identified. One of these objectives was to gather input from Virginia's farmers, food entrepreneurs, and agrifood service providers as a way to identify important issues affecting local and regional food systems. The project team developed a survey instrument to collect input from a wide range of agrifood system stakeholders throughout Virginia. Surveys can be a useful method to gather input from a large number of individuals and easily aggregate and compile the resulting data (Creswell, 2008). The survey development and implementation process began in January 2011 and continued through March 2011.

The development phase began with a review of literature investigating the use of surveys in comprehensive food system assessments and statewide food system plans. The Virginia Farm to Table team reviewed the Colorado, Iowa, and Vermont surveys to guide the development and implementation of an online survey. A first draft of the survey instrument that was based on the Iowa survey was developed in late January 2011. To ensure the content validity of the survey, the survey was reviewed by a panel of experts consisting of 14 faculty members in Virginia Tech's College of Agriculture and Life Sciences and 24 members of the Virginia Food System Council (Virginia Farm to Table Team, 2011). The expert panel provided comments and suggestions for improvements. Additional rounds of survey drafts were created and reviewed until a final draft was completed in February 2011.

The Virginia Tech Institutional Review Board reviewed the survey and gave approval for administration of the questionnaire (#11-103). To test the reliability of the survey, a pilot survey was administered to 17 diverse food system stakeholders attending the Shenandoah Valley Farm to Table Summit in Weyers Cave, Virginia (Virginia Farm to Table Team, 2011). After minor improvements were made following the pilot, along with additional comments and suggestions from the expert panel, the survey instrument was finalized.

The nine-page survey consisted of three major sections: (1) introduction, (2) priority rankings, and (3) demographic questions, with a total of 21 questions. In section one, three introductory questions asked respondents to confirm their residency, zip code, and email address to ensure that each respondent was unique and a resident of Virginia. In section two, the survey instrument assessed what Virginia respondents considered to be priorities for strengthening and developing local and regional food systems. Respondents were asked to rate 34 items using a four-point Likert scale (ranging from 1 as not important to 4 as very important) in four major food system categories: business production and management; market development; food system planning, management, and policy; and food security, food safety, diet, and health. A fifth column with a "not applicable" option was included for each item to allow respondents to indicate that the particular item was not a priority. Additionally, an open-ended question was added to the end of each category to allow respondents to identify additional priority items for strengthening Virginia's food systems. In section three, respondents were asked to complete a set of demographic questions.

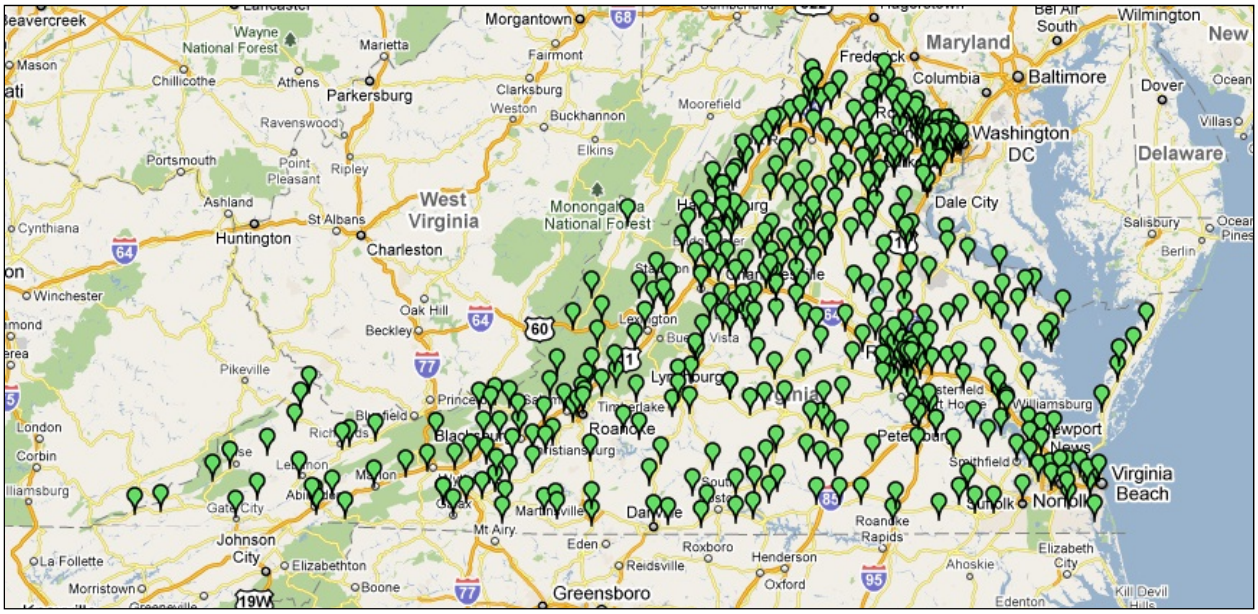
Survey distribution occurred via email through the project directors. A two-stage sampling strategy was used. The first stage involved a purposive

sample of individuals affiliated with diverse agrifood groups and organizations, and the second stage involved a convenient sample of individuals familiar with Virginia Cooperative Extension and the general public. This sampling strategy was chosen rather than a full random sample of Virginia households because of limited time and resources available. In order to mediate the limitations of using this sampling strategy, the project team used other methods to gather input from a broader range of Virginia residents for the Virginia Farm to Table Plan. A web address to the online survey was embedded in an invitation letter that was sent to all project partners. Project partners were asked to share the invitation with colleagues, local and regional food system networks, and other agrifood system stakeholders. Diverse food system stakeholder groups from agriculture, food and nutrition, public health, community development, natural resources, and policy were invited to complete the survey. Major universities and organizations that helped facilitate the distribution of the survey instrument included Virginia Tech, Virginia State University, the University of Virginia, the Virginia Food System Council, Virginia Cooperative Extension, Virginia Farm Bureau, Virginia Department of Agriculture and Consumer Services, Virginia Natural Resources Leadership Institute, Virginia Municipal League, Virginia Association of Counties, Virginia Association for Biological Farming, the Center for Rural Virginia, and the Virginia Department of Mines Minerals, and Energy. Additionally, the survey was made available at the listening sessions, forums, and farm-to-table summits that were held across the Commonwealth. Furthermore, the survey was also made available through social media. Survey distribution took place over three weeks with an initial survey invitation in week one, and two follow-up reminders at the beginning of weeks two and three. Survey design and distribution followed guidelines provided by Dillman, Smyth, and Christian (2009).

Results

Data for this study were analyzed using the SPSS statistical package. To test the survey instrument for reliability, a Cronbach's Alpha statistic was computed from the pilot responses. On a Cronbach's Alpha scale ranging from zero to one, with zero indicating low reliability among the items within a survey and one indicating high reliability among the items within the survey, the computed Cronbach's Alpha was 0.93, indicating the survey items were extremely reliable. A total of 1,374 individuals accessed the online survey instrument during the time it was available. Of these respondents,

Figure 1. Map of Zip Codes with at Least One Respondent to the Virginia Food System Survey (N=1,134)



98 percent (n=1,347) were Virginia residents. The responses of individuals who indicated they were Virginia residents and supplied an email address (N=1,134) were used in the data analysis. Figure 1 shows the reported location of each respondent. A pin indicates each zip code that had at least one individual respond to the survey. In total, respondents were located in 418 unique zip codes across Virginia. It is important to note that while 1,347 respondents were included in the analysis of the study, not all of the respondents completed the survey.

Survey respondents tended to be female (approximately 60 percent, n=465) and predominantly self-identified as Caucasian or white (92.4 percent, n=685). While the respondents tended to be female, within Virginia's population, gender is almost evenly split between men and woman. Additionally, it is important to note that while the survey respondents tended to be white, Virginia's population is much more diverse. Virginia's population is made up of approximately 68.6 percent white residents, 19.4 percent African American residents, 0.4 percent American Indian and Alaska native residents, 5.5 percent Asian residents, and 7.9 percent Hispanic or Latino residents (United States Census Bureau, 2010). The survey respondents are not representative of the more than 30 percent of residents of color living in Virginia. The majority of the respondents (63 percent) were older than 45 years of age (n=490). It is also important to note that the average age of Virginia residents tends to be younger than the average age of the survey respondents. Table 2 describes the demographics of Virginia residents compared to the survey respondents by the gender, age, and race and ethnicity (United States Census Bureau, 2010).

Respondents were asked their primary function within Virginia's food system. These functions broke down into three primary areas: (1)

Table 2. Virginia Demographics Compared to Survey Respondents

Gender	Virginia Demographics	Percentage of Respondents	Number of Respondents (n=774)
Female	50.9%	60.1%	465
Male	49.1%	39.9%	309
Age	**Virginia Demographics**	**Percentage of Respondents**	**Number of Respondents (n=778)**
18 to 24 years old	7.2%	4.1%	32
25 to 34 years old	20.9%	14.4%	112
35 to 44 years old	13.8%	18.5%	144
45 to 54 years old	15.1%	28.4%	221
55 and older	24.3%	34.6%	269
Race and Ethnicity	**Virginia Demographics**	**Percentage of Respondents**	**Number of Respondents (n=741)**
White	68.6%	92.4%	685
African American or Black	19.4%	3.1%	23
American Indian or Alaska Native	0.4%	1.9%	14
Hispanic/Latino	7.9%	1.2%	9
Asian	5.5%	0.7%	5
Native Hawaiian or Pacific Islander	0.1%	0.4%	3
Non-Hispanic/Latino		0.3%	2

[a] The Virginia demographic information comes from 2010 United States Census (United States Census Bureau, 2010).

[b] The statistics reported in this category within the Virginia demographics section represent individuals between 20 and 24 years of age. This is how the United States Census Bureau reports ages for these individuals.

preharvest, including farmers and producers, (2) postharvest, including processors, distributors, and wholesalers; and (3) service and consumption, including members of food service, advocates, and educators. The majority of the respondents (64 percent) stated their primary function was within the service and consumption sector (n=730). Approximately 33 percent of respondents identified themselves as part of the preharvest sector (n=372). Three percent of the respondents stated their role was in the postharvest sector of the food system (n=32). When asked about their occupation within the food system, approximately one-half of the respondents (44 percent) identified themselves as farmers, producers, growers, or market-gardeners. Approximately 23 percent of respondents identified themselves as working in higher education, 8 percent of the respondents identified themselves as working in prekindergarten through secondary (preK–12) educational institutions, and approximately 8 percent of the respondents identified themselves as working in local government. Table 3 describes the respondents' primary function and occupation within the food system.

The scores given by respondents were analyzed to determine which items received the highest mean score or were ranked as the highest level of importance. Table 7 in the appendix offers a full list of the 34 items ranked in order as determined by survey respondents, as well as the category in which the item appeared, mean score for the item, and coefficient of variation (CV). Coefficient of variation is the simplest way to compare standard deviations on measures that have different means (Howell, 2010). Respondents rated increasing the "understanding by government officials of the economic, environmental, and social issues surrounding local food systems" as the most important priority among all items (mean=3.63, CV=17.6 percent). They rated the "development of food outlets with local and regional foods" as the second highest priority (mean=3.61, CV=18.0 percent), and determining the "economic impacts of local and regional food systems on localities" as the third highest priority (mean=3.53, CV=18.2 percent). These three items represent a starting place for Virginia's agrifood organizations to strengthen the state's local and regional food systems through new education, policy, and research efforts. Within the top 10 most important items, eight of the items came from the food system planning, management and policy (FSP) and market development (MD) categories. Only two of the top 10 items came from the business and production management (BPM) and food security, food safety, diet, and health (FS) categories.

The overall priority rankings for each of the four categories were then calculated. This was done to determine which categories the survey respondents rated as the most important. The category

Table 3. Respondents' Primary Function and Occupation within the Virginia Food System

Primary Function of Respondents within Food System	Percentage	Number (N=1,134)
Service and consumption: Retail, institutional, lender, supplier, food service, advocate, technical assistance provider, educator, extension representative	64.4%	730
Preharvest: farmer, producer, grower, market-gardener	32.8%	372
Postharvest: processor, aggregator, distributor, wholesaler	2.8%	32
Occupation of Respondents within the Food System	**Percentage**	**Number (n=623)**
Farmer producer, grower, market-gardener	43.8%	273
Higher education (college, university, cooperative extension)	23.4%	146
Education (preK–12)	8.4%	52
Local government	7.7%	48
Food service	6.6%	41
State government	5.9%	37
Food processing, packaging, distribution, shipping	4.2%	26

Table 4. Priority Ranking of Survey Categories by Mean Score (Most important to less important)

Rank		Mean	CV
1	Food System Planning, Management, and Policy (FSP)	3.31	19.0%
2	Market Development (MD)	3.25	18.3%
3	Food Security, Food Safety, Diet, & Health (FS)	3.17	21.7%
4	Business and Production Management (BPM)	3.11	22.5%

with the highest rated items (i.e., most important priorities) was FSP, followed by MD and then FS. The category with the lowest rated items was business and production management (BPM). Table 4 lists each of these categories, as well as their corresponding cumulative mean score and CV. A one-way ANOVA was conducted to determine if the mean scores for each category are statistically different and found that there was no statistically significant difference between the group means.

Analyses were conducted to compare the mean scores of respondents with different occupations. Table 5 describes how respondents with different occupations prioritized each of the four categories within the survey instrument. Respondents who identified themselves as a (1) farmer producer, grower, market-gardener, (2) food processor, packer, distributor, shipper, (3) food service representative, (4) state government official, or (5) local government official rated items in the FSP category as the highest or most important priorities. Respondents who identified themselves as working in education (preK–12) rated items in the category of MD as the highest or most important priorities. Respondents working in higher education (college, university, cooperative extension) rated items in FS as the highest or most important priorities.

Table 6. Priority Ranking of Survey Categories by Respondents' Age

	BPM [a]	MD [b]	FSP [c]	FS [d]
18–24 years of age	3.15	3.19	3.50*	3.31
25–34 years of age	2.93	3.19*	3.07	3.16
35–44 years of age	2.94	3.23*	3.22	3.04
45–54 years of age	3.00	3.16	3.22*	3.13
55+ years of age	3.03	3.25	3.31*	3.15

[a] Business and production management; [b] Market development; [c] Food system planning, management, and policy; [d] Food security, food safety, diet and health.
* Highest rated category for each respondent group.

Analyses were also conducted comparing the mean scores of respondents by age. Table 6 describes how respondents in different age categories prioritized each of the four categories within the survey instrument. Respondents 18 to 24 years of age rated items in the FSP category as the highest or most important. Respondents between 25 to 44 years of age rated items in the MD category as the highest or most important. Respondents 45

Table 5. Priority Ranking of Survey Categories by Respondents' Occupation

	BPM [a]	MD [b]	FSP [c]	FS [d]
Farmer producer, grower, market-gardener	3.07	3.21	3.28*	3.12
Food processing, packaging, distribution, shipping	2.91	3.32	3.36*	3.19
Food service	2.82	3.16	3.24*	3.18
State government	3.37	3.34	3.42*	3.12
Local government	3.09	3.31	3.42*	3.22
Education (preK–12)	3.14	3.34*	3.22	3.33
Higher education (college, university, cooperative extension)	2.95	3.23	3.19	3.29

[a] Business and production management; [b] Market development; [c] Food system planning, management, and policy; [d] Food security, food safety, diet and health.
* Highest rated category for each respondent group.

and older also rated items in the FSP category as the most important.

Discussion

Overall, respondents rated (1) food system planning, management, and policy (FSP), and (2) market development (MD) as the most important priority areas for strengthening Virginia's food systems. Respondents rated increasing the "understanding by government officials of the economic, environmental, and social issues surrounding local food systems" as the most important priority among all of the items listed. These results indicate that respondents view the most pressing food system issues to be related to off-farm needs. This is significant from our perspective because it identifies the need to collaborate and connect with a wider variety of individuals who may not be directly related to agricultural and food production but who can play a vital role in strengthening Virginia's local and regional food systems. The Virginia survey results also reveal that respondents would like local and state policymakers to fully understand the impacts of local and regional food systems and begin to strengthen Virginia agriculture through innovative policies that promote strong farm to table connections.[2]

The goal, sampling strategy, and results of the Virginia survey can be compared to the Colorado, Iowa, and Vermont surveys. The goal of the Virginia survey was similar to the Iowa and Vermont surveys, which involved identifying priority issues and strategies for strengthening local and regional food systems. In contrast, the goal of the Colorado survey was to identify action items to promote access to healthy food. Virginia employed a similar sampling strategy as Iowa, using first a purposive sample of targeted groups and organizations, followed by a convenient sample of the general public. The Virginia survey found the most important priority to be increasing the "understanding by government officials of the economic, environmental, and social issues surrounding local food systems." This result is similar to one of the priorities identified in the Iowa survey, which was a lack of awareness of local food systems by local governments. In contrast, other results of the Iowa survey were different than those found in Virginia. These differences may be due to a number of reasons, including the unique characteristics of each state's agrifood system.

In recent decades, land-grant universities have been criticized for being slow to respond to recent restructuring in the food system, and some people have begun to question their ability to fulfill their institutional mission (Colasanti, Wright, & Reau, 2009). However, in the midst of change within higher education, the Cooperative Extension Service, and the agrifood system, new opportunities are blossoming around strengthening local and regional food systems. As was shown through the survey and subsequent development of the Virginia Farm to Table Plan, land-grant universities and Cooperative Extension professionals can be effective in convening, coordinating, and leading efforts to work collaboratively with other organizations and other state agencies on community food system issues (Dunning, Creamer, Lelekacs, O'Sullivan, Thraves, & Wymore, 2012).

Developing a survey instrument as part of the Virginia Farm to Table Plan development process provided an opportunity for a diverse group of faculty, practitioners, and stakeholders across the food system to address agrifood system issues. The survey development and implementation process was initiated after diverse Virginia groups and organizations hosted a series of educational programs on community food systems, worked with state organizations to compile statistics about Virginia's food system, and worked with food system analyst Ken Meter to complete several local food economy assessments. These steps were critical in providing a strong foundation to complete a Virginia food system assessment and subsequent Virginia Farm to Table Plan. Other land-grant universities, Cooperative Extension Systems, and community-based and nonprofit organizations can use this survey instrument and plan development process as a framework to address agrifood system issues with the aim of strengthening local and regional food systems.

