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Featuring Papers from the
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Local-level Responses to Globalization in the Food System

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On the cover: The Miraflores Bioferia, one of Peru's most successful certified organic farmers markets. Locals and tourists alike shop there for artisan cheeses and breads, along with fruits, vegetables, prepared foods, and handicrafts. Independent producers and organic cooperatives receive support from local nongovernmental organizations to feed the growing demand for certified organic products. See the paper from the 2014 UVM Food Systems Summit, *"La misma realidad de cada lugar es diferente" ("The same reality of each place is different"): A Case Study of an Organic Farmers Market in Lima, Peru,* in this issue. *(Photo by Kevin Cody; used with permission)*

Featuring Papers from the 2014 University of Vermont Food Systems Summit:
Local-level Responses to Globalization in the Food System

(Continued)

Open Call Papers

Reviews

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In This Issue

Duncan L. Hilchey

Local responses to global problems

Published online March 29, 2015

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This issue features a unique collection of papers presented at the University of Vermont's 2014 Food Systems Summit, the theme of which was "local-level responses to globalization in the food system." UVM has held its Food Systems Summits since 2012, drawing scholars, practitioners, and food systems leaders throughout the country to engage in dialogue on critical food systems issues. JAFSCD was a cosponsor of the Summit last year, and managing editor Amy Christian and I enjoyed attending presentations, meeting with authors and offering some of them suggestions. Jane Kolodinsky, professor and chair of the Community Development and Applied Economics department, and Alison Nihart, assistant for the UVM Food Systems Initiative, managed the front end of the UVM Food Systems Summit papers—working with authors in presubmission preparation, editing commentaries, and helping keep folks on track. The commentaries of keynote speakers and accepted papers are summarized in Jane's thoughtful editorial. We are pleased with the hard work authors put into their papers, and the quality shows. We look forward to sponsoring the summit this year and publishing more presenters' papers in the future.

In addition to our UVM Summit papers, in this issue we offer two columns, five open-call papers, and a couple of book reviews, much of which coincidentally address UVM's Food Systems Summit theme. Starting us out are our columnists. In her Digging Deeper column, **Kate Clancy** challenges us to adopt and adapt to credible research that questions some of the food movement's cherished ideals. **John Ikerd** argues in his Economic Pamphleteer column that we need to move beyond food security and adopt food sovereignty as the core mandate for U.S. food and agricultural policy.

Next, **Amy Coplen** and **Monica Cuneo** provide a candid post-mortem case study of a failed food policy council in *Dissolved: Lessons Learned from the Portland Multnomah Food Policy Council.*

In *The Relationship Between Different Approaches to Multifunctionality of Agriculture and Choice of Methods: A Critical Review,* **Monika Korzun** identifies patterns in how the various approaches to multifunctionality are studied and argues for greater diversity and triangulation in methodology.

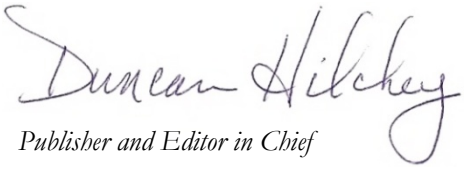
Brian Schilling, Dixon Esseks, Joshua Duke, Paul Gottlieb, and **Lori Lynch** compare samples of two generations of farmers of deed-restricted farmland and find that land generally continues to stay in production after succession in *The Future of Preserved Farmland: Ownership Succession in Three Mid-Atlantic States.*

Food insecure families with limited space in urban slums are finding creative alternatives to grow food as documented in *Creating Space: Sack Gardening as a Livelihood Strategy in the Kibera Slums of Nairobi, Kenya* by **Courtney Gallaher, Antoinette WinklerPrins, Mary Njenga,** and **Nancy K. Karanja.**

Jeanne Pourias, Eric Duchemin, and **Christine Aubry** introduce a new participatory tool (the "harvest booklet") for research and self-study of the impact of urban food production in *Products from Urban Collective Gardens: Food for Thought or for Consumption? Insights from Paris and Montreal.*

Finally in this issue we offer two book reviews. **Linda Young** reviews *Rethinking Food Systems: Structural Challenges, New Strategies and the Law,* edited by Nadia C. S. Lambek, Priscilla Claeys, Adrienna Wong, and Lea Brilmayer, and finds the analysis comprehensive but wanting in terms of answering their own question: can existing institutions lead us to a just, equitable and sustainable food system?

Similarly **Rachael Kennedy** finds Goodman, Dupuis and Goodman, *Alternative Food Networks: Knowledge, Practice, and Politics,* theoretically dense, but not without practical messages for those working on the front lines of the food movement resisting the global industrial food system.



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2014 UVM Food Systems Summit Guest Editorial

The UVM Food Systems Summit makes more room at the table

Jane Kolodinsky
University of Vermont

Published online March 29, 2015

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http://dx.doi.org/10.5304/jafscd.2015.052.017

This special issue of the *Journal of Agriculture, Food Systems and Community Development* highlights the best of the 2014 Food Systems Summit held at the University of Vermont. The Summit focused on local-level responses to globalization through the following themes: the impact of our *geopolitical context* on our food system, the *biophysical constraints* we face for food production globally, and the implications of *behavior and culture* for our food system. Using a format of refereed presentations and keynote speakers, and allowing for a dialogue between and among scholars, practitioners, policy makers, community activists and interested citizens, the Summit provided a space for lively pushing of the envelope by highlighting constraints and problems with our current food system and offering thoughtful, evidence-based solutions for improvement. Several presenters took the opportunity to go through the referee process. Five of those papers are included in this special issue, along with three commentaries written by the three keynote speakers.

What is unique about the UVM Food Summit is the complex web of inquiry, discussion, openness, and questioning of the status quo by stakeholders in the food movement who don't often come together in the same venue. Conversing about one of the presentations or at the Taste of Vermont reception held on one evening of the Summit, one might find the Vermont secretary of agriculture interacting with a full or assistant

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professor, a staffer for U.S. Senator Patrick Leahy or Bernie Sanders, the executive director of Vermont's Farm to Plate initiative, and a dairy producer or small vegetable grower. In order to foster change that can improve working conditions of farm workers, provide tasty and healthy meals to schoolchildren, improve the economic conditions of farmers, and insure food access for now and into the future it is necessary for a wide range of actors to have a seat at the same table on an equal basis. That was and remains the goal of the annual UVM Food Systems Summit. What made the 2014 Summit even more meaningful was its place as a preconference event to the joint meeting of the Agriculture, Food and Human Values Society (AFHVS) and the Association for the Study of Food and Society (ASFS)—further expanding the audience across many disciplines as well as organizations.

Despite increasing evidence that our current food system is severely challenged, including climate change that threatens food production, population growth that threatens food security, monocropping that threatens crop diversity, and globalization that requires attention to individual economic constraints and choice, discussion of big-picture issues often results in heated debate and standoffs that do not lead to viable solutions. In the U.S. and abroad, the only voices at the table are those with the power, as noted by the keynote commentaries included in this special issue. As the commentaries and several of the papers make clear, until we understand how and why a food system must make room for a variety of scales, production methods, value chains, and distribution methods, solutions will not be found to global problems that are manifested in local decisions (or the lack thereof). The commentaries and peer-reviewed papers included in this special issue all provide context and examples that illustrate why we all need a "seat at the table."

Rosamond L. Naylor, William Wrigley Professor, Environmental Earth Systems Science, and director of the Center on Food Security and the Environment at Stanford University, provides a global perspective on food systems. Her essay expounds on how a "growing appreciation for the biophysical and socioeconomic complexities of food systems is enabling communities throughout the world to manage agriculture in ways that promote healthy food products, rural income growth, and environmental services." Implicit in her commentary is the need for a coexistence among scales and diversity in agricultural production—all with an eye on environmental and social sustainability.

Nicholas Freudenberg, Distinguished Professor of Public Health and director of the doctoral program at City University of New York's School of Public Health at Hunter College, brings the focus into the realm of consumption in his commentary on *Choice, Responsibility and Health: What Role for the Food Movement?* He argues that food system change—clearly a historical challenge—requires collaboration among the food movement, policy makers, consumers, and industry. Freudenberg highlights the necessity for people to continue to remain involved despite push-back from industry and a less than warm reception from federal policy makers.

Eric Holt-Giménez, executive director of Food First/Institute for Food and Development Policy, focuses his commentary on food (in)justice, pointing out the necessity of continued food activism at all levels of the food system. Giménez has perhaps the most extreme and passionate voice of the keynote speakers, underscoring the role of true activists who aim to make change in the food system. He clearly points out the smoking gun of our industrialized food system as a major cause of many of the things that are broken in the food system.

The first two refereed papers highlight **biophysical constraints.** Nathaniel Foust-Meyer and Megan E. O'Rourke write about the (low) technology high-tunnel approach to increasing local food production in climates that do not support agricultural production year-round. They provide evidence that even relevant production methods are part of a complex system of biophysical constraints ***and*** market, policy and socio-demographic characteristics of a region. Simply expanding production capability does not insure a sustainable local or regional food system.

Sheryl Breen's paper compares and contrasts two seed conservation projects. The Svalbard Global Seed Vault preserves seeds from across the globe, while Native American seed-saving efforts in the U.S. promote cultural heritage and food sovereignty at the local and/or tribal level. What is fascinating about Breen's discussion is that the preservation of seeds and therefore cultivar diversity presents conflict between strategy

and ownership…so between *people*, even when the larger goals are similar.

The next paper highlights the **geopolitical context** of the food system. Kevin Cody presents a case study of the local food movement, specifically an organic farmers market in Peru. Even in the developing world, where we might expect to see more direct-to-consumer food distribution venues, we find "alternative" food systems. Cody compares an organic market in the global South to those in the U.S. and concludes that there are entrepreneurial opportunities in the direct-to-consumer market for rural producers in Peru. But there are also issues of food access and privilege.

The last papers in this special issue relate to **behavioral and cultural considerations** in the food system. Philosopher Beth Dixon challenges us to rethink our charity work. While many of us would believe that our volunteer time at a food pantry fulfills our obligation to help others who are food insecure, Dixon nudges us in a not-so-subtle manner to understand that volunteerism is not a substitute for activism that will change the system—activism that will result in a food system where the need for food pantries disappears.

The paper by Erin Roche, David Conner, and me brings this special issue back to Vermont, where the Summit took place. We examine the farm-to-school movement, specifically local procurement of food. While many assert that providing fresh and (even) local produce in a school setting cannot be accomplished because it is simply too expensive, Roche et al. provide evidence that pricing is only one of many complexities in farm-to-school food programs. The social networking component of a community food system is equally important.

Together, the papers in this issue clearly point out that food systems that produce enough for all, provide access to all, and are environmentally sustainable and resilient are more than farmers producing food and selling it wholesale or retail. They are more than food producers adding value to food. They are more than the resources it takes to produce food and move it to the point of distribution. They are more than a consumer's ability to find an access point and pay for nourishment. All of these papers point to the human aspect of the food system. Whether local or global, biophysical or geopolitical, or behavioral or cultural, PEOPLE are the key to a sustainable and equitable food system. The UVM Food Systems Summit that provided the impetus for this special issue was and continues to be one of the "tables" where people across many disciplines as well as organizations can come together with ideas that spark interest in developing and taking steps that will result in what the Summit organizers call "the necessary [r]evolution for sustainable food systems."

Acknowledgements

There are many people at the University of Vermont who worked diligently to ensure the success of the 2014 UVM Food Systems Summit and this special issue. Cynthia Belliveau, Doug Lantagne, and Thomas Vogelmann chaired the executive committee; Alison Nihart provided assistance, from planning and execution through follow-up; and many other faculty, staff, and students participated as hosts, discussants, and reviewers.

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DIGGING DEEPER

Bringing a systems approach to food systems

KATE CLANCY

Another argument for adaptability

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I thought of some of the systems concepts I've been writing about here when I saw the paper by Marty Heller and Greg Keoleian in the *Journal of Industrial Ecology* last fall (2014). In it they reported that a shift from the present-day average American diet to a diet based on the current USDA dietary recommendations results in an 11% *increase* in greenhouse gas emissions (GHGE). On the other hand, a shift to a 2,000 calorie diet (Americans now "consume" an average of about 2500 calories according to the USDA's retail-level food availability data [Heller & Keoleian, 2014]) results in only a 2% overall *decrease* in GHGE. Most people would expect larger decreases in GHGE given the 20% decrease in calories and considerable decreases in recommended meat consumption. But the shifts to food patterns needed to move to a healthier diet include the substitution of dairy products for meat proteins, and solid fats and added sugars represent relatively low emissions per calorie. The authors state that this may be a surprising result—but it shouldn't be if one has been following the research on foodprints for a while. What I find of most interest, however, is how the new science in the article again calls forth a need to understand the complexity in dynamic food systems, including feedback and how it is heard and treated, and heterogeneity—many actors who have different goals and decision-making procedures. What follows from this reality is the need for adaptability, clear thinking, and overcoming innate biases.

One of the major goals of much of our collective work is to align the environmental and health

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objectives of the food system. Complexity, flexibility, adaptability, attention to feedback loops, and heterogeneity are hallmarks of a systems approach to problem-solving (Institute of Medicine & National Research Council, 2015). And they all come into play when new research demonstrates that previous information is no longer valid. It turns out that people are not very good at believing new scientific findings because they interpret information with an eye to reinforcing preexistent views (Keohane, 2010). For some time now, experts have researched and written about how pre-existing beliefs "can skew our thoughts and even color what we consider our most dispassionate and logical conclusions" (Mooney, 2011, p. 2). All the work on framing that many of us have looked at in the last 10 years tells us that we take new information and place it very quickly in the slots in our brains where it seems to fit. It turns out that we also push threatening information away, at least at first, until we have time to deliberate on it (Mooney, 2011). But often we don't get to the deliberation step. Instead, because reasoning is tied up with emotion we bring up thoughts that justify previous beliefs, whether they are factual or not (Keohane, 2010).