From our experiences, we found it helpful to create a collaborative team with individuals from

[2] For further discussion on these issues, see the Virginia Farm to Table Plan (2012).

multiple backgrounds related to the food system. Individuals from different disciplines represented expertise in health and nutrition, local and state government, agricultural production and distribution, and community economic development. We also found it helpful to include representation from numerous higher education institutions and organizations from across Virginia such as Virginia Tech, Virginia State University, the University of Virginia, Virginia Cooperative Extension, and the Virginia Food System Council. Each university and organization had connections to stakeholders, organizations, and resources throughout the state, and we believe that these connections were one reason the survey instrument received a high number of responses. We also found that Cooperative Extension played an instrumental role in supporting the statewide food system assessment.

Conclusions

This study provides specific food system priority areas that can be addressed by policymakers, as well as priority areas that can be addressed by research and educational programs through land-grant universities, Cooperative Extension Systems, and community-based organizations. The importance of this study was alluded to in many of the comments provided by respondents in the open-ended questions within the survey. Many of the comments related to the need for more education and outreach. Comments included "there needs to be educational programs to inform potential growers/producers about the local food movement," "motivation and education are needed to help this movement grow," "need peer-to-peer collaborative learning opportunities," and "just think outside the box." The respondents reinforce the point that opportunities exist for land-grant universities, Cooperative Extension Systems, and community-based organizations to expand educational programming and develop informational campaigns focused on strengthening sustainable local and regional food systems.

The findings of this study show that people's connection to purchasing locally or regionally produced food is part of a greater movement currently taking place in Virginia and throughout the U.S. Respondents represent a large number of residents from a diverse set of backgrounds and over 400 zip codes across the Commonwealth. The number of respondents who completed the Virginia food system survey (N=1,134) was considerably higher than the number of respondents that completed similar surveys in other states such as Iowa (N=586) and Colorado (N=130). Although Virginia received a greater number of responses compared to Iowa and Colorado, according to the 2010 U.S. Census the total population of Virginia is considerably higher (8.1 million residents) than both Iowa (3.1 million residents) and Colorado (5.1 million residents). The high number of responses may be due to the collaborative nature of the groups involved in strengthening Virginia's local and regional food systems, as well as the extensive networks established by project directors and partners who were activated to distribute the survey invitation. This high number of responses may also be due to residents and stakeholders identifying with the work or the individuals and organizations involved. Other states may want to explore working with the Cooperative Extension System and land-grant universities to develop initiatives related to community food systems.

While this food system assessment can be most closely classified as a comprehensive food system assessment following the typology developed by Freedgood, Pierce-Quiñonez, and Meter (2011), we believe that a new category may need to be created that fully reflects the trend of states creating their own food system plan. While state-based food system plans may use methods similar to comprehensive food system assessments, their focus is slightly different. The primary purpose of developing a state food system plan is often to determine a set of actions or strategies that agri-food system stakeholders can pursue for strengthening local and regional food systems, rather than strictly analyzing "the systemic nature of a local, state, or regional food system, including the land requirements, production, processing, distribution, consumption, and disposal of waste" (Freedgood et al., 2011, p. 86). When developing priorities for strengthening a state's local and regional food systems, we suggest that agrifood system stakeholders consider "the interactions of food with social, envi-

ronmental, and economic concerns" (Freedgood et al., p. 86).

It is important to acknowledge and understand the limitations of this study. First, a limitation comes from the sampling strategy used to collect survey responses. Time and funding restrictions limited the development and implementation of a full random sample of Virginia households. Instead of a random sampling method, the team utilized a two-stage sampling method. This approach, which incorporated purposive and convenient samples, limits the external validity of the results, and we cannot claim that these results represent the entire population of Virginia. Second, this study is limited by the nonrepresentative sample collected from the survey questionnaire. Although considerable care was taken to try and receive a representative sample, this was not achieved. As previously mentioned, Virginia's population can be classified as approximately 69 percent white individuals and 31 percent individuals of color (United States Census Bureau, 2010). Additionally, it can be classified as almost evenly split between male and female (United States Census Bureau, 2010). The majority of the respondents of the survey identified themselves as white individuals (92.4 percent) who were female (60.1 percent). Males and respondents of color are not represented among our respondents at the same percentage as those individuals living in Virginia, and therefore the survey results fail to completely express the concerns and priorities of these populations. Because of this, our findings may accurately provide insight into the beliefs of Caucasian and female individuals in Virginia, but may not represent the diversity of views of all individuals living in Virginia. Third, survey results are limited by the unequal distribution of stakeholder groups that responded to the survey. For example, far more respondents identified themselves as having service and consumption as their primary function within the food system, compared to respondents who identified themselves as either involved with preharvest or postharvest functions. Our results are limited by this unequal distribution, and we acknowledge this may have skewed the results away from prioritizing on-farm agricultural production and processing needs. Fourth, this food system assessment is limited in that it does not analyze the business assets nor the views of Virginia business leaders. To help combat these limitations while developing the Virginia Farm to Table Plan, several other types of data collection methods were employed, including local and regional focus group and listening sessions, and farm-to-table summits to ensure that the Virginia Farm to Table Plan represented the views of multiple audiences. Even with the use of convenient sampling method and the lack of diversity in respondents, the large sample size represents food system stakeholders from every region of Virginia and provides a substantial baseline to determine the most pressing priority areas to strengthen and further develop Virginia's local and regional food systems.

Future research could focus on several issues that were not addressed in this study, as well as issues related to the limitations of this study. An in-depth assessment of Virginia's local and regional food systems could be completed using a full random sample to ensure that all groups in Virginia have the opportunity to provide input into the priority strategies employed to strengthen Virginia's local and regional food systems and to allow for externally valid results. Additionally, an in-depth assessment could be completed for each of the four categories contained within the survey. Furthermore, an in-depth assessment could be completed that investigates and prioritizes business strategies and initiatives for strengthening Virginia's local and regional food systems. Finally, specific assessments of the diverse organizations and groups involved with Virginia's food system could be completed to better understand priority areas within each stakeholder group and allow for a greater understanding of priorities for strengthening Virginia's local and regional food systems.

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Appendix

Table 7. Priority Ranking of Survey Items by Mean Score (Most important to less important)

Rank	Item	Category [a]	Mean	CV
1	Understanding by government officials of the economic, environmental, and social issues surrounding local food system.	FSP	3.63	17.6%
2	Development of food outlets with local and regional foods.	MD	3.61	18.0%
3	Economic impacts of local and regional food systems on localities.	FSP	3.53	18.2%
4	Training, knowledge, and support to market development for local and regional products.	MD	3.53	18.8%
5	Land-use planning and zoning considerations for food system needs.	FSP	3.53	19.3%
6	Consumer focused educational programs on healthy eating and cooking with local and regional foods.	FS	3.48	21.3%
7	Environmental impacts of local and regional systems on localities.	FSP	3.47	20.4%
8	Development of markets for local and regional foods to meet the needs of educational institutions and hospitals.	MD	3.47	20.9%
9	Education on identifying local marketing opportunities.	MD	3.46	20.9%
10	Training, knowledge, and support to develop comprehensive business plans.	BPM	3.45	21.2%
11	Availability of USDA- and state-approved processing capabilities (flash-freeze, canning, meat processing, and community kitchen).	MD	3.44	22.1%
12	Educational programs in whole-farm planning.	BPM	3.42	21.7%
13	Business planning support to maintain public, physical, and capital infrastructure for local food systems.	FSP	3.41	20.9%
14	Training, knowledge, and support for value-added marketing and product pricing.	MD	3.39	21.0%
15	Local food system planning in the localities' comprehensive plans.	FSP	3.39	22.0%
16	Cost, supply, and knowledgeable workforce to prepare local, fresh, value-added foods.	MD	3.38	21.1%
17	Consumer focused education on the cost of local and regional foods.	FS	3.35	22.9%
18	Local or regional food systems impact on the diet and health of consumers.	FS	3.35	23.4%
19	Cost and availability of insurance for producers direct selling local food products.	MD	3.34	22.1%
20	Affordable business loans for long-term and short-term financing.	BPM	3.34	24.9%
21	Knowledge of and step-by-step procedures to meet Good Agricultural Practices (GAP) certification.	BPM	3.32	23.6%
22	Educational programs in specialty crop production.	BPM	3.31	23.9%
23	Managing or disposing of the non-consumable (waste) products generated during the food production and consumption process.	FSP	3.30	23.5%
24	Year-round local product availability.	MD	3.27	25.8%
25	Training, knowledge, and support to obtain loans for local food enterprises.	BPM	3.27	25.9%
26	Food safety practices for local foods (food storage, preparation, preservation) targeted at consumers.	FS	3.23	25.4%
27	Educational programs in animal/livestock husbandry.	BPM	3.22	25.3%
28	Commercial education about safely producing, preparing, and storing local and regional foods.	FS	3.20	24.8%
29	Benchmark data to support local food business financing.	BPM	3.17	25.0%

continued

Rank	Item	Category [a]	Mean	CV
31	Access to food system market research for localities.	FSP	3.10	25.2%
32	Consumer education and training on food budgeting and food assistance programs.	FS	3.05	28.7%
33	Research on food safety risks to consumers within a local or regional food system.	FS	2.97	30.2%
34	Implementing a tracking system for products as they travel through the supply chain.	MD	2.82	33.9%

[a] Abbreviations: BPM = business and production management; FS = food security, food safety, diet, and health; FSP = food system planning, management and policy; MD = market development

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Building capacity between the private emergency food system and the local food movement: Working toward food justice and sovereignty in the global North

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Abstract

One area of food system research that remains overlooked in terms of making urban-rural distinctions explicit is the private emergency food system of food banks, food pantries, soup kitchens, and emergency shelters that exists throughout the United States. This system is an important one for millions of food-insecure individuals and today serves nearly as many individuals as public food assistance. In this article, we present an exploratory case that presents findings from research looking at the private emergency food system of a rural county in northern New England, U.S. Specifically, we examine the history of this national network to contextualize our findings and then discuss possibilities for collaboration between this private system and the local food movement (on behalf of both the public and the state). These collaborations present an opportunity in the short term to improve access to high quality local foods for insecure populations, and in the long term to challenge the systemic income and race-based inequalities that increasingly define the modern food system and are the result of prioritizing market-based reforms that re-create inequality at the local and regional levels. We propose

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alternatives to these approaches that emphasize the ability to ensure adequate food access for vulnerable populations, as well as the right to define, structure, and control how food is produced beyond food consumerism (i.e., voting with our dollars), but through efforts increasingly aligned with a food sovereignty agenda.

Keywords
emergency food, food justice, food sovereignty, rural and urban

Introduction

The rural private emergency food system is an overlooked area of research. The popularity of local food has increased in urban and rural areas alike, yet despite the social and economic capital driving this innovative food movement, food-insecure populations remain ignored to a large degree. We know that the rural food environment is substantively different than the urban food environment (Sharkey, 2009). People in rural areas generally have less money to spend on food and they live further from markets where local food producers sell their products (Morton & Blanchard, 2007). Producers are predominantly located in rural areas where land and water resources are abundant, yet the most profitable markets for their products more often than not are located in urban centers where they can more easily access a concentrated population center with greater financial capital. These urban-rural distinctions can be made about multiple aspects of food systems research. For instance, early applications of the food desert concept (and the corresponding efforts to identify them) were overwhelmingly situated in urban places. Today, there is recognition that there is not a single food desert definition that can be universally applied. Researchers as well as government authorities have recognized this; for instance, the United States Department of Agriculture (USDA) has adopted different criteria for urban and rural food deserts. In examinations of local food, some have identified key urban-rural distinctions. For example, McEntee's (2010) *contemporary* and *traditional* conceptualization has been used to distinguish between a broad base of activities that are local in terms of geographical scale, but potentially exclusive in terms of their social identity and obstacles to adequate access. Access in this sense is not represented by a Cartesian notion of physical proximity, however; it is also indicative of access barriers in terms of financial ability as well as structural and historical (e.g., institutional racism) processes that privilege some, but harm others (McEntee 2011a).[1] These concerns are increasingly recognized as part of growing food justice and food sovereignty agendas.

The private emergency food system (PEFS) is a national network of food banks, food pantries, soup kitchens, and shelters that operate largely to redistribute food donated by individuals, businesses, and the state. This is a tremendously important system that serves both urban and rural food-insecure populations. Based on a review of this system's functionality, urban-based critiques of this system, and findings from an exploratory qualitative study, we propose that there are key distinctions between the urban and rural PEFSs that have been overlooked (in the same manner that urban and rural local food systems are conflated). The PEFS serves as a safety net for many, yet it struggles financially and lacks access to the high-quality foods (e.g., fresh produce and meat) that clients of this system often prefer. In this article we present emergent opportunities to develop the collaborative capacity between the PEFS and the rural local food system in ways that address the needs of the PEFS and utilize the assets of the burgeoning local food movement. Furthermore, we explain how these synergies potentially contribute to food justice by providing high-quality food to low-income populations. We begin the article with a review of pertinent literatures. This is followed by a depiction of the PEFS, summary of existent critiques, and presentation of our data. We propose that livelihood strategies related to traditional localism (McEntee, 2010) contribute to food justice and food sovereignty

[1] Cartesian understandings of space utilize a grid-based measurement of physical proximity. These types of proximity-based understandings of food access (i.e., food access is primarily a matter of bringing people physically closer to food retailers, as is promoted by the USDA Food Desert Locator) tend to overlook other nuanced forms of food access based on knowledge, culture, race, and class.

agendas by focusing on the natural and social assets of rural communities. We conclude with a discussion of the possibilities for not only remediating the PEFS, but challenging the corporate food regime that currently institutionalizes it.

Local Foods, Food Justice, and Food Sovereignty

Consumer confidence in the conventional food sector has decreased as a result of food scares (Morgan, Marsden, & Murdoch, 2006), with consumers feeling alienated from modern-day food production (Sims, 2009). From these consumer-based concerns over food safety and a general alienation from modern-day food production, alternative food initiatives and movements have surfaced (including local food initiatives). Feenstra (1997) made the case for local foods as an economically viable alternative to the global industrial system by providing specific steps to be taken by citizens to facilitate the transition between the local and the global; it is these forces that have become the focus of food provisioning studies (Winter, 2003). These efforts include more sustainable farming methods, fair trade, and food and farming education, among others; these have been reviewed extensively elsewhere, such as by Kloppenburg, Lezberg, De Master, Stevenson, and Hendrickson (2000) and Allen, FitzSimmons, Goodman, and Warner (2003). Essentially, all are categorized by a desire to create socially just, economically viable, and environmentally sustainable food systems (Allen et al., 2003) and the majority are now collectively referred to as the dominant food movement narrative (Alkon & Agyeman, 2011). It is from this narrative that the local food movement emerges.

Food justice efforts have successfully utilized food localization efforts to improve food access opportunities for low-income and minority communities. These efforts typically occur in urban areas and target low-income minority populations (Alkon & Norgaard, 2009; Gottlieb and Joshi 2010; Wekerle, 2004; Welsh & MacRae, 1998). The concept of food justice supports the notion that people should not be viewed as consumers, but as citizens (Levkoe, 2006); by linking low-income and minority populations with alternative modes of food production and consumption, advocates prioritize human well-being above profit and alongside democratic and social justice values (Welsh & MacRae, 1998).

This represents "more than a name change" departure from conventional food security concerns; it is rather a systemic transformation that alters people's involvement in food production and consumption (Wekerle, 2004, p. 379). Increasingly substantiated by racial and income-based exclusion, food justice operates to prioritize just production, distribution, and access to food within the communities being impacted. This is the focus of the food justice movement, though environmental and economic benefits often result from these efforts as well. A recently published volume edited by Alkon and Agyeman (2011) unpacks various forms of food justice, ranging from issues of production (e.g., farmworker rights) to distribution, consumption, and access. In this article we are concerned with the consumption element of the food chain; food justice efforts in this realm often take the form of alternative food initiatives that create new market-based or charity-based solutions to inadequate food access (e.g., farm-to-school programming that link schools and local farmers, sliding-scale payment plans for low-income consumers at farmers' markets that are subsidized by wealthier patrons, or agricultural gleaning programs) that stress social equity and solutions that are implemented by and for the people impacted by inadequate access to food. This latter element is a definitive characteristic of food justice initiatives. Most recently, Alkon and Mares (2012) situated food justice in relation to food sovereignty, finding that although food justice and community food security frameworks often challenge conventional agricultural and food marketing systems, the food sovereignty framework is the only one to explicitly underscore "direct opposition to the corporate food regime" (p. 348). This is because both contemporary food justice and (community) food security frameworks often operate within traditional markets that are agents of the industrial agricultural system representative of a neoliberal political economy. This marks a departure between food justice and food sovereignty; La Via Campe-

sina, a major proponent of food sovereignty, defines the concept as:

> the right of peoples to healthy and culturally appropriate food produced through sustainable methods and their right to define their own food and agriculture systems. It develops a model of small scale sustainable production benefiting communities and their environment. It puts the aspirations, needs and livelihoods of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. (La Via Campesina, 2011, para. 2)

Whereas food justice often works to create solutions in sync with market structures by filling the gaps in government services, food sovereignty focuses on dismantling the corporate food regime.

History and Structure of the PEFS

An area of the food system where food justice advocates have increasingly engaged in an urban setting is the PEFS. Operating on a charity basis, emergency food assistance provides food to individuals whose earnings, assets, and social insurance options have not met their needs (Wu & Eamon, 2007). Public government-run assistance programs include welfare, the Supplemental Nutrition Assistance Program (SNAP), Medicaid, and subsidized housing. Private emergency food assistance is provided by nonprofit organizations and includes soup kitchens, food pantries, food banks, food rescue operations (Poppendieck, 1998), and "emergency shelters serving *short-term residents*" (emphasis added) (Feeding America, 2010a, p. 1).

Largely in reaction to dissatisfaction with the federal food stamp program, Congress passed the Omnibus Budget Reconciliation Act in 1982. This act allowed federally owned surplus commodity food to be distributed by the government for free to needy populations. Prior to its passage, the vast majority of food assistance in the U.S. was governmentally provided through the food stamp program (now the Supplemental Nutrition Assistance Program [SNAP]) and the majority of food that food pantries received came from individuals and businesses. The act's success was followed by the Temporary Emergency Food Assistance Act (TEFAP) in 1983, which began the process of routinely distributing excess commodities through private emergency food programs, such as food banks and food pantries (Daponte & Bade, 2006). Food pantries flourished as a result of commodity-sourcing, since they now began receiving a reliable stream of food. Businesses that previously did not want to be involved in emergency food provisioning activities could now dispose of unwanted inventory for a much cheaper rate by giving it away (Daponte & Bade, 2006) (see figure 1). In fiscal year 2009, Congress appropriated USD299.5 million for the program, made up of USD250 million for food purchases and USD49.5 million for administrative support (USDA FNS, 2010).

In the U.S., companies defined as C corporations by tax code (the majority of U.S. companies) can collect an enhanced tax deduction for donating surplus property, including food. Thus when food businesses donate food to a charity, including food banks and pantries, the businesses can take a deduction equal to 50 percent of the donated food's appreciated value. In addition, the Bill Emerson Good Samaritan Food Donation Act of 1996 provides safeguards for entities donating food and groceries to charitable organizations by minimizing the risk of legal action against donors. Companies are not required to publicly disclose deductions for food donations, though in 2001 corporations wrote off USD10.7 billion in deductions (Alexander, 2003). Feeding America received USD663,603,071 in charitable donations in 2006. In a 2003 *Chicago Tribune* article, Delroy Alexander described how America's Second Harvest received USD450 million in donated provisions in 2001, USD210 million of which came from just 10 major food companies, such as Kraft, Coca-Cola, General Mills, ConAgra Foods, Pfizer, and Tropicana (Alexander, 2003). The top five donors each gave more than USD20 million in food, with the top contributor at USD38 million. Current figures are unavailable, though many companies proudly display pounds of food donated on their websites. For instance, Walmart's website states:

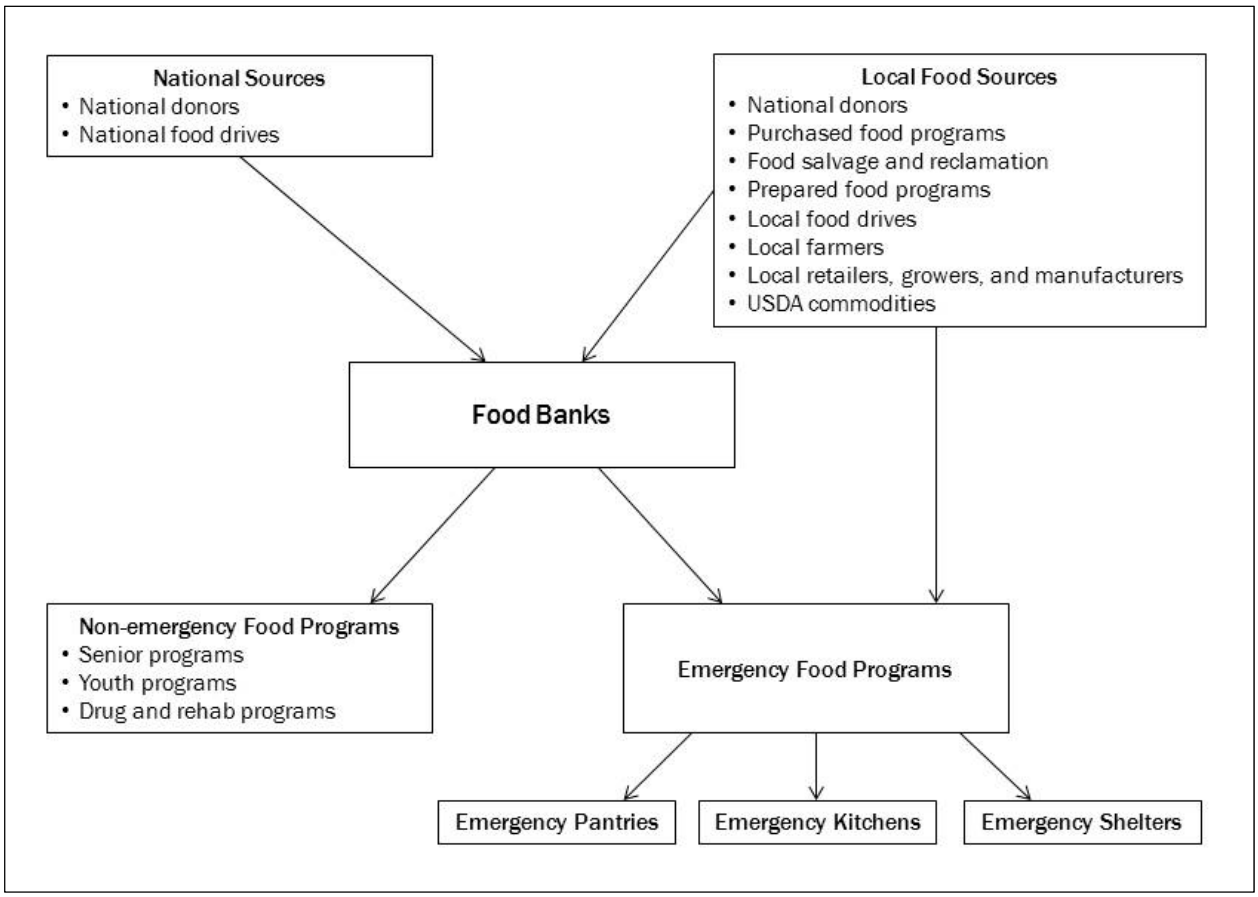
> From November 2008 to November 2009, the Walmart stores and Sam's Club locations have already donated more than 90 million pounds [41,000,000 kg] of food.…By giving nutritious produce, meat, and other groceries, we've become Feeding America's largest food donor. (Walmart, 2010)

This arrangement allows for unwanted food (food that would otherwise be considered waste) to be utilized; it acts as a vent for unwanted food, allowing large corporate entities to dump surplus product of questionable nutritional quality upon the PEFS. Simultaneously, these corporations are receiving tax breaks and benefiting from policies that minimize their legal risk. Approximately 80 percent of food banks belong to Feeding America, a member organization that acts as an advocate and mediator in soliciting food from major food companies and bulk emergency food providers. This network has 205 food bank members that distribute food and grocery products to charitable organizations. Nationwide, more than 37 million people accessed Feeding America's private food assistance network in 2009 (up 46 percent from 2005), while 127,200 accessed it in New Hampshire (Feeding America, 2010b).

Critiques of the PEFS

Critical assessments of the PEFS range from those focused on political-economic relations to on-the-ground implementation of this redistributive system. In the following section we have grouped these appraisals into four main points. First, the PEFS is largely "emergency" in name only. Second, distribution of food in the PEFS is largely unregulated. Third, nutritional content of donated items is frequently overlooked for the sake of its quantity. Fourth, because of their limited budget and food-storage capacity, the PEFS requests nonperishable,

Figure 1. United States Emergency Food Network (adapted from Feeding America, 2010a)



and resultantly, low-nutrition donations. Related to this point, perpetuation of the PEFS as it currently operates supports a short-term food strategy that supports immediate caloric need while sacrificing long-term health (and ignoring its associated costs).

A prominent critique of the PEFS is that it is "emergency" in name only, and examples highlight the emergency programmatic emphasis of programs even though their services appear to be operating in a nonemergency manner. The U.S. government describes TEFAP as a program that "helps supplement the diets of low-income needy persons…by providing them with emergency food" (USDA FNS, 2010). Feeding America, "the nation's largest organization of emergency food providers," describes food pantries as "distributing food on a short-term or emergency basis" (the NHFB shares this definition) (Feeding America, 2010a, p. 13). According to Feeding America's *Hunger in America 2010* report, approximately 79.2 percent of clients interviewed reported that they had used a pantry in the past year, indicating that they were not new clients. Multiple researchers have observed that many food pantries are being used on a regular, long-term basis (Beggs, 2006; Bhattarai, Duffy, & Raymond, 2005; Daponte, Lewis, Sanders, & Taylor, 1998; Hilton, 1993; Molnar, Duffy, Claxton, & Conner, 2001; Mosley & Tiehen, 2004; Tarasuk & Eakin, 2005; Warshawsky, 2010).

Along these lines, others have cited how the PEFS is unregulated to its detriment; for instance, many private donations do not have any federal or state laws regulating their distribution (Bhattarai et al., 2005). The unregulated nature of any charity brings both benefits and burdens, and one benefit to the PEFS has been the ability to utilize the efforts of a large volunteer base. However, it has been proposed that pantries that operate with a largely volunteer workforce employ subjective eligibility criteria and a "they should be satisfied with whatever they get" mindset on behalf of workers (volunteers as well as paid staff) (Tarasuk & Eakin, 2005, p. 182). Food pantry clients may have limited rights and entitlement to the food being distributed, "further reinforcing that people are unable to provide for themselves" (Molnar et al., 2001, p. 189) in this redistributive system. In fact, it has been shown that workers "routinely eschew the aesthetic values that dominate our retail system" where "distribution of visibly substandard or otherwise undesirable products is achieved because clients have few if any rights" and "are in desperate need of food" (Tarasuk & Eakin, 2005, p. 184).

The belief of some workers that clients should be satisfied with whatever items they receive underlies the non-nutritional focus threaded throughout the private emergency food system. This is especially evident from the supply side. Government commodities serve as a major source of food for the PEFS. Commodity foods are provided to food banks, directly to independent agencies, and to Feeding America (Feeding America, 2012c). The original intents of this commodity program were to distribute surplus agricultural commodities and reduce federal food inventories and storage costs, while simultaneously helping food-insecure populations. In 1988, however, much of the federal government's surplus had been exhausted, and as a result the Hunger Prevention Act of 1988 appropriated funds for the purchase of commodities for TEFAP (USDA FNS, 2010).

The PEFS's other major contributor, private corporations, do not explicitly concentrate on the nutritional content of their donations. Corporations benefit from considerable tax incentives along with liability protection; they can donate food that would otherwise be wasted, forgoing dumping costs while engaging in what many of these entities now call "corporate social responsibility." For instance, pounds of donated food are showcased and used as progress markers to show how successfully hunger is being combated. Feeding America states that it distributes 3 billion pounds (1.4 billion kg) of food every year (Feeding America, 2012a). Clicking on a few of Feeding America's "Leadership Partners" on its homepage website (Feeding America, 2012b) yields similar language. For instance, ConAgra states that, "In the last dozen years, ConAgra Foods has provided more than 166 million pounds of food to families in need" (ConAgra, 2009, para. 5), Food Lion (part of the Delhaize Group) has "donated more than 21 million pounds of food" (Food Lion, 2010), and

"just last year, Procter & Gamble contributed nearly 30 million pounds of product" (Procter & Gamble, 2010). These figures provide no indication of nutritional content, although one pound of naturally flavored drink boxes has different nutritional composition than one pound of fresh produce. If success is measured in terms of quantity, then this will be the criterion that drives emergency food provisioning.

Charities are easy targets for critique; they often operate on a shoestring, use labor with different levels of knowledge and experience, and much of the time are put in a financially and socially powerless position, at the whims of donors. One result is that nonperishable or low-perishability items are preferred (Tiehen, 2002; Verpy, Smith, & Reicks, 2003); these last longer and do not require refrigeration. Their long shelf life means handling and transport is not time-sensitive. These products cost less and are more likely to be donated. Nutrient-poor foods are less healthy overall (Monsivais & Drewnowski, 2007); previous food pantry investigations discovered the poor nutrient composition of donated items, especially in regards to adequate levels of calcium, vitamin A, and vitamin C (Akobundu, Cohen, Laus, Schulte, & Soussloff, 2004; Irwin, Ng, Rush, Nguyen & He, 2007). Donating large amounts is important since donation quantity is prioritized by agency recipients. Rock, McIntyre, and Rondeau (2009) found a misalignment between donor intent and client preference indicative of the "ignorance among food-secure people of what it is like to be food-insecure" (p. 167). Food banks and food pantries are pressured to accept foods on unfair grounds, just as clients are pressured to accept whatever food is handed to them. In at least one other case, food pantry donors "did not consciously consider nutrition when deciding which foods to donate" (Verpy et al., 2003, p.12).

A demand-side perspective of private emergency food provisioning reveals somewhat complementary conditions that support the acquisition and distribution of low-quality foods. The long-term health consequences associated with the consumption of low-quality foods can be overlooked to satisfy immediate food needs, thereby reinforcing the value placed on the low-quality supply being donated. While expenses like shelter, heat, and medical expenses are relatively inelastic, food is flexible and can be adjusted based on these demands. On a limited budget, it is often the case that whatever money is left over is used for food (Furst, Connors, & Bisogni, 1996; McEntee, 2010). As reported by McEntee, a homeless shelter resident commented:

> It's likes this, your oil's almost out, your electricity's high and they're going to shut it off, what are going to do? Well, we're going to have to cut down on our food budget. Do what you gotta do. . . you can buy your family packs and suck it up and eat ramen noodles. (McEntee, 2010, p. 795)

Sometimes these types of food are chosen out of necessity (that is the only type of food offered) and other times it is out of habit (they are used to eating it).[2] With the recent recession in the U.S. economy, purchases of cheap, ready-to-eat processed foods have increased. An Associated Press article entitled, "ConAgra Foods 3Q profit rises, maintains outlook" (Associated Press, 2010, para. 1) states:

> Strong sales of low-priced meals such as Banquet and Chef Boyardee and lower costs pushed ConAgra Foods Inc.'s third-quarter profit up 19 percent. Cheap prepared foods like those that ConAgra offers have appealed to customers during the recession as they look for ways to save money and eat at home more.

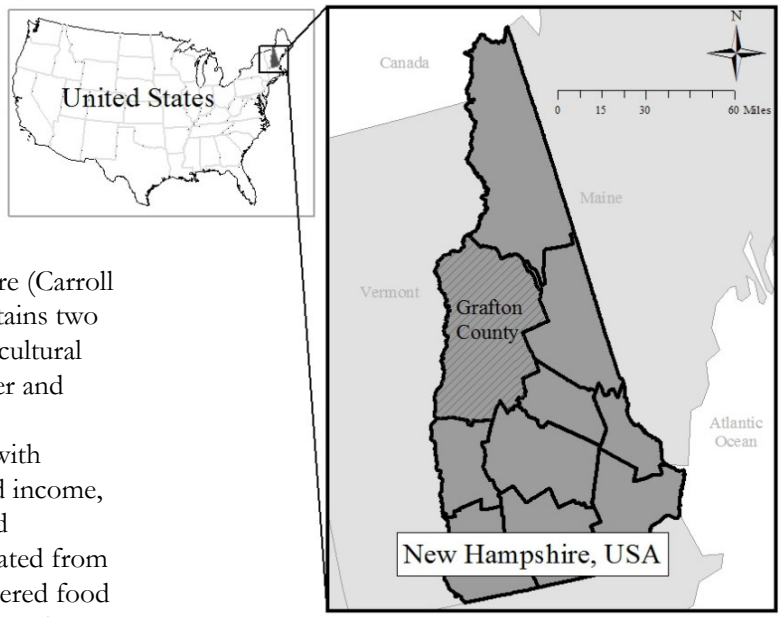
Methods and Research Setting

Approximately 7.7 percent of New Hampshire's population is food-insecure (Nord, Andrews & Carlson, 2008); 8 percent of the state's population lives in poverty, while 9.4 percent of Grafton County's population lives in poverty (U.S. Census Bureau, 2008). Grafton County was selected as the

[2] The amount of processed food, especially in the form of prepared meals and meals eaten outside the home, is steadily increasing in the United States (Stewart, Blisard, & Jolliffe, 2006).

research site based on proximity to researchers as well as the existence of food insecurity. Grafton County (figure 2) has a population of 81,743 and a population density of 47.7 people per square mile (18.4 people per square kilometer) (U.S. Census Bureau, 2008).

Figure 2. Grafton County, New Hampshire



Unlike the other two primarily rural northern counties of New Hampshire (Carroll and Coos counties), Grafton County contains two universities that serve as educational and cultural centers (Dartmouth University in Hanover and Plymouth State University in Plymouth). Accordingly these areas attract residents with above-average educational attainment and income, thus offering a variegated set of social and economic conditions which are differentiated from the rest of the county. There are 14 registered food pantries in Grafton County (of a total of 165 in New Hampshire) (New Hampshire Food Bank, 2010). In 2012, there were 92 SNAP-authorized stores within the county, marking a 13 percent increase from 2008 (USDA FNS, 2012a). Approximately 16 percent of students were free lunch eligible in 2008 (USDA FNS, 2012b). In terms of local food potential, there were 10 farmers' markets in 2010 (USDA AMS, 2012) with 3.3 percent of farm sales attributable to direct to consumer sales ; U.S. Census of Agriculture, 2012).

A purposive sampling method (Light, Singer, & Willett, 1990) was used to identify respondents (N = 16) who work regularly in Grafton County's PEFS. This included state employees, although the majority were workers and volunteers at food banks, soup kitchens, food pantries, and homeless shelters. These respondents were selected based on their above-average knowledge about hunger, food insecurity, and private emergency food provisioning in Grafton County (beyond their personal experience). Although some questions were specific to the respondent's area of expertise, the same general open-ended question template was used to facilitate informative discussion on topics related to food access, such as affordability, nutrition, and food provisioning (see table 1).