We take new information and place it very quickly in the slots in our brains where it seems to fit. We also push threatening information away, at least until we have time to deliberate on it. But often we don't get to the deliberation step.

We *are* motivated to see the world in an accurate, realistic way. And we also can change our minds, but other goals such as not wanting to admit that we are wrong make us resistant to change our beliefs (Mooney, 2011). And it gets worse. Following a phenomenon known as "backfire," not only do people not change their minds when looking at new science, but "they may hold their wrong views more tenaciously than ever" (Mooney, 2011, p. 6). This is called "motivated reasoning" and it kicks in with no concern about the accuracy of those beliefs (Keohane, 2010). Interestingly, some research suggests that the more self-esteem a person has, the better he or she listens and accepts new information (Keohane, 2010).

I can think of many instances when new research has not been accepted or has only been accepted quite slowly, by all sides on a food systems issue. One example is the debate about energy and food miles. In the late 1990s when the formulae for calculating the average distance food travels were developed, the information about long distances seemed to favor a preference for foods produced closer to the point of consumption (Carlsson-Kanyama, 1998; Leopold Center for Sustainable Agriculture, 2002), but other research on the energy utilized to transport food different distances told a different story. Local food required in many cases more energy and emitted more carbon dioxide than regionally or nationally transported food because the trucks supplying local food had smaller capacities and required more trips (Pirog, Van Pelt, Enshayan, & Cook, 2001). Since then there has been more and better research on transportation issues in specific situations, and adaptations such as more aggregation of small loads, but the generic claim is still being made too frequently.

Another example is the debates about the nutrient differences between organic and conventional food. Many organic advocates have insisted that there were significantly higher levels of nutrients in organically produced crops, despite the fact that many experts from Europe and the United States disagree. Unfortunately, many of the studies cited were hindered by the fact that they were conducted without any input from human nutritionists. It is only recently that an extensive study by a team that did include such experts reported that there are not nutrient differences, but there apparently are significant differences in phytochemical levels which are not, with a few exceptions, nutrients (Barański et al., 2014). The research on phytochemicals is not at the point where standards can be set, so the differences can't be compared on nutrition grounds.

One more instance is the argument about whether grain subsidies cause obesity. Claims were made for many years that they did (see, for example, Schoonover & Muller, 2006)—despite credible research by both progressive and conservative researchers that showed that they do not and that eliminating subsidies would not help small farmers or decrease prices (Beitel, 2005).

While it is true that one of the reasons debates occur is because science progresses slowly, the examples above reflect something else: the refusal to admit error and to accept a consensus among experts that a particular set of scientific findings is valid.

To avoid falling into these errors we could consider the following suggestions:

(1) Recognize and accept the complexities inherent in food systems issues;
(2) Apply a basic science philosophy to recognize that research is constantly evolving;
(3) Adapt programs to new credible knowledge;
(4) Keep an open mind, be conscious of the biases that we have, and work to recognize and put them aside when new information arrives from a credible source; and
(5) Present issues in a way that resonates with and is accessible to non–science-literate audiences (Scheufele, 2014).

I would argue that continuing to not accept credible results makes policy change and problem-solving much more difficult, and certainly extends for many years the work that must be done. Not adapting and adopting the best new science unnecessarily impedes progress, and progress is hard even with the best evidence and science available to us.

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THE ECONOMIC PAMPHLETEER
JOHN IKERD

Food sovereignty: A new mandate for food and farm policy

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The historical justification for farm policy and other public policies related to agriculture has been *food security*. Contrary to current indications, farm policies should serve the common interests of the public rather than the individual interest of farmers. The U.S. Department of Agriculture (USDA) defines food security as "access by all people at all times to enough food for an active, healthy life" (USDA-ERS, 2014, para. 1). Unfortunately, the emphasis of both farm and food policy in the U.S. has been to providing enough "calories" to support active lifestyles, while placing little emphasis on health. USDA nutrition programs focus on education, clearly placing the responsibility for healthy diets on informed consumers rather than caring politicians.

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

Early U.S. farm policies emphasized keeping enough socially responsible family farmers on the land to produce enough healthful food to meet the basic needs of all. However, the priorities of farm policies shifted during the 1960s and '70s to focus on increasing agricultural productivity. Lower agricultural production costs were expected to result in lower retail food prices, making enough healthful food affordable for everyone. The farm policies of choice consistently promoted the industrialization of agriculture: specialization, standardization, and consolidation into fewer, larger farming operations. The message sent to farmers by this "cheap food policy" was to either "get big or get out."

Agricultural industrialization succeeded in reducing production costs, but failed in its fundamental purpose of providing food security. The percentage of food insecure people in the U.S. today is greater today than during the 1960s, when the shift in farm policies began. The 1968 CBS video documentary, *Hunger in America,* referred to 10 million hungry Americans (Davis & Carr, 1968). The U.S. population in 1968 was 200 million, meaning about 5 percent of Americans were food insecure. The public outrage resulting from the documentary led to dramatic changes in food assistance programs, which virtually eliminated hunger within a decade. Forty-five years later, in 2013, 15% of adults were food insecure, and more than 20% of American children lived in food insecure homes (Coleman-Jensen, Gregory, & Singh, 2014).

Furthermore, the industrial food system is linked to a different kind of food security problem: unhealthy foods. A recent global report by 500 scientists from 50 countries suggested that "obesity is [now] a bigger health crisis than hunger" (Dellorto, 2012). The U.S. obesity rates in 2012 were 27% for adults (Sharpe, 2013), 18% for children, (ages 6 to 11), and 21% for adolescents (ages 12 to 19 years) (CDC, 2014). More than one-third of children and adolescents were either overweight or obese (CDC, 2014). Furthermore, obesity has more than doubled in children and quadrupled in adolescents over the past 30 years — the era of agricultural industrialization. It's clearly time for a new mandate for farm and food policy.

Obesity has more than doubled in children and quadrupled in adolescents over the past 30 years — the era of agricultural industrialization. It's clearly time for a new mandate for farm and food policy.

Food sovereignty is a term coined in 1996 by Via Campesina, an organization of 148 international organizations advocating family farm–based, sustainable agriculture (Via Campesina, n.d.). Megan Carney contrasts the competing policies of food sovereignty and food security in a 2012 article in the *Journal of Agriculture, Food Systems, and Community Development* (Carney, 2012). The food sovereignty movement is an explicit rejection of the industrial agriculture polices forced upon "lesser-developed" nations under the guise of promoting food security. The poster child for these policies, the Green Revolution, is heralded as a great success in the U.S. but is despised by many in the parts of the world most directly affected.

In the words of Vandana Shiva, a globally prominent ecologist and Indian food activist, "The Green Revolution has been a failure. It has led to reduced genetic diversity, increased vulnerability to pests, soil erosion, water shortages, reduced soil fertility, micronutrient deficiencies, soil contamination, reduced availability of nutritious food crops for the local population, the displacement of vast numbers of small farmers from their land, rural impoverishment and increased tensions and conflicts" (Shiva, 1991, para. 1). Stacia and Kristof Nordin, long-time farming consultants in Africa, have concluded: "Farmers throughout the world were encouraged to convert from their conventional agricultural practices to the new improved [Green Revolution] methods….We are only now beginning to see some of the long term results, but it would seem that instead of ending world-wide hunger, the Green Revolution has actually fostered it" (Nordin & Nordin, n.d., para. 3).

During a global Forum for Food Sovereignty in Sélingué, Mali, in February 2007, about 500 delegates from more than 80 countries adopted the "Declaration of Nyéléni" (Nyéléni, 2007). It defines food sovereignty as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies, rather than the demands of markets and corporations" (para. 3).

The declaration continues that food sovereignty "guarantees just incomes to all peoples as well as the rights of consumers to control their food and nutrition. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food" (Nyéléni, 2007, para. 3). It offers a strategy to resist, dismantle, and replace the current corporate trade and food regime with "food, farming, pastoral and fisheries systems determined by local producers and users" (Nyéléni, 2007, para. 3). It promotes transparent trade and prioritizes local markets over national and global markets.

Food sovereignty also calls for "new social relations, free of oppression and inequality between men and women, peoples, racial groups, social and economic classes and generations" (Nyéléni, 2007, para. 3). It "empowers peasant and family farmer-driven agriculture, artisanal-fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability" (para. 3). Finally, "it defends the interests and inclusion of the next generation" (para. 3).

Agricultural industrialization has failed to provide food security either in the U.S. or anywhere else in the world. It's time for a new public policy mandate, domestically and internationally. The principles of food sovereignty obviously need to be interpreted differently in different countries, but its basic principles are just as valid in the U.S. as elsewhere. The right to food must be recognized as a basic human right, not left to the vagaries of charity or the indifference of the marketplace. Markets have never provided food security and never will.

The right to food must be recognized as a basic human right, not left to the vagaries of charity or the indifference of the marketplace. Markets have never provided food security and never will.

Farm policies to ensure food sovereignty support self-determination, relocalization, beneficial trade, environmental protection, land stewardship, social justice, and intergenerational equity. Food sovereignty is the logical public policy mandate to support agricultural sustainability and a sustainable future for humanity.

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2014 UVM Food Systems Summit Keynote Commentary

A global perspective on food systems

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There is a widespread perception, particularly among observers in the United States, that the world's food system is broken. Obesity rates now rival hunger rates in developed and developing countries.[1] Both afflictions are more prevalent than they should be given the rising prosperity and technological advances that have occurred in many parts of the world in recent decades. Private corporations dominate large segments of the global agricultural economy—most notably in seed development and distribution—and unhealthy food products are marketed widely at prices affordable to most consumers. Agricultural development strains water and land resources, and farming operations generate nutrient and chemical pollution. Food and agricultural policies in many countries favor certain interest groups with only limited consideration for the larger social good.

Yet as 2015 unfolds it is clear that a growing appreciation for the biophysical and socioeconomic complexities of food systems is enabling communities throughout the world to manage agriculture in ways that promote healthy food products, rural income growth, and environmental services. Strategies for enriching food systems are numerous and highly varied at local to global scales. No silver bullet exists to assure food-system success, and it is particularly important for critics to keep an open mind with respect to the evolving

The keynote speakers at the 2014 University of Vermont Food Systems Summit were invited to contribute commentaries to this issue of JAFSCD, which also includes presenters' papers.

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Photo of Rosamond L. Naylor by Stephen Mease.

[1] See, for example, Black et al., 2013; Food and Agriculture Organization of the United Nations [FAO], 2012; United Nations Development Programme [UNDP], 2012.

opportunities and challenges of achieving food and nutrition security both at home and abroad.

During my time in Vermont I had the opportunity to visit a variety of farms and farming communities, and it was apparent that a major shift was taking place from a focus on systems based on single commodities toward the promotion of more diverse, environmentally sound, and healthy food systems. I spoke with Doug Lantagne, Dean and Director of University of Vermont (UVM) Extension, about the challenges facing Vermont farming communities. He noted the persistent problem of rural poverty within the state and described how the priorities of UVM Extension were increasingly being driven by the need to improve rural incomes and livelihoods, rather than just by the need to solve specific crop and livestock production constraints.[2] The fact that the extension program was now engaging in both the demand and supply sides of Vermont's agricultural economy had resulted in burgeoning local food markets, improvements in school lunch programs, and higher incomes for farmers who were able to connect to value chains for diverse, healthy, and environmentally sound agricultural products.

It is important for critics to keep an open mind with respect to the evolving opportunities and challenges of achieving food and nutrition security both at home and abroad.

Policymakers in many developing countries also face the challenge of persistent rural poverty. High on their policy agendas is the need to help farmers earn an adequate living, yet there is no one-size-fits-all model of how to achieve this goal. During the past 50 years the model has often focused on improvements in staple-crop production, including the widespread dissemination of modern agricultural technologies (high-yielding seed varieties and chemical fertilizers), irrigation expansion, and the development of supply chains to reach poor communities. Along with the introduction of these "green revolution" technologies, governments have frequently relied on agricultural trade at the margin (i.e., when domestic food supplies are insufficient or in surplus of domestic demand) to ensure price stability and food security.[3] Sound governance and sensible macroeconomic policies that reinforce rural development objectives have also been critical for success. Indonesia, the world's fourth most populous country, benefited enormously from this approach; extreme poverty rates fell from 80% to roughly 15% within a generation, resulting in vast improvements in the country's food security (Falcon, 2014). China also invested heavily in agricultural research and development, irrigation, and rural supply chains. The changes in Indonesia and China together helped to bring global hunger rates down in the latter half of the 20th century.

A focus on primary staple-crop systems over wide geographic scales has led to poverty alleviation and rural development in several parts of Asia and Latin America, but success has been not been ubiquitous. In several locations, policy incentives have benefited larger and wealthier farmers, sometimes at the expense of the poorest farmers. The dissemination of green revolution technologies has been particularly difficult across Africa's heterogeneous agro-ecosystems, and irrigation has been relatively slow to develop within the continent's fractured hydrological landscape. The political commitment to reduce rural poverty and improve food security has not always been in place.