The one-on-one semistructured interviews (Morgan & Krueger, 1998) with this group of respondents lasted between 60 and 90 minutes and took place in an office setting, community center, or over the phone (when in-person meetings were difficult to arrange). All interviews were recorded, transcribed, and coded. Participant observation (Flowerdew & Martin, 1997) was conducted at a Plymouth-area soup kitchen that served weekly hot meals for free to attendees. Data from interviews as well as field notes were coded and analyzed using NVivo, qualitative analysis software (QSR International, 2010). After data was cleaned, data was examined as a whole to gain a general sense of overall meaning and depth. Open coding was undertaken, where material was organized into groups or segments of related information (Rossman & Rallis, 1998). We developed a qualitative codebook for efficient and consistent code assignment. Codes were examined, as well as the overall corpus of information. We identified underlying themes based primarily on respondent narratives. Over time, themes and trends emerged. Overlaps and differences between themes were identified, thus allowing their properties to be refined, ultimately resulting in progressively clear theme categories. Following theme assessment,

Table 1. Sample Question Template Used To Interview Respondents

Question Focus	
Food access	**Local food**
• How do you define inadequate food access? • Do you believe inhabitants of (state/county/town) experience inadequate food access? • What would you say are the top three reasons for people not having adequate access to healthy foods? • What would you say are the unique food access barriers faced by rural residents? • In coping with inadequate food access, which group of people do you think is more likely to use their social network more? a. Lower- vs. middle- and upper-income populations b. Urban vs. rural populations • Do you think local foods make healthy eating options more available to the general population? • Do you think inhabitants of New Hampshire fair better or worse when it comes to food access compared to the rest of the northeast? To the rest of the U.S.? • For those who experience inadequate food access, do you see their situation improving in the next five years?	• How do you define local foods? • Do you believe local foods are increasing in popularity among residents of (county/town)? Why or why not? • Do you think consumption of local products depends upon income level? Nutritional knowledge? Location? Cultural values? • Do you think local foods are equally accessible by all people residing in (county/town)? Why or why not? • Do you think local foods are healthier than nonlocal foods? • What do you see as the most common medium through which people obtain local foods? (CSA, farmers' market, grocery store, informal network with relatives and/or friends) • Do you think participation in local food activities, such as farmers' markets and CSAs, is increasing, decreasing, or stable? • Do you think local products are an important part of the general public's diet? • Do you think consumption of local products depends upon cultural values? • Who do you think has a greater appreciation of local foods? a. Lower- vs. middle- and upper-income populations b. Urban vs. rural populations • In general, who do you think consumes more local products: people who live in cities, or people who live in "the country"/rural areas?

interconnections and relations between themes were identified through concept mapping and triangulation (Fielding & Fielding, 1986). The authors conducted all interviews and observation, processed all data, and conducted all analysis. Institutional Review Board approval was obtained and all standard research protocols used.

Findings from Grafton County

Some of the data emerging out of the Grafton County case echoes previous observations about the PEFS. The preliminary data we present in this article is the product of field work, policy evaluation, and literature review. We do not claim that these findings are externally generalizable, although we do see similarities between our observations and those of other researchers, indicating that our data may be indicative of trends elsewhere, especially in rural areas of the northeastern United States where similar demographic and cultural traits exist. In this way, we also see potential in terms of research trajectories and policy reforms for those looking to build capacity between the PEFS and the local food system.

Reliance upon Volunteers

In relation to the existing criticisms that the PEFS is actually serving a long-term and sustained need and not a short-term or emergency one, many food pantry workers indicated that long-term usage by clients was common. For instance, one pantry worker explained that "most of the people that come in here are…I don't know if I would say chronic, but regulars" (0607).[3] In these pantries, representatives talked about getting to know clients over the course of months and years of use; some clients stay and talk with pantry workers for emotional support during food pick-ups. This long-term usage has been critiqued and connected to the fact that the PEFS is so heavily reliant upon volunteer labor that resultantly there

[3] The four-digit number indicates interview location and respondent IDs.

are opportunities for inconsistencies to develop (Lipsky, 1985; Molnar et al., 2001). Ad hoc administration of private emergency food distribution has consequences, such as inconsistent eligibility requirements and quality control (Daponte & Bade, 2006). In Grafton County pantries, eligibility was determined through a combination of criteria, such as pantry worker's personal judgment and preset income criteria. In one large pantry, more refined conditions were followed by staff and volunteers. In this pantry, if it was a client's first visit, then they were allowed to get food no matter what. However, in order to get food on subsequent visits they would need to bring proof of income (their income had to be below a certain amount based on number of household members). The director of this pantry explained, "the only time I turn them away is if they're using the other food pantries.…Most of the time they trip themselves up" (0505). When asked about the consequences of using more than one pantry, the same respondent said, "I turn them off for a whole year.…To me, that's stealing food because that's government food involved in both places" (0505). This was not a set rule or policy of the pantry, but a guideline created by the director. Another worker explained that clients needed to fill out a TEFAP form (which determines eligibility under the rubrics of "Program" (already receiving a form of public assistance) and "Income" (one-person weekly income at or below USD370)), but that "it [the form] doesn't turn anybody away" (1215). The downside of a more subjective, informal system is that pantries can be run in a potentially inequitable manner (Daponte & Bade, 2006). In addition, a client who offended a staff member or volunteer in the past will not be safeguarded against as they would be in a government-run system. A pantry director from a small church-run pantry was asked about assistance eligibility and replied that:

> We don't ask a lot of questions…We don't take any financial information and you don't need to qualify. I just tell people, "if you need it, you can use it."…*You can tell by looking at them*, you know? The car they drive, their clothes, you could tell they're not living high off the hog, so to speak. (0607, emphasis added)

In New Hampshire, 92 percent of food pantries and 100 percent of soup kitchens use volunteer labor, while 64 percent of pantries and 46 percent of soup kitchens rely completely on volunteer labor (Feeding America, 2010b). Volunteers partnered with pantry staff to perform tasks. Food has to be inspected, sorted, organized, and in some cases cleaned before it is handed out; how these tasks are carried out varies by pantry. In all pantries visited as part of this research, clients waited in line with other recipients (visible to each other) where nonpantry visitors to the agency could see them openly. In one venue, while pantry clients picked their food from a closet in a church, people working to set up a church dinner worked in the same room; these individuals and the pantry clients were visible openly to each other. These patterns show that by engaging in this private form of food assistance, clients give up any right to confidentiality they may be afforded through other forms of assistance, such as those offered by federal or state forms of food assistance.

Another consequence of reliance on volunteer labor is that food standards are frequently disregarded. A set of pantry workers explained how they went to great lengths to utilize some squash donated from a nearby farm:

> We discovered a couple years ago that he can't keep it here [the pantry] because it will spoil…and then I said I'll take it, I got a place.…So now I've got squashes and I keep an eye on them to make sure they aren't spoiling.…So I have a room downstairs [in her house] that has no windows and it's about 55 [degrees]. And I put them down in the basement and then I bring them up into the garage and they're stored in the garage where it doesn't freeze. (0506)

Pantry and food bank workers often clean and repackage food that is inconveniently packaged (e.g., in bulk) or has been broken open.[4] These

[4] A leading antihunger effort in New Hampshire is the New Hampshire Food Bank (NHFB), the state's only food bank and a member of Feeding America. In 2008 the NHFB "distributed over 5 million pounds of donated, surplus food to

findings not only underscore the role of volunteer subjectivity, but they more broadly illustrate the negative externalities that can emerge in this unregulated system.

Food Preferences: "Change Your Taste Buds"

Depending on the agency, food preferences of clients may have minimal influence over foods received. Nutritional, cultural, or taste preferences can be disregarded, while pantry staff beliefs dictate allotments. A volunteer who worked at a pantry and soup kitchen and also served on the board of the pantry said, "the younger ones [clients] are very, very fussy, they are turning their nose up at different things.…Whereas if you're hungry, you accept and *you learn to do it and change your taste buds*" (0506, emphasis added). In the same interview as the one quoted above, this respondent reflected that "we're a spoiled society" and "there's a lot of honest need, but I think there's also those that are needy who don't help themselves" (0506). This respondent seems to believe that clients should be thankful for whatever they get, no matter what, since it is better than nothing. This is similar in a sense to how pantries are pressured into being thankful for all donations out of fear that refusal of items would jeopardize future giving (for an example, see Winne (2005)).

Believing that clients should "change their taste buds" to accommodate the food available at the pantry food represents a misalignment between clients' nutritional well-being and the pantry objective of efficiently distributing all donated food. This respondent held a position of power within the pantry and was able to make managerial-level decisions. Following through on her sentiments means that clients should adjust their personal taste preferences to whatever donors decide to donate. Client preferences are interpreted by pantry staff in a number of ways; consider the experience of this employee who worked at a smaller pantry in a northern part of the county:

> I had a guy call me today and wanted me to take his name off the list here and I said "OK." I said "did you get a job?" I know he was looking for a job, "no, but I can't eat that crap." He said, "I like to eat organic now, natural food." He said, "I can't eat this stuff, processed kind of food." He said, "not that I don't appreciate what you're doing for me, but I just can't eat that kind of food." I said, "well, get a job" or that's what I felt like saying.…Do you know how much that stuff costs? We're not the end all, we're just supplemental here, we can't provide food for you for the week. I mean its just not going to happen. (0607)

This employee appeared offended by this man's decision to stop accessing the pantry. By participating in the PEFS, these individuals relinquish rights and standards they may have in the public retail sphere (i.e., where federally and state enforced food safety regulations are upheld) and as a result are forced to gamble on the whims of the largely unregulated PEFS . This removal of food rights places food-insecure individuals in an even more food-precarious state, disempowering them beyond that which is accomplished through retail markets.

One pantry worker explained that when individuals donate food, "lots of times it's ramen noodles because you can donate a lot at a low price" (0709). Food-pantry representatives working with a food-insecure population indicated that this group prefers quick and easy meals in the form of processed products, and also lacks adequate knowledge about nutrition and cooking to make informed food selections. Simultaneously, those accessing pantries revealed that food was a flexible budget item that could be adjusted according to the demands of other expenses. This often leads to trading down of items purchased — from more expensive, healthy items to cheaper, less healthy items.

386 food pantries, soup kitchens, shelters, day care centers and senior citizen homes" (N.H. Food Bank, 2010). In total N.H. has 441 agencies registered with NHFB that provide food to 71,417 people annually. Grafton County has 18 food pantries, which "distribute non-prepared foods and other grocery products to needy clients, who then prepare and use these items where they live" and where "[F]ood is distributed on a short-term or emergency basis until clients are able to meet their food needs" (N.H. Food Bank, 2010).

Food pantry representatives commented on how clients, especially young ones, prefer quick and easy products because "it's so much easier to open a can…things that are quick" (0506). Another pantry worker commented that "it's great when they say they cook....It just makes it so much easier to give them bags of nutritional food, but sometimes they'll just want the canned spaghetti, macaroni and cheese, hot dogs…foods that are easy to prepare for families," which she acknowledged as "a problem" (0709). Efforts to reform these eating habits were evident; one pantry worker reflected on how they had tried to switch from white to wheat bread, but found that "the wheat bread was not a hit" (1215). A nutrition professional working at a nonprofit described an attempt to change her clients' eating habits. She explained that her efforts were aimed at making people more nutritionally informed by showing them that eating healthier can be more affordable:

> We will do a comparison and we will make a meal with Hamburger Helper and we'll make basically homemade Hamburger Helper.…I'll do a comparison of what Hamburger Helper costs and what it costs to make it from scratch. It's always of course cheaper to make it from scratch and then we do a taste test. And unfortunately many of the people have grown up with Hamburger Helper so that's what they like.…They don't see the difference; how salty and awful it tastes.…We'll do a whole cost analysis and they'll see it's about 59 cents a serving if you make it from scratch compared to about 79 cents a serving for Hamburger Helper. (1013)

Another pantry worker explained:

> I think it's pricing, but then we have people, you know I believe it comes from how you grew up. You know, a lot of people shop the way their moms or dads shopped. And some people were just brought up on frozen boxed food and not cooked homemade meals and so that's all they know how to purchase. (0303)

This may explain why pantries experience a demand for these easy-to-cook processed foods. While some pantries might push more nutritional options, others send contradictory nutritional messages. Not far from where the abovementioned nutritional professional worked, another pantry worker at the same agency remarked that "the stuff that's easy for us to get is pasta, canned stuff, pasta mixes, and it's not highly nutritional.…Tuna or some kind of a tinned meat, you know, with a Tuna Helper, that's the kind of stuff we get here because we don't have any way to give them fresh meat" (0607). The food being donated is free for the pantry and free for the clients, made possible through private, often corporate donors. This represents a seemingly collaborative alignment between the need to dispose of unwanted food on behalf of corporate donors and the need for food-insecure clients to consume food, yet this arrangement is rooted in a short-term outlook and power imbalance where corporate food entities are able to dump unwanted food for free upon a food-insecure population, thereby realizing short-term profit gains (for the business) at the cost of long-term health of food-insecure individuals and its effect on governments.

Assessing Collaborative Potential

The rural PEFS appears to be similar to the urban PEFS in a number of ways. It is heavily reliant upon volunteer labor and it serves a significant proportion of the population, often on a regular basis. In the rural context there is a dispersed population. While centralized population centers like cities provide efficient and short-distance transportation networks, rural networks are decentralized with people living in remote areas, often requiring automobile access. This has a few practical consequences. A dispersed population also means that community food-growing opportunities like neighborhood gardens are more difficult to organize and implement when compared to a city where a group of neighbors can have a small vegetable plot within walking distance. Contrastingly, in many rural places the transportation cost of getting to a community space where a garden may be located represents another financial and logistical barrier. Cities are also places where

people can more easily congregate to meet and organize reactive and proactive responses to inadequate food access (for example, to grow a neighborhood garden in response to being located in a "food desert"). In urban areas for instance, these have manifested in food justice efforts. In rural areas, the PEFS is the chief response to hunger and food insecurity (in addition to federal and state mandated programs).

However, the rural PEFS operates on a smaller scale with fewer numbers of people accessing it and a high degree of malleability. As described earlier in this essay, this informality has been criticized; however, this ability to adapt means that individuals who operate PEFS entities (like food pantries) can take advantage of opportunities without having to obtain approval from higher levels of bureaucracy. In addition, the rural PEFS is often located where the land, soil, water, and air resource base for growing food is abundant. In contrast to the literature that supports the claims that low-income populations prefer processed foods (Drewnowski & Specter, 2004), data from the Grafton County case shows that in the pantries that were able to obtain small amounts of fresh, perishable foods (meats and fresh fruits and vegetables), these quickly became the most popular items. As one pantry worker explained:

> Most people know that an apple is healthier than a hot dog, but those [hot dogs] are way cheaper, you know, not that they're the same in any way.…Here [at the food pantry] they would go for the things that they don't normally get their hands on, which is why those dairy products go fast and those veggies go fast. But I think in general when they are shopping they go for the cheapest, easiest thing to get through to the next week. (1215)

In another study of Grafton County, a food pantry employee described how a local hunter donated moose meat:

> **Interviewer:** What are the most popular items that you have here in the pantry?
> **Respondent 1:** Meat. It's the most expensive…
> **Respondent 2:** Oh, was it last year we got the moose meat? We got 500 pounds [230 kg]. And we're thinking, what are we gonna do with all this moose meat? And it flew out of here. I mean, people were calling us and asking us for some. (McEntee, 2011b, p. 251)

A key question emerging from this research is, "how do we harness the *assets* of both the PEFS and local food system to better serve the *needs* of food-insecure populations?" There is a demand for locally produced produce and meat on behalf of food-insecure individuals (as others have shown; see Hinrichs and Kremer (2002)). The desires of low-income consumers to eat fresh meat and produce (which often is locally produced) as well as to participate in some local food production activities (whether it be hunting or growing vegetables) have been overlooked by researchers. People accessing the PEFS in rural areas are accessing pantries, but also growing their food because it is an affordable way to obtain high-quality food they may otherwise not be able to afford (McEntee, 2011b).

Based on the information provided in this article, potential synergies between the PEFS and the local food system in the rural context exist. Specifically, a *traditional localism* engages "participants through non-capitalist, decommodified means that are affordable and accessible" where "food is grown/raised/hunted, not with the intention to gain profit, but to obtain fresh and affordable food" (McEntee, 2011, pp. 254–255). *Traditional localism* allows for local food to become an asset for many food-insecure and poor communities that are focusing on the need to address inadequate food access. How could the rural PEFS source more food locally, thereby strengthening the local economy? How could private emergency food entities like food pantries and local food advocates promote food-growing, food-raising, and hunting activities as a means to increase grassroots, local, and affordable access to food? Like many places throughout the U.S., Grafton County is home to small-scale local agriculture operations supported by an enthusiastic public and sympathetic state.

Simultaneously, there is the presence of food insecurity and a PEFS seeking to remediate this

persistent problem. The actual structure of the PEFS could be thoroughly assessed (beyond the borders of Grafton County). If warranted, this system could be redesigned to prioritize privacy and formalize procedures in terms of ensuring that client food choices are respected. A crucial next step in reforming this system to benefit low-income and minority clients is to emphasize the ability to grow, raise, and hunt food for their own needs[5] through the *traditional local* concept. This would represent a transformation in which these activities could not only be supported by the PEFS, but also draw upon the social capital of communities in the form of memories and practices of rural people from the near past, all while reducing reliance upon corporate waste. If *traditional local* efforts were organized on a cooperative model, based on community need and not only the needs of individuals, it would benefit all those participating, drawing on collective community resources, such as food-growing knowledges and skills, access to land, and tools, thereby enhancing the range of rural livelihood strategies. In this sense, these activities are receptive to racial and economic diversity as well as alliance-formation across social groups and movements, all of which are characteristic of the food sovereignty movement (Holt-Giménez & Wang, 2011).

In moving forward additional research is needed. While our findings highlight potential shortcomings, there is a lack of data exploring the rural PEFS experience. Specifically, from the demand side, we need more data about the users of this system, specifically in regard to their satisfaction with food being given to them. Are they happy with it? Do they want something different that is not available? Do they lack the ability to cook certain foods being handed out by the pantry? Feeding America's Hunger in America survey asks about client satisfaction; in its 2010 report, only 62.7 percent of surveyed clients were "very satisfied" with the overall quality of the food provided.[6] Additionally, the fact that this survey is administered by the same personnel who are distributing food donations raises methodological biases. More needs to be discovered about why such a large proportion of users is not "very satisfied." From the supply side, we need to know more about food being distributed and its nutritional value. Currently, the food being donated and distributed is unregulated to a large degree, especially in rural pantries. Also on the supply side, the source of food provided to Feeding America as well as individual state food banks and food pantries needs to be inventoried with more information beyond just its weight. Knowing the quantity of specific donated products as well as the financial benefit (in terms of tax write-offs) afforded to donors would add transparency.

Conclusion: Neoliberal Considerations and Future Directions

The findings we have presented in this article are intended to reveal important policy questions about the PEFS and local food movement; we do acknowledge, however, that it also has raised some important questions. In summary, we see opportunities to move forward in enacting a food sovereignty agenda with both local and global scales in mind. First, value-added, market-based local solutions used to address the inadequacies of the current food system are immediately beneficial. However, these should not be accepted as the end-all solution. Looking beyond them to determine what else can be accomplished to change the structure of the food system to shift power away from oligarchic food structures of the corporate food regime to food *citizens*, not only food *consumers*, would result in systemic change.