Moreover, despite gains that have emerged globally from a focus on staple commodity systems, new challenges have arisen with continued economic development and population growth. Middle-income countries such as China now face a

[2] See more at UVM Extension: http://www.uvm.edu/extension/

[3] The high-yielding seed varieties during this period were the result of classical breeding (not genetically modified organisms [GMOs]). For further information on the overall agricultural development approach, see Evans, 1998; Mosher, 1966; Schultz, 1964; Timmer, Falcon, & Pearson, 1983.

second food security challenge: how to improve the availability of and access to micronutrients (e.g., iron, vitamin A, iodine, zinc) in order to support the cognitive development, education, and productivity of their growing labor force (Rozelle, Huang, & Wang, 2014). During the initial period of the green revolution in the 1960s to '80s, there was little pressure to deliver a highly nutritious product, protect the environment, maintain food safety, and combat climate change. The goals were to eradicate massive famines through access to macronutrients and to establish a trajectory for rural development and the alleviation of extreme poverty. The sequencing of policy objectives was important in this case to avoid inadvertent triage. But to sustain agricultural productivity and protect human health into the 21st century, the environmental, nutritional, and food-safety dimensions of global food systems must be elevated substantially (Conway, 1997).

To sustain agricultural productivity and protect human health into the 21st century, the environmental, nutritional, and food-safety dimensions of global food systems must be elevated substantially.

Moving in this direction will take political will and the constructive involvement of both the public and private sectors. On my most recent visit to Indonesia in the summer of 2014 I visited sites of a newer agricultural revolution: the widespread expansion of tropical oilseeds. Once again, this revolution focuses on the development of single commodities across immense geographic areas. Soy and oil palm, in particular, have been planted across large tracts of the tropics, including the Amazonian and Southeast Asian rainforests (Byerlee, Falcon, & Naylor, in press). Indonesia is now the third largest emitter of greenhouse gases globally due primarily to the clearing of tropical land and the production of oil palm on high-carbon peat soils. Due to public pressure by non-governmental organizations (NGOs) and emerging corporate values promoting social responsibility, several large private companies involved in supply chains for tropical palm oil and soy have recently taken a leading role in transitioning production to areas that have previously been cleared for other purposes. Some of the most influential companies in the industry are advocating a zero-forest-clearing standard. Large agribusinesses are typically viewed as villains when it comes to human health and environmental outcomes, a view that in many cases is well deserved. However, these same companies provide some of the most promising opportunities for changing the structure of the entire industry in an environmentally sound direction. Nonetheless, astute public policy remains critical for providing the correct incentives for a successful transition.

Given the impact of tropical forest clearing on greenhouse gas emissions and climate change, the future direction of tropical oilseed development has serious implications for food production worldwide. In addition, these crops are consumed largely by the world's middle- and upper-incomes classes via livestock feeds and meat, cooking oil, and processed foods. The global health and environmental spillovers from these major single-commodity activities are therefore substantial, underscoring the importance of understanding the myriad dimensions of global food systems (Rueda & Lambin, 2014).

Circling back to the Vermont story, there are vital lessons to be learned from a focus on farm incomes and livelihoods, the diversification of cropping systems, and the promotion of healthy food products. The challenges of achieving these outcomes increases, however, when the analytical scale moves from local to national or global—across agricultural landscapes of varying quality and across political boundaries with varying degrees of governance. While improvements in food systems may start at the local level, fixing the "broken" world food system requires a broader view of the agents of change—including the private sector—and a deep knowledge of the biophysical, technological, and political constraints on and opportunities for change. Food systems at all scales are

connected through climate, resources, markets, international trade, and governance. I urge those working (or wanting to work) in the field of food security to keep an open mind and to strengthen their analytical capacity. These are critical needs, for there are no universal solutions that can be used or imposed successfully throughout the world's complex food system. 

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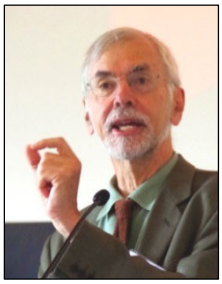

2014 UVM Food Systems Summit Keynote Commentary

Choice, responsibility, and health: What role for the food movement?

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In making decisions about how best to improve the food choices people make, the food movement faces a dilemma. On the one hand, individuals decide what to put in their mouths and swallow, suggesting that improvements require changing what's inside people's heads: their knowledge, skills, and motivation. On the other hand, growing evidence shows that these choices are shaped by external forces: the food that giant corporations produce; the relentless advertising of some products but not others; the taxes and subsidies of governments; and the proximity, price, and products offered at local retail outlets. Taking on these external influences will require changing organizations, policies, and environments.

Many of our national food fights pit proponents of changing demand for food against those who advocate changing our food supply by changing the business practices of the food industry. In theory it should be obvious that we need to do both, but in practice food activists are often polarized by this debate. More broadly, the food movement's trouble in articulating the connections between changing individuals and changing institutions and environments makes it more difficult to enlist the public in mobilizing for either type of change.

To address this obstacle to progress, I propose an ongoing dialogue within the food movement on

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Photo of Nicholas Freudenberg by Stephen Mease.

how best to reconcile and integrate these two levels of change. Such a dialogue would need to include all sectors of people seeking food change: from urban gardeners, vegan activists, and food scavengers to food studies scholars, parents organizing for better school food, and food workers seeking safer working conditions and fair wages.

Some questions that may help to inform such a dialogue include:

1. How do food industry practices, government policies, and other institutional forces influence how people think about food?
Posing individual and institutional change as polarities assumes these two levels are separate. In fact, much of what we know, believe, and feel about food is shaped by advertising, supermarket design, and the food environments in which we live, shop, work, and play (Nestle, 2013). How can we better understand the pathways by which the food industry gets inside our heads to make the choices that bring them profit seem natural and immutable?

Under what circumstances can our desires for health, community, fairness to others, or safeguarding the planet trump our craving for sugar, fat, and salt, or for paying the lowest price possible?

2. Are there "authentic" desires, needs, wants, and fears, and how are they different from the emotions "manufactured" by those seeking to profit? Can tapping more authentic emotions lead to different food choices?
Each of us is motivated by a complex web of desires and fears. Under what circumstances can our desires for health, community, fairness to others, or safeguarding the planet trump our craving for sugar, fat, and salt, or for paying the lowest price possible? How can food activists illuminate these different motivations and engage individuals and communities in assessing the costs, benefits, and mutability of these desires?

3. When is "nudging" individuals to make healthier daily choices appropriate, and when do we need to shove institutions away from practices that harm the public?
Behavioral economists urge us to structure choices so that it is easier, for example, for children on the school food line to choose fruits and vegetables than French fries and soda (Thaler & Sunstein, 2008). This approach provides one way to understand the connections between environments and behavior. How can food activists persuade our schools, supermarkets, and fast-food outlets to maximize this potential? And what are the limits of this approach? When, for example, does a society say to soda makers, no—you simply cannot advertise products that cause children to die prematurely or suffer preventable illness?

4. What kinds of education can prepare individuals to engage in both personal and political change?
The social movements of the last few decades have created pedagogies that prepare individuals for activism. The Brazilian educator Paulo Freire urges teachers to engage learners in critically analyzing their own environments so as to understand what they can change (Freire, 2000). Counter-advertising campaigns unmask the real motivations of industry advertising to diminish its appeals to consumers (Agostinelli & Grube, 2002; 2003). How can the food movement use these pedagogies to prepare children, young people, and others to be informed consumers and politicized food activists?