A key consideration in realizing any reform in the PEFS, and simultaneously challenging and transforming the unsustainable global food regime, is recognizing the neoliberal paradigm in which government and economic structures exist. Neoliberalism can be defined as a political philosophy that promotes market-based rather than state-based

[5] A noteworthy example of an organization that has begun to accomplish these objectives is The Stop Community Food Centre in Toronto, which was recently described by Levkoe and Wakefield (2012).

[6] The remaining categories are: "Somewhat satisfied" (31.3 percent), "Somewhat dissatisfied" (4.8 percent), and "Very dissatisfied" (1.3 percent).

solutions to social problems, while masking social problems as personal deficiencies. The PEFS is essentially acting as a vent for unwanted food in this system that also provides a financial benefit to the governing food entities (i.e., food businesses). Too often alternatives are hailed as opposing the profit-driven industrial food system simply because they are geographically localized; in reality, they may re-create the classist and racist structures that permeate the larger global system.[7] The PEFS is an embedded neoliberal response to food insecurity; while public-assistance enrollment is on the rise, so is participation in the PEFS. This is a shift in responsibility in who is providing assistance to food-insecure populations from the government to the private sector. In this sense it is a market-based approach to addressing food insecurity (i.e., by dumping food on the private charity sector, market retailers cut their own waste disposal costs), and the result is continual scarcity and the establishment of a system that reinforces the idea that healthy food is a privilege, only accessible to those with adequate financial and social capital. Along these same lines, a form of food localism exists that is arguably detrimental to those without financial and social capital; these efforts have and continue to frame food access solely as an issue of personal responsibility related to economic status and nutritional knowledge (a narrative thoroughly discussed by Guthman (2007, 2008)). This prioritizes market-based solutions to developing local food systems as well as universal forms of food education that emphasize individual health. As Alkon and Mares (2012) explain,

> Neoliberalism creates subjectivities privileging not only the primacy of the market, but individual responsibility for our own wellbeing. Within U.S. food movements, this refers to an emphasis on citizen empowerment, which, while of course beneficial in many ways, reinforces the notion that individuals and community groups are responsible for addressing problems that were not of their own making. Many U.S. community food security and food justice organizations focus on developing support for local food entrepreneurs, positing such enterprises as key to the creation of a more sustainable and just food system. The belief that the market can address social problems is a key aspect of neoliberal subjectivities. (p. 349)

Though elements of both the PEFS and the local food system have arguably been folded into neoliberalization processes through market-based mechanisms, incremental steps to change these dynamics are possible. Reframing issues of food accessibility (including food insecurity, hunger, food deserts, etc.) as issues of food justice moves us beyond an absolute spatial understanding of food issues. For instance, when we only look at physical access to food, we often disregard the more important considerations of class, race, gender (see Alkon and Agyeman, 2011), and sexual orientation that define a person's present position (and over which they often have no control) and which dictate how they engage with the food system. These considerations are present in current food-justice efforts, which seek to ensure that communities have control over the food grown, sold, and consumed there. Rural food justice has been defined using the traditional localism concept:

> Traditional localism in rural areas engages participants through non-capitalist, decommodified means that are affordable and accessible. Food is grown/raised/hunted, not with the intention to gain profit, but to obtain fresh and affordable food. A traditional localism disengages from the profit-driven food system and illustrates grassroots food production where people have direct control over the quality of the food they consume — a principal goal of food justice. (McEntee, 2011b, pp. 254–255)

Utilizing this rural form of food justice involves more than promoting individual food acquiring techniques; it involves developing organizational and institutional strategies that improve the quality

[7] For additional discussion of the political economic transition from government to governance, such as the transfer of state functions to nonstate and quasistate entities, see Purcell (2002).

of food available to PEFS entities. This is currently accomplished by some, such as when pantries obtain fresh produce through farmer donations or when a food bank develops food-growing capacity.[8] But these types of entities are in the minority. The next stage of realizing food justice, we posit, is to determine how a food sovereignty approach can be utilized in a global North context. Food justice predominantly operates to find solutions within a capitalist framework (and it has been criticized as such) while food sovereignty is explicitly geared toward the dismantling of this system in order to achieve food justice. Regime change and transformation requires more than recognition and control over food-growing resources; it requires alliance and partnership-building between groups to "to address ownership and redistribution over the means of production and reproduction" (Holt-Giménez & Wang, 2011, p.98). Adopted by organizations predominantly located in the global South, food sovereignty is focused on the causes of food system failures and subsequently looks toward "local and international engagement that proposes dismantling the monopoly power of corporations in the food system and redistributing land and the rights to water, seed, and food producing sources" (Holt-Giménez, 2011, p. 324). There is an opportunity for people in the global North not only to learn from the global South food sovereignty movements, but to form connections and alliances between North and South iterations of these movements.[9] As discussed above, the dominant food movement narrative is in sync with the economic and development goals of government (e.g., state-sanctioned buy-local campaigns) as well as marketing prerogatives of global food corporations (e.g., "local" being used as marketing label). Building a social movement powerful enough to place meaningful political pressure upon government to support a food system that prioritizes human well-being, not profit, is an immediate challenge.

Incremental solutions are necessary in order to improve the lives of people now. However, these local solutions, such as innovative farm-to-school programming and other viable models between the local food environment and the PEFS that we have discussed in this article, would be more effective at affecting long-term systemic change if they were coupled with collective approaches to acknowledge and limit the power of the corporate food regime to prevent injustice, while also holding the state accountable for its responsibility to citizens, which it has successfully "relegated to voluntary and/or market-based mechanisms" (Alkon and Mares, 2012, p. 348). Food sovereignty offers more than an oppositional view of neoliberalism, however. The food sovereignty movement advances a model of food citizenship that asserts food as a nutritional and cultural right and the importance of democratic on-the-ground control over one's food. These qualities resonate with food-insecure and disenfranchised communities, urban and rural, in both the global North and South.

[8] An example of this type of effort is that of the Vermont Food Bank, which purchased a farm in 2008 in order to supply the food bank with fresh, high-quality produce as well as to sell the produce.

[9] The U.S. Food Sovereignty Alliance has recognized the importance of building these coalitions: "As a US-based alliance of food justice, anti-hunger, labor, environmental, faith-based, and food producer groups, we uphold the right to food as a basic human right and work to connect our local and national struggles to the international movement for food sovereignty" (US Food Sovereignty Alliance, n.d., para. 1).

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Concentrations of heavy metals and pesticide residues in leafy vegetables and implications for peri-urban farming in Nairobi, Kenya

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Abstract

The primary objective of this study was to assess the levels of heavy metals, nitrate, and pesticide residues in kale (*Brassicaolaracea* var. *olecephala*), a leafy vegetable. The study was conducted in three peri-urban sites in Nairobi, Kenya, where the use of wastewater irrigation is pervasive. The results indicated elevated levels of boron (B), cobalt (Co), chromium (Cr), copper (Cu), lead (Pb), zinc (Zn) and nickel (Ni) in vegetables irrigated with wastewater in two sites. High loadings of the heavy metals Ni, arsenic (As), Pb, Cr, Cu, and Zn into agricultural soils were demonstrated to be from chicken manure. Nitrate levels were within acceptable daily intakes. Residues of diazinon, cypermethrin, biternol, and profenofos pesticides exceeded permissible maximum residue limits in kale at one site. Study findings suggest that consumers of vegetables grown in wastewater-irrigated soils may ingest significant amounts of heavy metals and pesticides. Considering these findings, reducing heavy metal deposits into soils should be a strategic aim of soil protection policies in Kenya.

Keywords

food safety, heavy metal concentrations, leafy vegetables, peri-urban, pesticide residue

Introduction

Change in dietary preferences, incomes, and urbanization have increased the demand for leafy vegetables, which has led to increased production of these vegetables in Kenya in the past decade (Onyango, Shibairo, Imungi, & Harbinson, 2008). Vegetable production systems are often characterized by intensive use of fertilizers and pesticides

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(Nugent, 2000). This is in response to consumers' demand for vegetables with characteristics such as spotlessness, freshness, and that are pest and disease-free.

The quality of water used to irrigate vegetable crops in the vicinity of cities in low- and middle-income countries has been compromised by rapid urbanization that has not been matched by improvements in water and sanitation infrastructure (Nabulo, Oryem-Origa, Nasinyama, Cole, & Diamond, 2008). Surface and well waters have consequently been exposed to contamination by industrial effluents and uncontrolled sewage, leading to the accumulation of heavy metals and other toxic materials in soil and crops, particularly leafy vegetables (Abdel-Ghani, Hefny, & El-Chaghaby, 2007). Similarly, anthropogenic inputs associated with industrialization and agricultural deposition, such as atmospheric deposition, waste disposal, waste incineration, urban effluent, traffic emissions, fertilizer application, and long-term application of wastewater in agricultural land, contribute to heavy metal accumulation (Ensink & Simmons, 2004; Emongor, 2007). Previous studies in Kenya, Uganda, Senegal, Ghana, and Pakistan have shown that use of irrigation water mixed with industrial effluent led to accumulation of toxic metals and excessive nitrates in plants (Keraita et al., 2002; Kar et al., 2007; Karanja et al., 2010).

Build-up of heavy metals contaminants in agricultural soils is of increasing concern due to potential health risks as well as detrimental effects on soil ecosystems (Qishlaqi, Moore, & Forghani, 2008). Health risks associated with wastewater include exposure to heavy metals from industrial effluent and microbiological contaminants WHO, 2006). Heavy metals are particularly hazardous because elements such as nickel (Ni), cadmium (Cd), chromium (Cr), and lead (Pb) can lead to hepatomegaly (enlarged liver) and increase the likelihood of cancer, congenital malformation, and bone and kidney disorders (Kakar, Yasinzai, Salarzai, Oad, & Siddqui, 2006).

Poor pollution-control policy and weak enforcement of industry zoning regulations have led to widespread vegetable production on parcels of land that are close to industrial and manufacturing plants and therefore prone to water and air pollution. Other pollutants from nonpoint pollution sources such as construction sites, auto garages, and oil residue and exhaust gas emissions at highways exacerbate the problem of heavy metal accumulation in peri-urban and urban farming areas. In addition, the accumulation of heavy metals in ecosystems has been attributed to excessive fertilizer and pesticide use, especially phosphates (Aydinalp & Marinova, 2003).

Some studies on public health risks associated with heavy metals have shown the necessity of measuring the accumulation of heavy metals since they pose serious health hazards to human health (Keraita et al., 2002; Nabulo, 2008; Kar et al., 2007; Karanja et al., 2010). In this study, we assess the contamination of irrigation water by more abundant metals such as boron, copper, zinc, and manganese, as well as pesticide residues, which may sometimes pose greater hazard than lead, mercury, and cadmium (Cornish & Kielen, 2004).

Pesticide bioaccumulation and biomagnification have become the weak links in the food chain. Some studies show an association between exposure to pesticides and health problems such as cancer, attention deficit (hyperactivity) disorder, and nervous system disorders, and suggest that exposure to pesticides could weaken the immune system (Faruqui, Niang, & Redwood, 2004; Kakar et al., 2006; Karanja et al., 2010). In this study, we explore pesticide bioaccumulation in the leafy vegetable kale that is grown in peri-urban areas of Nairobi. Kale is the most commonly grown and consumed fresh vegetable by both rural and urban households in Kenya and plays an important role in nutritional balance in developing countries (Okello, Lagerkvist, Hess, Ngigi, & Karanja, 2012).

Methodology and Approaches

Sampling Sites

Nairobi is at an elevation of 5,480 feet (1,670 meters) above sea level and covers an area of 270square miles (700 square kilometers). The city and its environs receive 41 inches (1,050 millimeters) of rainfall, which is bimodal, with the long rains falling between March and May and the short rains between October and December. The mean annual temperature is 62.6^0 F (17^0 C), while the

mean daily maximum and minimum temperatures are 73.4^0 F (23°C) and 53.6^0 F (12°C), respectively (Foeken & Mwangi, 2001). While irrigation activity is expected to occur during the driest months (June and September), for more than 90 percent of farmers, irrigation is a year-round activity.

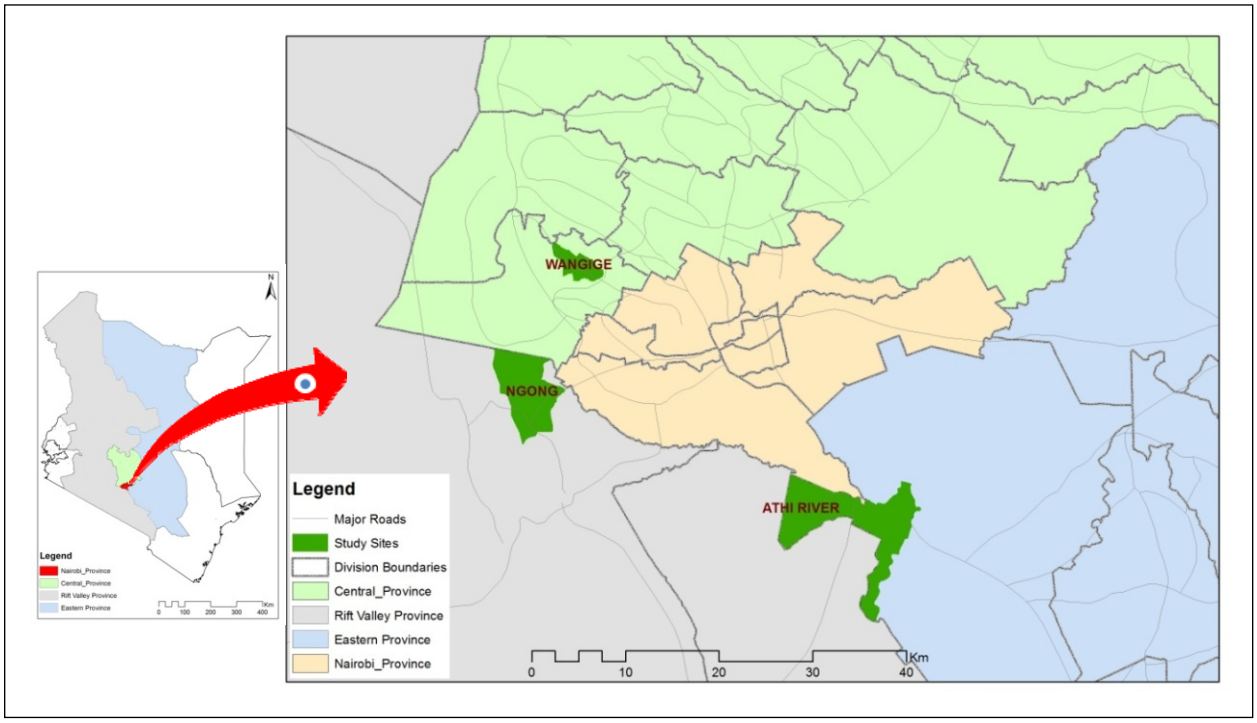
Study Area

Three peri-urban farming areas were selected based on production practices, proximity to industries, and major roads and age of settlement (figure 1). Athi River is an industrial area, while Ngong and Wangige comprise farms of recent settlement and those occupied for over 50 years, respectively. The Athi River site has several manufacturing industries, meat processing plants, wine distillers, and hide and skin processing industries. Most of the farmers in this area utilize water from the Athi River to grow vegetables using furrow irrigation. A small number of farmers exploit untreated effluent water from the meat processing plant. In the Ngong site, farmers use water from streams that flow from the Ngong Hills for the production of kale and spinach. A few farmers use highly contaminated stream water at the Kiserian town, in Ngong. The farmers in Wangige utilize water from streams or boreholes.

Kale, Soil, and Water Sampling

We collected samples of kale, soil, and water from 60 peri-urban farms (Athi River, n=16; Ngong, n=22; and Wangige, n=22). From these farms, kale leaves were picked randomly from various locations of the sample plot by moving in a zigzag manner across the plot while picking leaves from lower, middle, and upper part of each selected plant. Samples from each plot were pooled and mixed, and a subsample of 17.6 ounces (500 grams) was put into a sterile paper bag for analysis. We took irrigation water samples at the source aseptically into sterile bottles and transported them to a laboratory, where they were analyzed. Since chicken manure is the main source of vegetable nutrients, chicken manure samples were collected in the same manner in farms from Wangige. Sampling was done for both the wet and dry season in Ngong and Athi River. However, in Wangige, water samples for heavy metal analysis

Figure 1. Map Showing Ngong, Wangige, and Athi River Peri-urban Agricultural Areas



were collected only once since there was no threat of heavy metal contamination as farmers use borehole water for irrigation.

Laboratory Analysis

Soil and manure samples were air-dried to constant weight and then sieved through a 2 mm mesh wire. One gram of soil was digested in 9 ml aqua regia (1:3 HNO_3: HCl) then passed through Whatmann filter No. 1 and directly aspirated into an inductively coupled plasma (ICP) spectrophotometry for determination of heavy metals (Moenke-Blankenburg, 1993). Water samples for heavy metal analysis were directly aspirated into the ICP. The kale tissues were oven dried at 140º F (60º C) for eight hours and 0.5 g was transferred into a crucible and dry-ashed at 122º F (50º C) for 6 hours and then extracted with mild aqua regia (3 ml HCl 5M + 0.25 ml conc HNO_3) evaporated on a hot plate (Campbell & Plank, 1997) to determine the total concentrations of As, Co, Cu, Fe, Pb, Mn, Ni, and Zn in filtrate using the ICP spectrophotometry. Total heavy metal concentrations in chicken manure samples were determined by digesting 200 g (fresh weight) samples with aqua regia and analyzing them as above.