5. What type of movement will engage people working at each of these two levels to find common ground?
In the 1960s and '70s, the feminist movement insisted that "personal problems are political problems" (Hanisch, 1969). Women joined the movement because they believed that in order to solve their daily problems related to health care, work, sexuality, reproduction, and parenting, they needed to act politically. Can the food movement of today apply this same perspective? Can the mundane tasks of choosing foods that don't make you or your kids overweight or sick, or deciding where to shop, be connected to the questions of whether having cheap groceries and fast food is

worth letting Walmart and McDonald's not pay their workers living wages?

In the past, social movements that could link people's daily concerns with the deeper questions of who has power and how they use it to maintain injustices were often able to mobilize and unify people across class, race, gender, and other lines and to sustain action across the years needed to bring about meaningful change.

The coming years are unlikely to be easy for the food movement. The food industry is well organized to defend any threats to profitability. The current Congress is unlikely to support any meaningful changes in food policy; action in Washington will be more focused on defending past gains. In times like this, it is easy to insist that we have to focus on the day-to-day fights—or to give up on policy change and focus instead on personal-level change. Neither of these approaches is likely to take the food movement to another level. Unless we take a step back to consider the deeper questions of how to connect the two levels food activists have been working on, we are unlikely to step forward anytime soon. 

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2014 UVM Food Systems Summit Keynote Commentary

Racism and capitalism: Dual challenges for the food movement

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Our modern food system has co-evolved with 30 years of neoliberal globalization that privatized public goods and deregulated all forms of corporate capital, worldwide. This has led to the highest levels of global inequality in history. The staggering social and environmental costs of this transition have hit people of color the hardest, reflected in the record levels of hunger and massive migrations of impoverished farmers in the global South, and the appalling levels of food insecurity, diet-related diseases, unemployment, incarceration, and violence in underserved communities of color in the global North.

The U.S. food movement has emerged in response to the failings of the global food system. Everywhere, people and organizations are working to counteract the externalities inherent to the "corporate food regime." Understandably, they focus on one or two specific components—such as healthy food access, market niches, urban agriculture, organic farming, community supported agriculture, local food (farm to table), food and farmworkers' rights, animal welfare, pesticide contamination, seed sovereignty, genetically modified organism (GMO) labeling, etc.—rather than the system as a whole. But the structures that determine the context of these hopeful alternatives remain solidly under control of the rules and institutions of the corporate food regime, e.g., the farm

The keynote speakers at the 2014 University of Vermont Food Systems Summit were invited to contribute commentaries to this issue of JAFSCD, which also includes presenters' papers.

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Photo of Eric Holt-Giménez by Stephen Mease.

bill, the free trade agreements, the USDA, the World Bank and International Monetary Fund, USAID, global supermarket oligopolies, meat, fisheries, grain, seed, and input oligopolies, and big philanthropy.

Neoliberal globalization has also crippled our capacity to respond to the problems in the food system by destroying much of our *public sphere*. Not only have the health, education, and welfare functions of government been gutted; the social networks within our communities have been weakened, exacerbating the violence, intensifying racial tensions, and deepening cultural divides. People are challenged to confront the problems of hunger, violence, poverty, and climate change in an environment in which social and political institutions have been restructured to serve global markets rather than local communities.

We can't rebuild the public sphere without addressing the issues that divide us. For many communities this means addressing racism in the food system.

Notably, the food justice movement has stepped up—supported largely by the nonprofit sector—to provide services and enhance community agency in our food systems. Consciously or not, in many ways the community food movement, with its hands-on, participatory projects for a fair, sustainable, healthy food system, is rebuilding our public sphere from the ground up. This is simply because it is impossible to do one without reconstructing the other.

But as many organizations have discovered, we can't rebuild the public sphere without addressing the issues that divide us. For many communities this means addressing racism in the food system. The food movement itself is not immune from the structural injustices that it seeks to overcome. Because of the pervasiveness of white privilege and internalized oppression in our society, racism in the food system can and does resurface within the food movement itself, even when the actors have the best of intentions. It does no good to push the issue aside because this undermines the trust we need to be able to work together. Understanding why, where, and how racism manifests itself in the food system, recognizing it within our movement and our organizations and within ourselves, is not *extra* work for transforming our food system; it *is* the work.

Understanding how capitalism functions is also the work, because changing the underlying structures of a capitalist food system is inconceivable without knowing how the system functions in the first place. And yet many people trying to change the food system have scant knowledge of its capitalist foundations.

This is because in capitalist countries the foundational political-economic structures are assumed to be immutable and are rarely systematically (or systemically) questioned. Doing so immediately uncovers the structural causes of the profound economic and political disparities between social classes (thus contradicting the notion of a classless society). Tragically, critical knowledge of capitalism—vital to the struggles of social movements throughout the 19th and 20th centuries—has largely disappeared from the lexicon of social change, precisely at a time when neoliberal capitalism is penetrating every aspect of nature and society on the planet and is exacerbating the intersectional oppressions of race, class, ethnicity, and gender.

Luckily, this is changing as activists in the food movement dig deeper to fully understand the system behind the problems they confront. Many people in the global South, especially peasants, fishers, and pastoralists, can't afford *not* to understand the socio-economic forces destroying their livelihoods. The rise of today's international food sovereignty movement, for instance, is part of a long history of resistance to violent, capitalist dispossession and exploitation of land, water, markets, income, labor, and seeds. Underserved communities of color in the global North—there as the result of recent and historical waves of colonization, dispossession, and exploitation—form the backbone of the food justice movement. Under-

standing *why* people of color are twice as likely to suffer from food insecurity, obesity, hypertension, diabetes, and other diet-related disease—even though they live in affluent northern democracies—requires an understanding of the intersection of capitalism and racism.

Activists across the food movement are beginning to realize that the food system cannot be changed in isolation from the larger economic system. Sure, we can tinker around the edges of the issue and do useful work in the process. However, to fully appreciate the magnitude of the challenges we face and what will be needed to bring about a new food system in harmony with people's needs and the environment, we need to understand and confront the social, economic, and political foundations that created—and maintain—the food system we seek to change.

The food system cannot be changed in isolation from the larger economic system.

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High tunnels for local food systems: Subsidies, equity, and profitability

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Abstract

High tunnels are expanding opportunities to increase local food production in the midst of a globalized food system. They can overcome biophysical growing constraints by buffering temperatures to extend the growing season and shelter crops from extreme weather events. In 2010, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) began subsidizing the purchase of high tunnels. However, many questions remain about the factors influencing participation in the program and its impacts. Using mixed-methods research, this paper assesses the biophysical, market, and socio-demographic factors influencing NRCS high tunnel adoption in the U.S. and examines how food production in high tunnels affects farmers, consumers, and the local food movement. Results show that the number of NRCS high tunnels per county increased in relation to a mixture of biophysical (high latitude, proximity to the coast, small average farm size, and high percent of farmland in vegetable production), market (high direct-to-consumer sales, good access to grocery stores, and high median household income), and socio-demographic (high percentage of nonwhite population, metropolitan counties with more than 250,000 people, and adjacent urban counties with fewer than 20,000 people) factors. According to our survey of Virginia high tunnel growers, high tunnel produce is largely sold locally (within 50 miles or 80 km of production) and marketed direct-to-consumers in Virginia. Many growers in Virginia who would not have purchased a high tunnel without NRCS support plan to purchase

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additional high tunnels in the future even without a subsidy. High tunnels are an emerging part of the U.S. local food movement, but work remains to ensure that their benefits reach all sectors of U.S. society.

Keywords
globalization, local food, season extension, Natural Resources Conservation Service (NRCS), Seasonal High Tunnel (SHT) initiative

Introduction

Food insecurity[1] is on the rise globally (Khoury, Bjorkman, Dempewolf, Ramirez-Villegas, Guarino, Jarvis, Rieseberg, & Struik, 2014). Many attribute this to volatility in global markets and food supply (Food and Agriculture Organization [FAO], 2008). Other criticisms of the globalized food system include increasingly homogeneous production and consumption patterns (Khoury et al., 2014; O'Hara & Stagl, 2001), and negative impacts on personal health and quality of life (Kennedy, Nantel, & Shetty, 2004). In the search for solutions, increasing local food[2] production has been offered as one option to boost food security and combat the ill effects of globalization (Porter, Dyball, Dumaresq, Deutsch, & Matsuda, 2014).

In the United States, local food production and consumption is on the rise. From 1992 to 2007, direct-to-consumer sales grew from US$404 million to US$1.2 billion, growing twice as fast as total agricultural sales in the U.S. (Tropp, 2010). Local food's market share has since expanded to US$6.1 billion in 2012, which is approximately 1.5% of total U.S. farm sales (Low et al., 2015). The amount of food that can be grown, marketed directly to consumers, and consumed locally is often limited by market capacity and biophysical growing constraints (Martinez et al., 2010; Timmons, Wang, & Lass, 2008). High tunnels are emerging as a technology that can increase local food production by protecting crops from cold temperatures and extreme weather events (Hood, Little, Coatney, & Morgan 2011; O'Connell, Rivard, Harlow, Peet, & Louws, 2012).

While there are a variety of high tunnel designs, most share several common attributes. They are covered by clear plastic, passively heated by solar energy, and built directly over the soil (Lamont, McGann, Orzolek, Mbugua, Dye, & Reese, 2002). One high tunnel typically covers an area of around 2,000 square feet (186 square meters) (University of Illinois Extension [UIE], 2014). The cost of construction is roughly US$2 per foot^2 (0.1 m^2) (Coolong, 2012), which is much less than constructing a conventional greenhouse (Hood et al., 2011; Ochterski, 2012). They are predominately used to produce high-value and specialty produce (Cheng & Uva, 2008; Winter, 2008). One standard high tunnel (30 x 70 ft. or 9 x 21 m) with 195 slicer tomato plants could net as much as US$5,200 in a single growing season (Chase, 2012). This equates to approximately US$100,000 per acre,[3] compared to netting US$20,000 per acre per year for high-value vegetables grown in the field (Chase, 2012).

The affordability of high tunnels and their potential to extend the growing season have made them profitable for a growing number of farmers (Carey, Jett, Lamont, Nennich, Orzolek, & Williams, 2009; National Center for Appropriate Technology, 2009). Survey data collected at three farmers markets in Michigan showed that customers were willing to pay premium prices for salad greens, spinach, and tomatoes late and early in the year (Conner, Montri, Montri, & Hamm, 2009). Forty-nine percent of the respondents indicated that they would pay up to US$3.00 extra per head of lettuce in the winter months (Conner et al., 2009). Additionally, growers report that high tunnels help them to retain their customer base because they have produce to sell more consistently throughout the year (Arnold & Arnold, 2003).

[1] "Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2008).

[2] Local food as defined by the U.S. Congress in the 2008 Food, Conservation, and Energy Act is any regionally or locally agricultural product produced within less than 400 miles (644 km) from its origin, or within the State in which it is produced (Martinez, 2010).

[3] 1 acre=0.4 hectare

High Tunnels and the NRCS

In response to the growing demand for local foods, the USDA instituted the Know Your Farmer, Know Your Food initiative to increase the connection between all levels of agricultural production and the consumer (USDA, 2013). In support of this initiative, the USDA tasked the Natural Resources Conservation Service (NRCS) with administering the Seasonal High Tunnel (SHT) initiative in 2009 (referred to throughout this paper as the NRCS high tunnel program), under the umbrella of the Environmental Quality Incentives Program (EQIP). In 2011, USDA then–deputy secretary Kathleen Merrigan made a statement attempting to directly link the NRCS high tunnel program with benefits to the local food system:

> By capturing solar energy, seasonal high tunnels create favorable conditions enabling farmers to grow vegetables, berries, and other specialty crops in climates and at times of the year in which it would not be possible otherwise. Farmers who sell their high tunnel produce locally benefit from the extra income and the community benefits from the availability of fresh, locally grown food. (Merrigan, 2010)

The NRCS also stated a goal of serving historically underserved groups of farmers, including beginning (those operating their current farm for less than two years) (USDA NASS, 2014), and non-white farmers (USDA NRCS, 2014).

Under the NRCS high tunnel program, individual farms have been eligible to receive up to US$4,116 toward the construction of a 2,178 square foot (202 m^2) or smaller high tunnel (USDA NRCS, n.d.). After four years of government support in the U.S., it is time to examine the factors driving NRCS high tunnel adoption and to explore their impacts. Specifically, this paper will address the following questions:

(1) Where have NRCS high tunnels been built?
(2) What influence do biophysical, market, and socio-demographic factors have on NRCS high tunnel adoption and distribution?
(3) Are high tunnels helping farmers, consumers, and/or the local food movement?

Methods

To address our research questions, we employed mixed-methods research strategies. These included geographic information system (GIS) mapping and statistical analysis of the nationwide distribution by county of NRCS high tunnels in relation to county-level biophysical, market, and socio-demographic factors. We also surveyed a subsample of high tunnel growers in Virginia to better understand how some farmers use high tunnels, and whether they are satisfied with the NRCS high tunnel program.

GIS High Tunnel Mapping

High tunnels funded by the NRCS from January 2010 through December of 2013 were mapped to show their distribution throughout the U.S. Data about NRCS high tunnels were obtained through a Freedom of Information Act request. High tunnel population data were totaledand mapped using ArcMap 10.1. To estimate total growing space covered by NRCS high tunnels, each high tunnel was assumed to be 2,000 ft^2 (186 m^2) (UIE, 2014).