Statistical Analysis

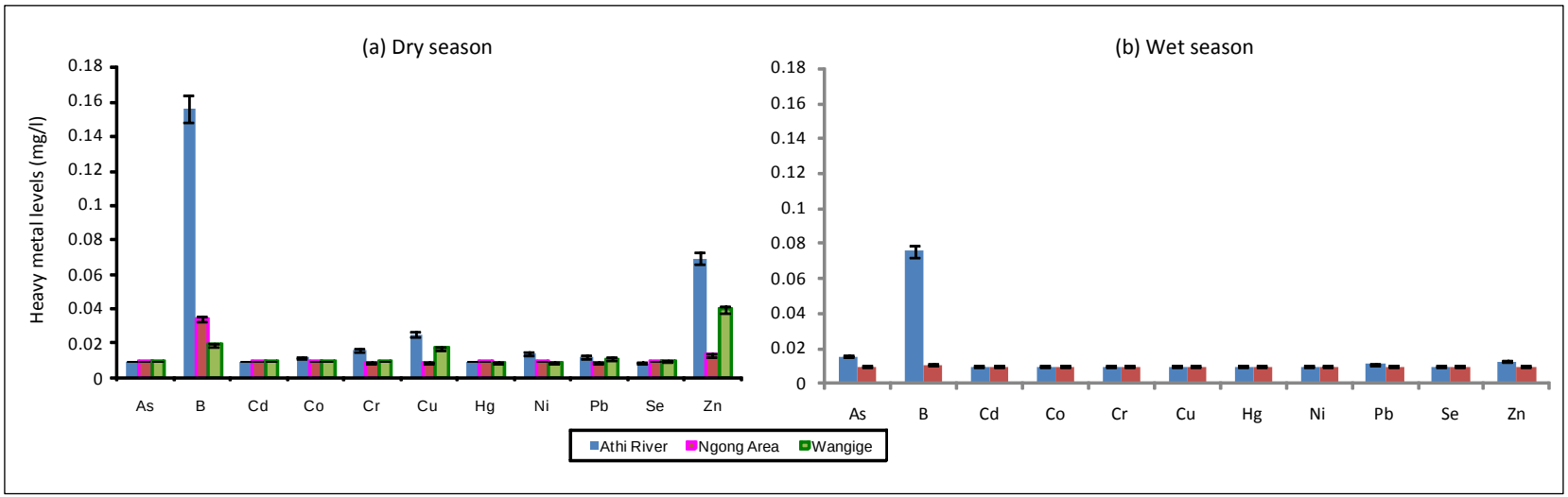
Statistical analyses were performed using XLSTAT. ANOVA and t-test were used for comparison of means between seasons. Principal Component Analysis (*PCA*) was performed to establish possible factors that contribute to the metal concentrations and source apportionment. All data sets were subjected to Factor Analysis (*FA*). The number of significant Principal Components (*PC*) was selected on the basis of Varimax orthogonal rotation with Kaiser Normalization with eigenvalue greater than 1.

Results and Discussion

Heavy Metal Concentration in Irrigation Water

Concentrations of As in water were not statistically significant among

Figure 2. Heavy Metal Concentrations in Irrigation Water in Peri-urban Sites During Nairobi (a) Dry and (b) Wet Seasons
(Athi River, n=16; Ngong, n=22; and Wangige, n=22



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the three sites in the dry season, but were significantly elevated in the wet season, with the highest levels recorded at Athi River (figure 2). William (2001) also observed that As concentrations in mine waters increased in the wet season compared to the dry season. Such seasonal variation in the concentration of As could be attributed to differences in individual As solubility, pH, and leaching by acidic rain during the wet season (Iwegbue, Egobueze, & Opuene, 2006). Similarly, in the wet season, As concentration in Athi River was significantly higher than in Ngong. Elevated heavy metal concentration in Athi River may be due to effluents from nearby manufacturing industries, meat processing plants, wine distillers, and hide and skin processing industries. Boron levels in irrigation water from Athi River (0.074 mg/L B) were elevated compared to Ngong (0.034 mg/L B) and Wangige (0.019 mg/L B). In both seasons, boron concentrations were consistently highest in Athi River. In general, heavy metal concentrations of Co, Cr, Cu, and Ni were significantly higher in the dry season compared to the wet season. Action of water dilution could be the main reason for the reduction in heavy metal concentrations during the wet season (with the exception of As) (Iwegbue et al., 2006).

While boron is essential for plant development (Jacob, 2007) the World Health Organization (WHO, 2006) notes that boron is toxic to plants in concentrations greater than 0.3–0.5 mg/L. In our study, we found boron concentration to be 0.08 mg/L, which is lower than the critical limit. Cadmium concentrations in irrigation water from the three locations were below the critical limits, implying that the water was suitable for agriculture. Nickel levels in irrigation water were highest in Athi River (0.014 mg/L Ni) compared to Ngong and Wangige (0.009 mg/L Ni), exceeding the safe standards for irrigation water approved by NEQS (National Environmental Quality Standards, 1999) of 0.001 mg/L Ni in agricultural soil. Cobalt concentrations in irrigation water from the three locations were below the Canadian Water Quality Guidelines (Canadian Council of Resource and Environment Ministers [CCREM], 1987) for irrigation (0.05mg/L) Co for irrigation on agricultural soils. However, the slightly elevated Co concentrations found in Athi River could be associated with industrialization and microenterprises, such as vehicle garages in Athi River town. *Soils*

The first principal component, *D1*, shows that 55.87 percent of the total variance is highly loaded by B, Cu, Co, and Ni, which were present in Ngong (figure 3). The heavy loading of As on *D1* in soils from Wangige may be attributed to the frequent use of chicken manure laden with this element. This component is thought to comprise heavy metal elements that are inherent in soil, originating mainly from the parent rock, including Zn.

The second component, *D*2, accounted for 44.13% of the total variance and was loaded by Hg, Mo, Pb, and Cr, indicating that their sources are emissions from industrial activities in Athi River town. Concentrations of As in soil varied by site where samples were taken and ranged from 8.15 to 17.72 mg/kg (figure 4). Normal soil concentrations of As range from 5 to 10mg/kg (Kapaj, Peterson, Liber, & Bhattacharya, 2006).

Figure 3. Principal Component Analysis of Metal Concentrations in the Three Peri-urban Sites in Nairobi

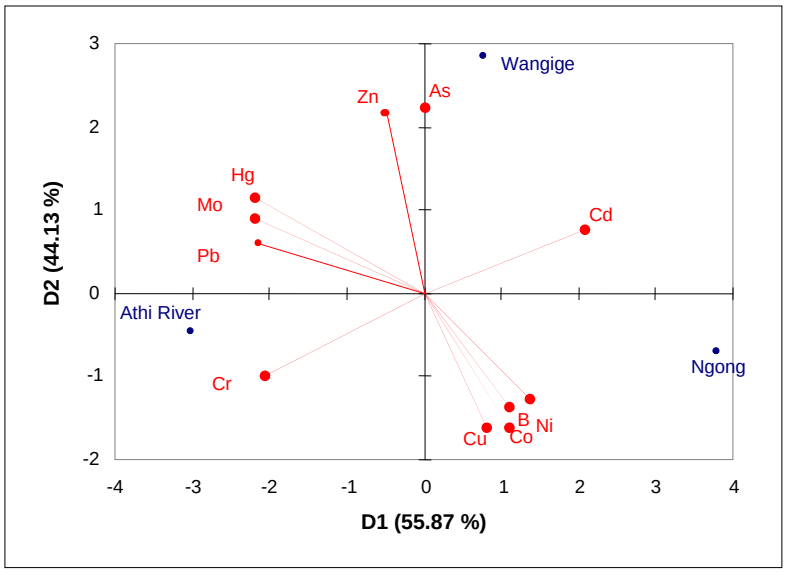
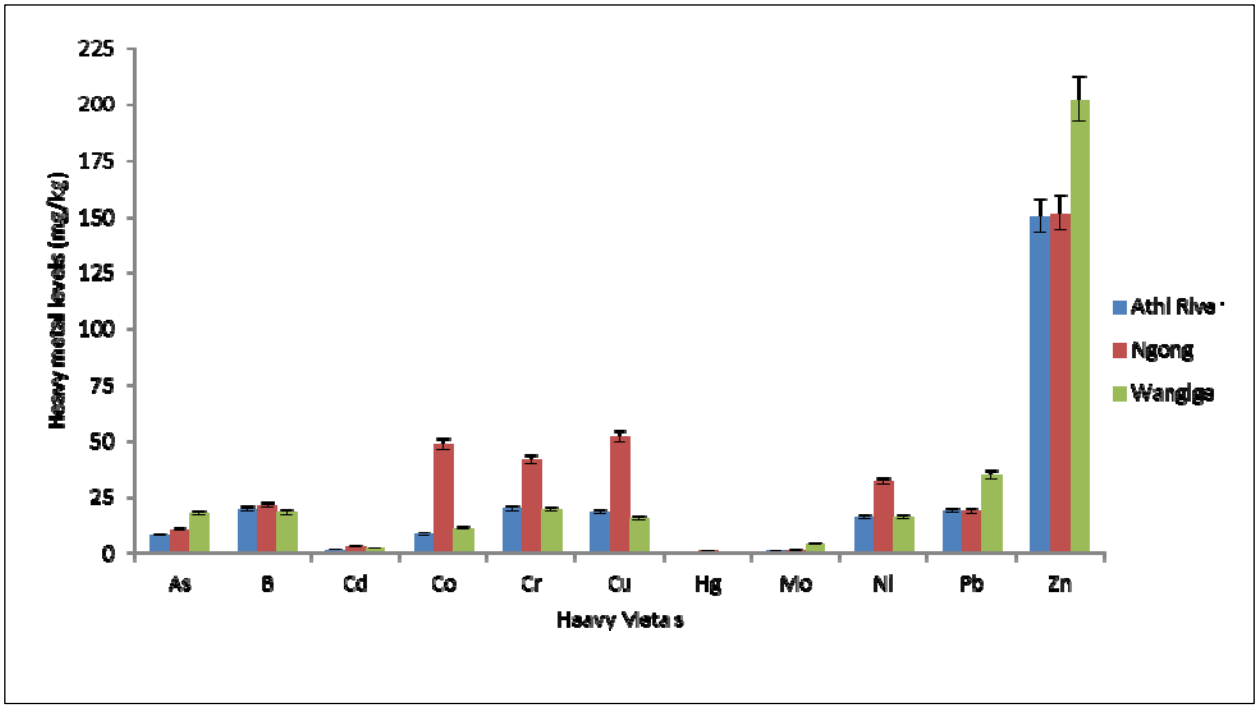


Figure 4: Heavy Metal Concentrations in Soil in Peri-urban Sites in Nairobi

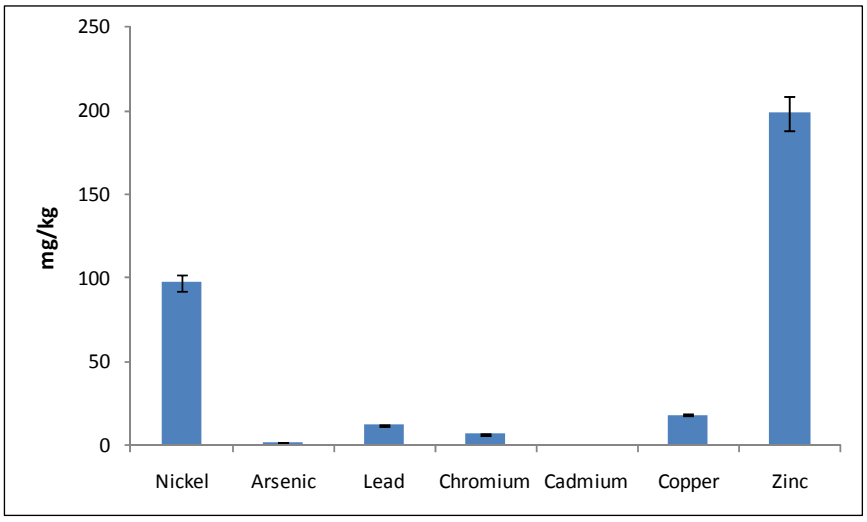


The soils from Wangige contained 17.72 mg/kg in average, which surpassed the normal concentrations and indicate that there is a high deposition of As in Wangige. This could emanate from either pesticides or fertilizers, given that the As water concentrations were similar in the three locations. Arsenic in Wangige particularly could be emanating from poultry manure (Hancock, Denver, Riedel & Miller, 2001). Organic arsenic compounds are commonly added to animal feeds, particularly those for poultry and swine, to control parasites and improve animal growth rates. Poultry manure, which is typically spread on agricultural fields for disposal and as fertilizer, has been shown to contain 15–35 mg/kg total arsenic (Morrison, 1969). The path of these arsenic feed additives in the environment is not well understood since the organic form of arsenic in poultry manure is rapidly converted into an inorganic form that is highly water soluble and capable of moving into surface and ground water. The boron concentration in Ngong was 14.72 mg/kg and in Wangige was 22.33 mg/kg, and so both were below the required 25–50 mg/kg for optimal growth of the crop. Similarly, the Cd levels in soil were below 4 mg Cd/kg, the critical limit (WHO, 2006): the highest Cd level (2.63 mg/kg) was recorded in soils from Ngong, followed by Wangige (2.02 mg/k), with the lowest in Athi River (1.15 mg/k). Soil Cr concentration were highest in Athi River and Wangige, with 19.6 and 19.4 mg/kg deposition, respectively. Livestock manure was also a significant source, contributing approximately 30 percent of Zn, Cu, As, and Cr. The guideline for chromium in agricultural soils is approximately 100 mg/kg (Karanja et al., 2010).

Manure

Manure from Wangige was found to contain Ni, As, Pb, Cu, and Zn (figure 5). A study by Nicholson Smith, Alloway, Carlton-Smith, & Chambers (2003) identified chicken manure as a major source of heavy metals in soil in England and Wales. Similarly Kalavrouziotis, Robolas, Koukoulakis and Papadopoulos (2008) found reported that the use of chicken manure raised the levels of As, Ni, Pb, Cr, Cu, and Zn in soils in Greece. Hence the elevated Ni and As concentrations observed in soils collected from Ngong and Wangige farms may have been from chicken

Figure 5. Heavy Metals in Chicken Manure from Wangige



manure fertilization. Total Co was significantly higher in Ngong (48mg/kg) compared to Wangige (11.8 mg/kg) and Athi River (8.6 mg/kg). The high levels of cobalt in Ngong may be attributed to heavy use of fertilizers, which are enriched with cobalt, generally in the range of 1–12 mg/kg, in order to amend cobalt-deficient agricultural soils. Total cobalt in soils was reported by Hamilton (1994) to generally fall within the range of 0.1–50 mg/kg.

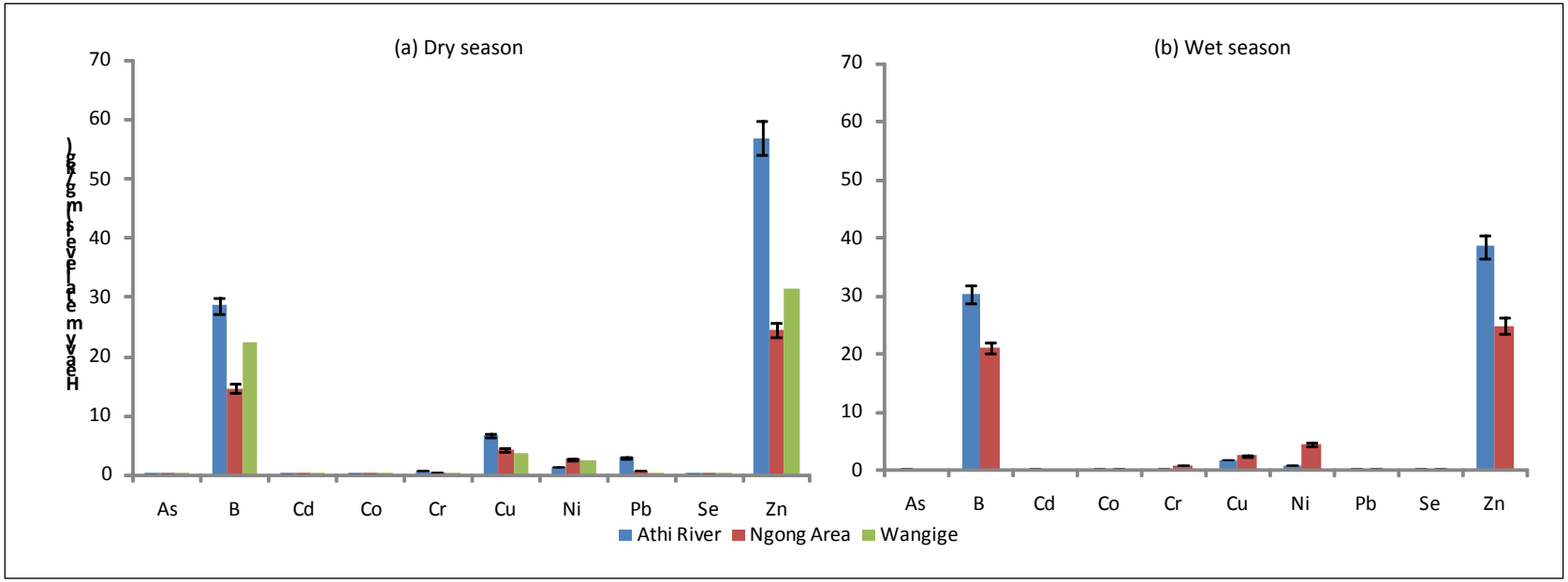
Heavy Metal Levels in Kale Leaves

Although kale normally has a low level of arsenic, we detected significant amounts of arsenic transferred from contaminated wastewater for irrigation to kale (figure 6). Arsenic content in the vegetables ranged from less than 0.01 mg/kg to 0.4 mg/kg. The maximum allowed limit of consumption of arsenic through food by a person is 0.2 mg/kg per day (World Health Organization [WHO], 2006). The presence of As in plants entering in the food chain, even in trace amounts, is a primary risk to food safety and human health by given that arsenic is classified as a toxin (WHO, 2006). Exposure to As may lead to hyperpigmentation, keratosis, carcinogenesis, cardiovascular diseases, fetal loss, premature delivery, and long-term loss of memory (Kakar et al., 2006). The major routes of As inputs to agricultural soils include atmospheric deposition, sewage sludge, animal manures, agrochemicals, and inorganic fertilizers (Emongor, 2007).

Boron content in vegetables from the peri-urban farms, ranging from 22 to 28.67 mg/kg, had optimal concentrations of this element. It is worth noting that twice the levels of Cd in kale leaves were recorded in Athi River (0.02 mg/kg) compared to Ngong (0.01 mg/kg) and Wangige (0.01 mg/kg). These concentrations were below the critical limit of 0.2 mg/kg in all the locations (Muchuweti, Birkett, Chinyanga, Zvauya, Scrimshaw, & Lester, 2006). Cd is a natural component of soil, hence its detection in trace levels in vegetable tissues at all the sites. The majority of foodstuffs will contain some Cd, and therefore all humans are exposed to natural levels (Kakar et al., 2006). Bioaccumulation of heavy metals has been shown to vary with plant species, age, environmental conditions, form, and mobility of the metal ions involved (Karanja et al., 2010). The lead levels in kale ranged between 0.39 mg/kg in Wangige to 3.06 mg/kg in Athi river, which were above the recommended level of 0.3mg/kg (Muchuweti et al., 2006). As indicated by Emongor (2007) and Nabulo et al. (2008), the high Pb level recorded in Athi River kale leaves (3.06mg/kg) results from effluent from the local industries as well as vehicular fumes from the nearby busy Mombasa-Nairobi highway.

The fact that the high variability in lead concentrations in soil did not result in substantial amounts in the leafy tissues of kale is a clear pointer to the immobility of lead in the soil (Emongor, 2007). It is estimated that an adult person of 143 lb. (65 kg) in Kenya consumes about 7.1 ounces (200 grams) of kale vegetables daily, which translated to ingestion of 0.078 mg to 0.612 mg Pb, which closely agrees with the amounts reported by Onyang et al. (2008) of 0.5 mg Pb per day. This dietary lead intake is below the lead limit of 1 mg set by the U.S. Food and Drug Administration Advisory (Gordon & Wayne, 1993).

Figure 6. Heavy Metal Concentrations in Kale Tissues from the Peri-urban Study Sites in Nairobi for Wet and Dry Seasons



The acceptable limit for human consumption of Cu is 10 mg/kg (Nair, Balachandran, Sankarnarayan, & Joseph, 1997). When Cu exceeds its safe level concentration, it causes hypertension and sporadic fever, among other conditions. Our study revealed that Cu varied from 3.6 to 6.7 mg/kg, which falls below the safe limits for human health and hygiene. It is worth noting that the highest concentration of Cu was found in vegetables in at the Athi River site (6.7 mg/kg), while the lowest concentration of 3.6 mg/kg was from Wangige, whose farmers use borehole water for opposed to the former, who use waste water for irrigation.

Nickel was also found in kale leaves in the range of 0.76–4.54 mg/kg. Kale from Ngong showed the highest nickel content during the wet season (4.54 mg/kg). The acceptable daily intake for Nickel is 3 to 7 mg/day (Agency for Toxic Substances and Disease Registry [ATSDR], 1999), meaning that the amounts reported in this study are within the safety limits of consumption.

Kale tissues accumulated trace levels of Chromium in the three study locations. Cr content could be linked to contaminated irrigation water but more likely to fertilizers and pesticides (Orhue & Ekhomun, 2010). Poor waste management practices, particularly where effluent is discharged into the river, is the main source of the higher Cr levels detected in irrigation water at Athi River. Kale leaf tissues from Wangige and Ngong had 0.52 mg/L and 0.50 mg/L levels, respectively, which were above the recommended maximum crop concentration of 0.2 mg/L Cr (Hide, Kimani, & Kimani, 2001). Kalavrouziotis and colleagues (2008) have shown that long-term use of irrigation water contaminated with heavy metals may contribute to accumulation of Ni in soil. It is evident that the continuous use of irrigation water contaminated with Ni enriched the soil and therefore enhanced accumulation in the soil-plant system (Kalavrouziotis et al.,

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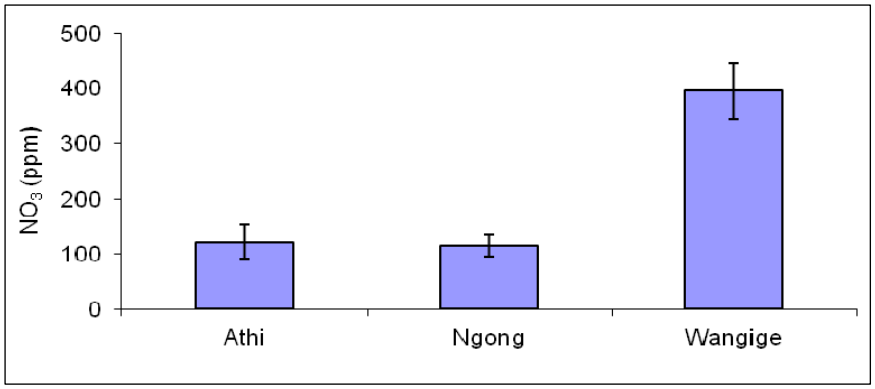
Figure 7. Nitrate Levels in Kale from Peri-urban Farms in Nairobi



2008). Various studies have demonstrated that *Brassicas olaracea* (kale) has very high hyperaccumulation and tolerance for Ni (Giordani, Cecchi, & Zanchi, 2005; Kabata-Pendias & Mukherjee, 2007).

Based on the nitrate levels in sampled kale, it was estimated that 0.381.32 mg nitrates were consumed daily based on the consumption of 7 ounces (200 g) of kale as estimated by Onyango (2008) (figure 7). Nitrate levels found in kale from the three locations were below the recommended daily intake of 0–3.7 mg per kg of bodyweight according to the World Health Organization (2000). Low levels of nitrate accumulation in the kale leaves could be attributed to the use of organic manures as a source of plant nutrients as opposed to inorganic fertilizers. Onyango and colleagues (2008) demonstrated that increased nitrate accumulation in leaves is often due to a high rate of application of nitrogen fertilizers.

Pesticide Residues in Kale

This study detected residues of organophosphates (diazinon), pyrethroids (cypermethrin and deltamethrin), and fungicides (triadimenol, prophenos, biternol, and metalaxyl) in the kale leaves (table 1).

Maximum residue limits (MRLs) have been established for individual pesticide/crop combinations by the Joint FAO/WHO Meetings on Pesticide Residues (JMPR), using residue data from supervised trials and recommending uses of pesticides, including good agricultural practices (GAPs) (FAO/WHO, 2009). Exceeded MRLs are strong indicators of violations of good agricultural practices. While the maximum initial deposits of cypermethrin and deltamethrin were less than their respective MRL values of 1 and 0.2 mg/kg for kale, diazinon on the other hand was above MRL of 0.01 mg/kg. Cypermethrin and deltamethrin have been shown to photodegrade rapidly and therefore pose far less risk to humans than organophosphates (Marei, Marei, Ruzo, & Casida, 1982). In addition, microbial degradation may enhance the degradation of the cyper- and delta methrins, which may explain the residue levels below detection limit in this study. Diazinon is an organophosphate insecticide whose toxic action is achieved by inhibiting acetyl cholinesterase, an enzyme essential for normal nerve-impulse transmission. It is highly toxic to humans and animals. Metalaxyl is an agricultural fungicide available in a variety of formulations, many of which include other active ingredients, such as mancozeb, thiabendazole, cymoxanil, and fludioxonil. Trade names are Apron Combi, Apron TZ, Max MZ, Phytospear, Ridomil Gold 2.5G, Ridomil Gold MZ, Speartek, and Wakil XL. Based on international studies, people may be exposed to residues of metalaxyl through their diet, but chronic dietary risk is minimal (U.S. Environmental Protection

Table 1. Pesticide Residues in Kale Samples from Peri-urban Farms in Nairobi

Pesticide	Level found (mg/kg)	EU MRL mg/kg
Diazinon	0.04–0.18*	0.01
Metalaxyl	0.03	0.2
Cypermethrin	0.02–1.1*	0.1
Deltamethrin	0.04	0.5
Triadimenol	0.03	0.1
Biternol	3.2*	0.05
Profenofos	4.1*	0.05

*Above the maximum permissible residue levels for the EU community.

Agency, 1994). In their study, Nasreddine and Parent-Massi (2002) found that vegetables including spinach often contained residues above the permitted levels of maneb, diazinon, cypermethrin, and deltamethrin, among other pesticides. Risks associated with the use of pesticides also could be aggravated by farmers not following the recommended preharvest interval period. This was noted among 85 percent of peri-urban farmers in a study by Ngigi, Njenga, Lagerkvist, Karanja, & Okello (2011).

Development and Policy Issues for Safe Production of Vegetables in Urban and Peri-Urban Farms

Wastewater used for irrigation was found to have concentrations of some heavy metals that exceeded recommended levels. The most likely sources of these heavy metals are industries and microenterprises such as motor vehicle garages. Government regulations on disposal of industrial effluent stipulated in Kenya's Environmental and Coordination Act (EMCA) of 1999 should be reinforced through publicity and training of farmers so as to mitigate the risks of using untreated wastewater for crop production, and thus exposing consumers.

Use of pesticides on kale by farmers to protect it from pests and diseases is widespread in Kenya. The motivation to these farmers for applying pesticides is to ensure that kale is good-looking or has high sensory quality attributes in order to meet buyers' aesthetic quality demands. In addition, use of pesticides protects kale from pests and diseases, thus increasing harvestable quantities and generating more money or higher profit margins to growers. However, observing the interval between pesticide application and harvest (i.e., the post-harvest interval) is very important to reduce exposure of consumers by ingesting residues in food. The recommended minimum preharvesting interval time between pesticide application and harvest is 15 days for most categories of pesticides. In the survey of 120 farmers (Ngigi et al., 2011) it was observed that only 15 percent observed this recommendation.

Over 70 percent of kale farmers applied livestock manure as a source of crop nutrients. Their reported motivations for applying manure were to improve soil fertility; improve the water-holding capacity of the soil; benefit from the long-lasting effects of manure; ensure that the kale was good looking and had high sensory quality attributes; and produce healthy kale. The long-lasting effects of manure in improving the water-holding capacity result in cost saving through reduced watering. Use of manure also results in savings that would otherwise be used to purchase chemical fertilizer and to hire labor for its application. Elevated levels of heavy metal contamination were detected in the soil samples, especially those meliorated with poultry manure. As a result of these findings, farmers should be made aware of a potential environmental and human health risks. In addition, efforts should be made to increase awareness of National Biofertilizer Use Guidelines (Kenya Bureau of Standards [KEBS], 2011) and where necessary to provide training on the safe use of livestock manure and other organic materials. Nonetheless it is important to note that manure acts as bioremediation agent for contaminated soils by enhancing biological processes by soil organisms.

Conclusions

This study detected significant amounts of heavy metals transferred from contaminated wastewater used for irrigation to kale. Generally, As, Ni, B, Co, Cu, and Pb were comparatively elevated at the Ngong and Athi River sites. The elevated heavy metal content in kale leaves was attributed to the use of untreated industrial wastewater used for irrigation. In this study, the highest loading of the heavy metals Ni, As, Pb, Cr, Cu, and Zn were demonstrated to be from chicken manure, mainly due to use of commercial feeds. There is limited knowledge of the quality of animal manures and the risk they may pose to the environment and humans as well as effects of heavy metals on uptake of plant nutrients. Nitrate levels were all below the recommended levels, mainly due to farmers' preferred use of organic manures as a source of plant nutrients as opposed to expensive inorganic fertilizers. Finally, violations of GAPs were apparent in the detection of pesticide residues of diazinon, cypermethrin, biternol, and prefenofos exceeding the permissible MRLs.

We recommend reducing heavy metal contamination by harmonizing and enforcing the various soil, water, and air pollution protection policies in Kenya because bioaccumulation and biomagnification of heavy metals and pesticides residue is associated with human health problems. Due to a lack of information on the consequences of ingesting food contaminated with heavy metals and pesticide residues, there is need for further studies on the effects of these two types of contaminants in human beings. Farmers should be trained on the safe use of pesticides or alternative, environmentally sustainable pest-control strategies. There is a need for researchers, development practitioners, and government extension staff to work together in farmer capacity-building and implementation of guidelines and regulations on safe use of pesticides, manure, fertilizers, and irrigation water. In regard to chicken manure and heavy metal leaching into soil, in order to secure long-term soil fertility, it is recommended that heavy metal content in animal feed should not surpass the chicken nutritional requirements. 

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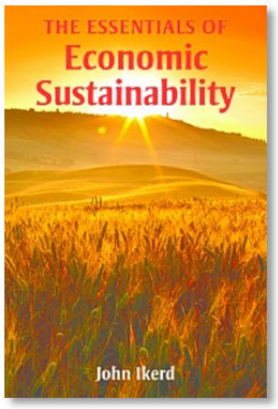

Book Review: *The Essentials of Economic Sustainability,* by John Ikerd

First of two reviews by Gilbert Gillespie, Cornell University, and Antonio Roman-Alcala, San Francisco Urban Agriculture Alliance

Ikerd, J. (2012). *The essentials of economic sustainability.* Sterling, Virginia: Kumarian Press.

Thoughts on John Ikerd's *The Essentials of Economic Sustainability*

Gilbert Gillespie, Cornell University

Published online 20 December 2012

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The Essentials of Economic Sustainability (EES) provides us with the latest version of Ikerd's thorough, thoughtful, and intelligent — but economically iconoclastic — analysis of the economic aspects of the most important social issue of our time. Ikerd is a scholar I have long admired for his thinking about the role of economics in modern life and his courage in persevering in the face of the unpopularity of his conclusions among economists and others. I truly enjoyed reading and reflecting on this book. As I read the printed text my mind often conjured up his spoken voice.[1]

I label Ikerd's *EES* a work of economic philosophy because he emphasizes the definitions of terms and the logic of his argument about "economic sustainability," which he defines as a narrowed version of the commonly cited Brundtland Commission definition, specifically: "How can we meet the *economic* needs of the present without diminishing the *economic* opportunities for the future" (p. 1— emphasis in the original as used to indicate the changes from the Brundtland Commission definition). My labeling *EES* as "philosophical" is merely to describe Ikerd's approach for the purpose of orienting readers; in no way do I intend it to be dismissive. On issues such as "sustainability" we need clearly thought-out

[1] See, for example, http://www.youtube.com/watch?v=b-zHf9iGy94

concepts and explicit theorizing about how such concepts fit together. This is what Ikerd emphasizes, although I think that in most respects *EES* is also consistent with "empirical realities." Ikerd himself describes the book, which he states that he wrote for people who are not economists, as:

> …an attempt to synthesize a set of core ecological, social, economic, and philosophical principles into a comprehensive and coherent economic paradigm that can guide the quest for economic sustainability by individuals, organizations, and governments in any part of the world at any level or stage of economic development. (p. xi)

EES is organized into nine short, but dense and not easily summarized, chapters. My summary of the gist of his argument is that our current corporate-dominated economy is not sustainable because it creates a context for decision-making that poorly serves societies and ecosystems. This results from embedded incentives for overexploiting resources, undermining community, and producing social inequalities. We need new ways of organizing the economy to better serve humans. This will require systems thinking to promote understanding the economy as part of the social and ecological systems in which it is subsidiary, and applying morality in purposive decision-making. Ikerd argues that this is not only possible, but would result in increased human happiness and well-being.

In chapter 1, "The Essential Questions of Economic Sustainability," Ikerd examines how — in our particular historical era of transformation — energy, productivity, values, and economic incentives and assumptions all influence the trajectory of change as it affects the prospects for economic sustainability. He argues that the values and incentives that currently dominate economic decision-making must be better balanced against social and ethical values if sustainability is to be achieved; this is, however, a change that would involve overcoming significant challenges.

In chapter 2, "The Essential Hierarchies of Economic Sustainability," Ikerd argues that economies are embedded in and subsidiary to the societies that they support and that, likewise, societies are embedded in and subsidiary to the ecosystems (nature) in which they exist. For him, achieving economic sustainability requires recognizing the existence of this hierarchy and then acting consistent with a hierarchy of ethical, social, and individual considerations to take advantage of the opportunities while working within the inherent limits.

In chapter 3, "Ecological Principles Essential to Economic Sustainability," Ikerd builds on the previously discussed constraints and incentives for sustainability (chap. 1) and the hierarchy conception (chap. 2) to argue that, if we humans think that our continued existence is important (a philosophical position), then we need to employ appropriate ethical considerations to help us to act in accord with ecological principles in order to become economically sustainable. He offers a systemic analysis in which he discusses the importance of the concepts of holism, diversity, and interdependence for healthy ecosystems and then transposes these concepts to apply to societies and economies.

In chapter 4, "Social Principles Essential to Economic Sustainability," Ikerd asserts that human needs go beyond simply the material ones to include finding satisfaction in social relationships. He then argues that all societies share a set of common values — "honesty, fairness, responsibility, respect, and compassion" — that, as a matter of common sense, must be enacted for people to have social relationships in which trust, kindness, and courage can emerge in balance and form the foundation necessary for a sustainable economy. Unfortunately, Ikerd argues, industrial forms of development, especially in their global, corporate variant, undermine the kinds of social relationships that he represents as being required for economic sustainability.

In chapter 5, "Essential Economic Principles of Sustainability," Ikerd proposes four economic principles as essential for economic sustainability — individuality, scarcity, efficiency, and sovereignty — and that he sees as needing to be applied as appropriate to the levels in the nature, society, and economy hierarchy. He also explains why in market societies economic efficiency cannot be

relied upon to produce sustainability, and how sovereignty — a key assumption among economists — does not really hold in modern society.

In chapter 6, "Essential Characteristics of Sustainable Economies," Ikerd conceptualizes economies as "living" entities that must be understood holistically (that is, as functioning wholes as opposed to sets of component parts that can be understood separately). These living entities are continually changing. Each has unique configurations (as opposed to operating primarily by general principles) and is purposive (that is, organized to produce particular outcomes). Finally, sustainable economies must be guided by the ecological principles of holism, diversity, and interdependence. Given this, if an economy is to be sustainable, it must "balance the three Rs of ecological *resourcefulness* [reduce, reuse, and recycle], the three Rs of ecological *regeneration* [renewal, reproduction, and reorganization] and the three Rs of ecological *resilience* — resistance, responsiveness, and redundancy" (p. 71, emphases in original). Our current economic system does not achieve these requirements and therefore for sustainability we need new, more systemic, ways of thinking, learning, and practice.

In chapter 7, "Essential Characteristics of Markets in Sustainable Economies," Ikerd examines the economic functions of markets, including providing choices, establishing economic value, allocating resources, facilitating trade, providing incentives for activities, and creating opportunities for profit. Then he argues that markets in sustainable economies would be characterized by a kind of tangible economic competitiveness that is largely absent in "today's markets," dominated as they are by large, corporate firms that are not economically competitive in many ways.

In chapter 8, "Essential Functions of Government for Economic Sustainability," Ikerd articulates a clear need for governments to exert social control to ensure that the sharing of ecological and social goods in common prevails over individual interests. This he represents as a prerequisite of a sustainable economy. He offers a long list of important functions of governments in creating sustainable economies, including making markets competitive, managing prices of goods, regulating financial firms, implementing policies that force internalization of what otherwise might be economic externalities, and regulating trade.

In chapter 9, "The Essential Mission of Sustainable Economies," Ikerd states clearly his rationale for the position that a continually growing economy based in exploiting energy and other resources simply cannot be sustainable. Therefore, he argues that we need to achieve a steady state or no-growth economy: one with the core mission of producing only a sufficient quantity of the kinds of things that will enable people to have happy, satisfying, and otherwise high-quality lives as integrated members of society. This will be a challenge.

In the foregoing paragraphs I have attempted to give potential readers a sense of the argument that Ikerd puts forward in *EES*. Perhaps not surprisingly for a person who is himself not enthralled by the religious tenets of neoliberal marketism, I found much to like in the book. Ikerd has addressed one of the key issues of our time: whether sustainability is possible under capitalism, especially in its current form as characterized by growing levels of material and energy throughputs and increasing social inequalities. Some, dubbed ecological modernists, argue that capitalism in its current form contains the seeds for a paradigm-maintaining revolution through emerging incentives for practices that will lead to sustainability (for example, Sandberg, Khan, & Leong, 2010). Others, often those influenced by Marxist thinking, argue that the incentives under capitalism make sustainability virtually impossible (for example, Magdoff, 2011). Given what I have been able to discern so far, I think that ecological modernist position is infused with excessive optimism about the prospects for success and the proposed neo-Marxist position, while very insightful, is too unpalatable to gain traction in our current context. In the sense of arguing for basic systemic change, Ikerd, in his antineoliberal solution to the problem of sustainability through fundamentally reforming contemporary "capitalism," is arguably no less radical than the neo-Marxist approach, but may be better accepted. He may be atypical in his proposed solu-

tion to our current situation of unsustainability, but he is not the only scholar who has considered this type of solution. For example, the late Thomas Lyson wrote about the social implications of what he called "civic agriculture" (2004, especially chap. 5).

Capitalism is a flexible and emerging concept, as demonstrated by Ikerd's illumination of how the concepts that undergird capitalism — and that are used to justify its manifestation in our modern time — are social constructs that have become transposed to mean very different things since the time of Adam Smith. In Smith's time their meanings and practice were integrated with community-based morality, but today many people's understandings of contemporary capitalist actor meanings and practices seem to remain anchored in the Smithian past, while these actors' practices and moral foci have acquired a new moral basis in neoliberal theology (Cox, 1999). I think that this sort of inconsistent rate of change in a society — a variant of "cultural lag" (Ogburn, 1957) — poses serious challenges for those who seek to institute the type of economy that Ikerd envisions.

Ikerd offers several considerations that I think are crucial for guiding intelligent people to act in ways that might enable sustainability for humans — his explicit intent for writing this book. He emphasizes that societies and their economies are embedded in the particular contexts of their ecosystems — ecosystems that can provide only limited quantities of particular materials for human use and can withstand only so much human burden without substantially changing them, generally toward less capacity for supporting a human population. He understands that our modern, industrial economy has evolved based on vast amounts of readily available and cheap fossil energy and the access to resources that this energy has enabled, but that this situation seems unlikely to persist in the long run. He calls on us to think systemically about the impacts of human activities, not just focus on their immediate economic implications. And he calls on us to examine the purpose of societies and economies, which he argues should be to serve their human members. The alternative to what Ikerd advocates may well be the sort of outcome that the late comedian George Carlin described in one of his bawdy routines in which he mocked humans' sense of self-importance: "We're going away…. And we won't leave much of a trace, either….The planet'll be here and we'll be long gone….An evolutionary cul-de-sac. The planet'll shake us off like a bad case of fleas" ("George Carlin," n.d., para. 3).

Despite my considerable enthusiasm about the analysis Ikerd presents in *EES* and about 98 percent of its content, I have concerns about some details in the book and some criticisms of Ikerd's argument. A good part of these are rooted in the very different mental models that economists (Ikerd) and sociologists (I) tend to use for understanding the world. For example, although I can understand why Ikerd might want to separate out "the economy" to make his discussion of sustainability more manageable, he continually brings in values and other social concepts as these shape economic understandings and decisions. In the end, I am not sure that even his description of economies being subsidiary to societies goes nearly far enough in communicating the essential social basis of economies; we humans' very understandings of the biophysical world around us and our place in it seem very much influenced by both the material world around us and our societies. Nowhere is the matter of economies being constituent parts of society in sharper relief than regarding power, that is, the socially based capacity that some people have to impose their will on others in situations that include economic ones. I am not arguing that Ikerd is unaware of this phenomenon in the context of societies that are dominated in many ways by corporate entities, increasingly those with global connections and with considerable resources for fostering particular "realities" through public relations and access to the mass media; I think he is more acutely aware than I read in his text — which I think understates the challenges posed by this kind of power for what might be very logical attempts to convert to the kind of sustainable economy Ikerd advocates.

I surmise that it was my sociological perspective that led me to cringe each time I encountered the terms "nature," "natural," and "naturally," as well as a related representations of inevitability that appear in many places in the text (for example, pp.

19, 21, 23, 41, 52, 53). It is not that I necessarily disagreed entirely with many of the points being made, for example, that in our current social context fairness is an important value. However, such use of "natural" often seemed to imply to me some type of essential quality or imputed universality that might not hold in all possible social contexts (especially non-Eurocentric ones). As Michael Bell points out in *An Invitation to Environmental Sociology* (2012, pp. 225–226), such representations and their referents represent what we interpret them to mean, and our belief systems tend to get projected onto nature (what Bell calls resonance). Sometimes this can be "unfortunate," as when certain qualities are attributed to women or to members of racial categories. So while such ideological representations may not be necessarily "false," neither are they necessarily "true." In actuality, there may be considerable variation both in ways of achieving something that seems "natural" and in the characteristics of things. Thus, this topic warrants a more careful thinking than I read in *EES*.

I think that Ikerd places too little emphasis on the topic of anthropogenic global climate change and its implications for sustainability. However, I am not faulting Ikerd on this. In just the last year, scientists have increased their information about climate change and their understanding of its seriousness. It seems that the probable rise in global mean temperatures and the unevenness of the weather that accompanies this will be something that readers will need to attend to in the future as part of efforts to achieve sustainability.

A final comment is that I found *EES* to be a dense book that was not easy to read even though I was already familiar with most of the social and ecological theorizing and information covered. In part I think this is a result of the complexity of the topic: achieving sustainability will not be simple and the density of *EES* reflects that. The challenge to readability also may due to the style in which the book is written. Had I more closely attended to the preface I would have been forewarned by Ikerd's description of his approach as coming from a co-learning philosophy:

> The reader must accept major responsibility for whatever learning or knowledge that he or she gains….No references are provided to support specific conclusions….No specific current examples are provided to show specific applications of general principles or concepts. (p. x)

Not including concrete examples, however, seems risky as a strategy and may undermine the stated goal of writing a book that would be accessible to non-economists. Although Ikerd seems to have faith that others would find examples that would be consistent with his thinking, as a social constructionist who thinks that people's understandings of their worlds are partly "real" and partly imagined, I am skeptical. For orientation and background for each chapter I recommend reading the annotated bibliography prior to reading the chapter. I also think it would be useful to have a website or companion "instructor's manual" that would have concrete pertinent examples of what Ikerd had in mind with end-of-chapter questions and the page numbers of the key sections of the books listed in his annotated bibliography. Given these considerations, I would recommend using this book chapter by chapter as part of a class or discussion group. I think such a reading would be more effective than reading it in isolation.

In the end I think reading *EES* was worth my effort. It has made me understand economic thinking and its potential for promoting sustainability in new and more favorable ways, helping me to better appreciate that "sustainable capitalism" is not necessarily an oxymoron, but the devil is in the details of how one understands capitalism. As Lyson (2004, chap. 5) pointed out regarding agriculture, most of the key decisions that have resulted in the system we now have were not made through public discussion and deliberation. Above the cacophony regarding "sustainability," Ikerd's voice directs us toward an alternative that promises greater chances of success than do the alternatives. I think we should not only listen, but to deliberate how to become more sustainable, and in what better place than the *Journal of Agriculture, Food*

Systems, and Community Development, a journal that brings together practitioners and researchers. 

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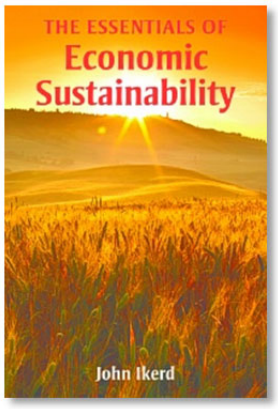

Book Review: *The Essentials of Economic Sustainability,* by John Ikerd

Second of two reviews by Gilbert Gillespie, Cornell University, and Antonio Roman-Alcala, San Francisco Urban Agriculture Alliance

Ikerd, J. (2012). *The essentials of economic sustainability.* Sterling, Virginia: Kumarian Press.

Sustainable economies: A question of values

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I work with my hands in the ground, as a farming educator in San Francisco, working to reskill communities with sustainable agricultural design tools that I believe will contribute to a more sustainable society, person by person. Specifically, my work is located in communities on the economic edge of society because I believe strongly that a "sustainable" food system must by nature be equitable. Throughout this work, while occupied with everyday concerns of running community food projects, I have remained concerned with how true, or global, sustainability might be achieved within a context of the current economic structure and its apparent commitment to endless growth. Due to my growing interest in the complex factors determining the success of projects like mine, I was excited to review John Ikerd's *Essentials of Economic Sustainability* (*EES*). Knowing of Ikerd's background in neoclassical agricultural economics and his conversion over time to a position more appropriate to an ecological economist, I figured he would have something valuable to offer regarding the prospects for transitioning to more sustainable economics.

Though it did not provide too many of the practical solutions I was hoping for, *EES* provides a concise, thoughtful exposition on the kinds of values that underpin current efforts toward sustainability, values that might prove crucial to a future economy fundamentally and foremost

committed to environmental and social goals. The book's form would also prove useful to teachers of introductory courses on sustainability, as the chapters are short and the ideas within them are simply presented yet are thought provoking, and can be considered in isolation (although certainly the chapters interrelate). Ikerd also provides lists of thoughtful questions at the end of each chapter as teaching tools for reflection and discussion, which lends itself to splitting the book into teaching modules, each module/chapter building toward a better understand of the basics of ecological economics.

It's true that the 10,000-year human experiment of agriculture has proven far more dynamic, and less stable, than our previous economy of hunting and gathering. From ancient societies irrigating their lands until the salt content precluded production, to the historic Dust Bowls, to modern soil destruction in the Amazon for soybean production, the pattern of agriculture destroying its own basis for existence is hard to ignore. But Ikerd isn't leading us back in time; the questions he raises are whether and how we can create a sustainable economics today. If (as he and so many others have pointed out) "all economic value is ultimately derived from nature and society," then *economic* sustainability really means *environmental* and *social* sustainability. The "essentials" of the former, then, must entail the protection of the latter, and yet our modern economies provide plenty of examples where the latter is compromised for the former.

Ikerd does include some useful ideas, like "solar budgets" being used as the base of government budgeting processes — knowing that at base a sustainable economy is one that relies foremost on our most sustainable energy source, the sun. He decries the misdirection of energy toward creating more economic output with fewer workers, rather than more jobs from a given amount of economic output. Similarly, he points out how prosperity can grow without growth (what Herman Daly calls "qualitative growth"), and that policies prioritizing economic growth are "more likely to compromise rather than enhance the ability of individuals to grow socially and spiritually" (p. 114). Ikerd also criticizes modern society's reliance on contracts as a function of the untrustworthy world we operate in. A sustainable economy must be built on trust, he argues, backed up by common-sense insights about the roles of trust, integrity, and honesty in human social and economic relations.

On the whole, Ikerd — considering his background in agricultural and applied economics — offers a heterodox take on capitalist economics: he is decidedly against the fixation with growth; he thinks that "free trade" regimes are damaging to the economic sovereignty of nations and that all economies are to varying degrees composed of market and government forces; he argues that "employment opportunities are too important to the overall well-being of society to be left to the economy" (p. 116); he is clearly concerned with values, and is convinced that the role of government as enforcer of cultural standards stemming from these values is crucial.

However, can a fundamentally flawed system really make the transformations Ikerd calls for? Ikerd still idealizes aspects of capitalist markets, arguing that markets contribute to "operational efficiency" (by which he means efficiency of production) and that, given conditions of economic competition (what other economists call a "perfect market"), the market's invisible hand would result in "allocative efficiency" (the satisfaction of society's *collective* needs). I've never seen a perfect market or any proof that one has led to allocative efficiency (in actuality, one sixth of the planet lives on less than $1 per day). And after 2008's economic collapse I find it ever harder to accept the notion that markets lead to productive efficiencies, when we've see them instead increase profit-making for some at the expense of the production of needed goods and services for the many. In the end Ikerd's discussion of economic principles, like that of the neoclassical economists with which he disagrees, sometimes seems mired in perfect worlds that don't hold up to scrutiny.

What I find is missing from *EES* are concrete suggestions for how to implement "principles of economic sustainability" from our current historical position. Perhaps Ikerd intentionally avoided being overly prescriptive since solutions are so regionally determined. However, if his goal was to inspire action, I think he should have gone further.

Ikerd promotes the importance of government to deliver and sustain better economic, social, and environmental conditions, but doesn't analyze relationships of power that prevent this mission, and therefore doesn't suggest initiatives to fix these relationships. He addresses the market failures that emerge from monopoly power, but not the generalized corruption that constitutes many of the world's ostensible democracies. He misconstrues the actions of individuals within economies as well, arguing (for example) that: "Women traditionally have been paid less than men in most parts of the world, not because they were less productive but because they were more willing to work in lower-paying jobs" (p. 55). This implies that women, as a collectivity, were passively accepting of this inequity, rather than forced into it by social conventions of male dominance and female dependence, and the gendered marking of socially reproductive labor (the type that generally goes unpaid around the globe). In other words, Ikerd's treatment of both the larger, macro issues of global economics with regards to corporate internationalism, and the smaller, micro issues of personal choice and participation in the market economy leaves out questions of contingent constraints based in inequities of power, such as how power relations affect the ability of someone to contribute to the implementation of sustainable values or to redress grievances through government or civil institutions.

Economic sustainability is and will likely continue to be a contentious subject. Those who see economic growth as necessary for attaining sustainability or reducing poverty are loath to criticize capitalism itself: building from the argument that growth brings money, money brings wealth, and wealth brings better human and environmental health, capitalism's dynamism will likely continue to be seen by some as a blessing. Yet even if the capitalist economy contributes to "sustainable" technology development and increasing access to consumer goods, our modern economy's crashes, tragedies, and failures — driven partly by the growth imperative's superposition over all other values — are increasingly hard to ignore. Those who, like Ikerd and myself, see *quantitative* economic growth as inherently opposed to sustainability doubt that technologies or technocratic solutions alone can solve problems that emerge from dysfunctional imperatives that themselves stem from the unique social relationships called into being by capitalism.

In attempting to provide a way forward, without being too capitalistic or socialistic, Ikerd is reaching for the middle ground, encompassing economists and environmentalists. This is admirable, and overall he succeeds. I doubt, however, that economists will accept his unavoidably values-laden vision, as theirs is a world steeped in numbers. Economists' values tend to be hidden by the presumed "objectivity" of their mathematical approach, and conceiving of our complex social-biological systems as machines with quantifiable parts makes the incorporation of values (into economic models) very difficult. This reduction of life to numbers is part of what ecological economist Richard Norgaard calls a worldview of "economism." If, in digging deeper, we find that the principles for sustainability (environmental and social values, according to the logic of *EES*) are directly and inherently precluded by the structure and ideologies of the current form of capitalist economy, how are practitioners such as myself to move forward? How might I deal with the fact that sustainably produced food costs more, making it inappropriate for me to tell my low-income friends and mentees to "vote with their fork"? How can I advocate for community-based agriculture as a valuable use of urban land, when that activity is very unlikely to compete economically with market-rate housing development or other money-making interests? Unfortunately, Ikerd does not give me much to work with in this area. Perhaps he will write another book that alludes to these less theoretical problems?

Still, I do take heart in Ikerd's sources of hope. One such source he locates in the "uniqueness of human intentionality" (p. 20). Compared with so many other beings on the planet, Ikerd reminds us that our effects on our surroundings can be shaped — and our negative effects mitigated — by the application of intention. It's not only individual positive intention motivated by values of sustaina-

bility that creates change, but also the combination of such forces into institutions and new social-structural arrangements. Ikerd's promotion of the synthesis of diverse knowledges into better and better analyses and solutions ("collective learning"), in the service of solving sustainability issues, is the idea for one such institution. This idea provides intimations toward the concept of a more decentralized and deliberative democracy as a basis for sustainability. Such a transformation of our political system could make headway toward sustainability by developing systems thinking among the populace and by reducing the voice of the currently powerful. If one accepts that our unsustainable behaviors aren't just the conscious choice of most people on the planet, and that our current governments are failing as mechanisms for social choice around environmental preservation and community development, reflecting instead mostly economistic principles, perhaps all books on sustainable economics should from now on be read as books about democratic governance, or the lack thereof.

The *Essentials of Economic Sustainability* was, for me, a reminder of the values that drive my work more than an introduction to new values or an exploration of how to change the world to bring about more democratic governance. Don't get me wrong, though: this doesn't mean it isn't a valuable book! I would recommend this book to anyone wanting a fully fleshed-out framework for understanding the hierarchies, values, and challenges of more sustainable economic systems. Considering its serious and political subject matter, it is about as un-ideological as is possible, and thus it also would make a great gift for someone who would be turned off by more polemical writing. If many more people were to be convinced of the importance of the values championed by Ikerd, I believe we'd be at least a little closer to the economically sustainable world that many of us are seeking.