Regression Analysis

A generalized linear model was constructed to examine relationships between county-level biophysical, socio-demographic, and market variables and the total number of NRCS high tunnels adopted per county in the U.S. until December 2013. The analysis used a negative binomial regression (O'Hara & Pirog, 2013) to account for non-normal and overdispersed data. All statistical calculations were executed using R 3.0.2 (R Development Core Team, 2010).

The biophysical variables that were examined included latitude (U.S. Census Bureau, 2014), location outside the arid Midwest, average farm size (in acres) (USDA NASS, 2014), and vegetable production acreage (USDA NASS, 2014). Each was analyzed to describe a county's location and agricultural growing conditions (Wielgolaski & Inouye, 2003). States considered as "arid Midwest" (Arizona, Colorado, Idaho, Kansas, Montana,

Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) were coded as 0, and all other states were coded as 1. Vegetable production acres per county (USDA ERS, 2014) were divided by the total farm land per county prior to analysis (USDA NASS, 2014).

The market variables analyzed were indicators of the strength of the food system before the advent of the NRCS high tunnel program. The specific, local food system factors examined were the percent of direct-to-consumer sales compared to total agricultural sales in 2007 (USDA ERS, 2014), the number of farmers markets per thousand people in 2009 (USDA ERS, 2014), and the percent of farms with community supported agriculture (CSA) programs in 2007 (USDA ERS, 2014). Direct-to-consumer sales include the total agricultural sales directly to individuals via farm stands, farmers markets, CSAs, or pick-your-own operations (USDA ERS, 2014; Low and Vogel, 2011). Median household income in 2010 was used in the analysis as an indicator of consumer buying power, and the percentage of people with low access to food in 2010 (USDA ERS, 2014) was included as an indicator of food insecurity. According to the USDA definition, households within one mile (1.6 km) of a grocery store have good access to food in urban areas; in rural areas, that distance is increased to 20 miles(32 km) (USDA ERS, 2014).

The socio-demographic factors analyzed included characteristics of county and farmer populations. Specific characteristics of the county populations examined were the percentage of the total population composed of minority individuals (U.S. Census Bureau, 2014), urbanization as measured by the Rural Urban Continuum Code (RUCC), and the percentage of the population voting for the Democratic candidate in the 2012 presidential election (U.S. Geological Survey, n.d.). Specific characteristics of the farmer populations included the percentage of non-white (USDA NASS, 2014) and beginning farmers (USDA NASS, 2014). RUCC values range from one to nine and were developed by USDA to characterize counties by their degree of urbanization and proximity to metropolitan centers (USDA ERS, 2013). Counties with an RUCC value of 3 (i.e., metropolitan counties with fewer than 250,000 people) or 4 (i.e., nonmetropolitan counties with an urban population of 20,000 or more, and adjacent to a metropolitan area) were coded as 1, and all other counties were coded as 0.

Farmer Survey

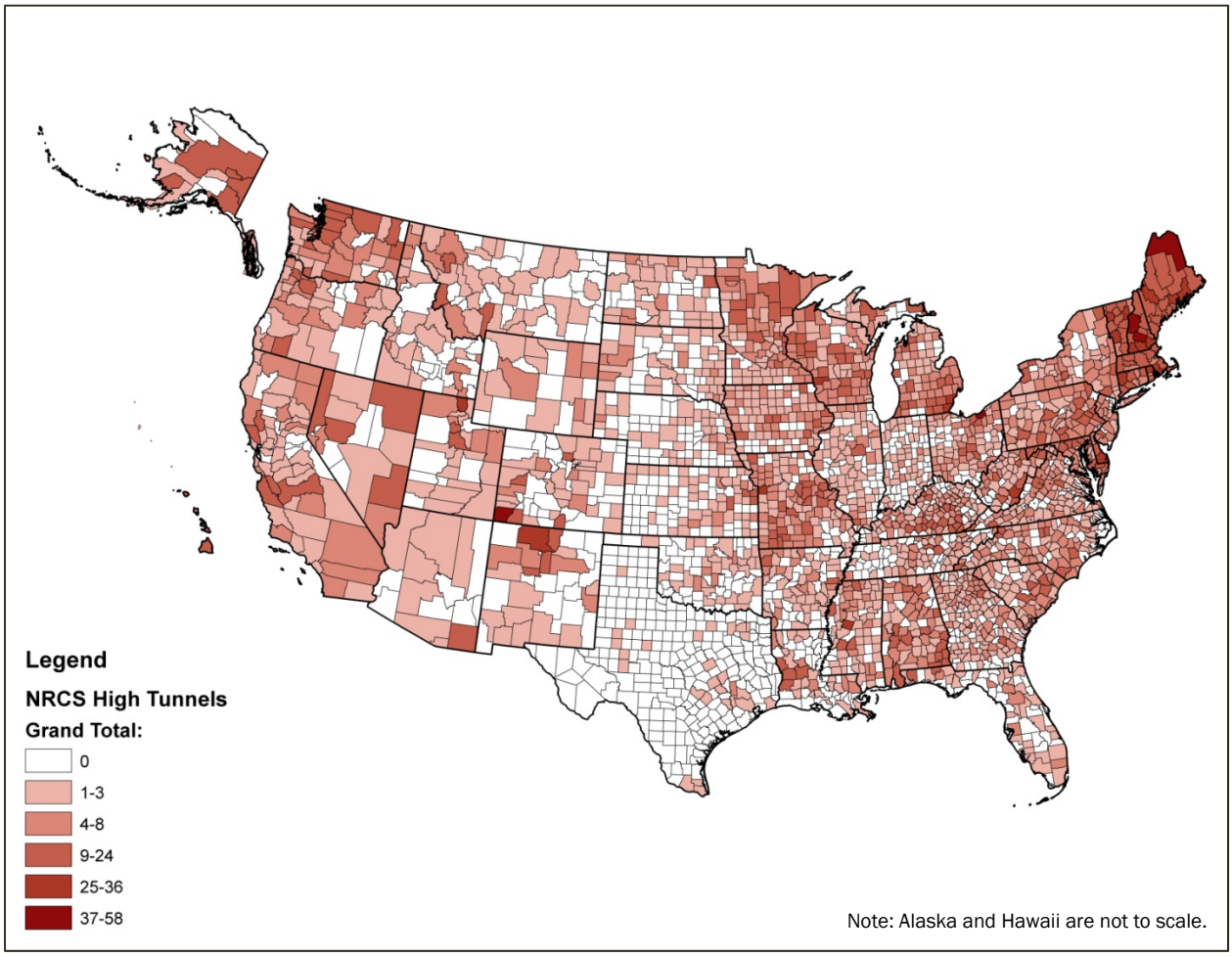
High tunnel growers in Virginia were surveyed to elicit details about their demographics, production practices, sales venues, revenue, and satisfaction with the NRCS high tunnel program. Our survey contained 13 questions and was distributed using email lists via Virginia Cooperative Extension, the Virginia Association for Biological Farming, the Catawaba Sustainability Center (Catawaba, Virginia), and the Local Food Hub (Charlottesville, Virginia). Responses were collected by VT Survey (survey.vt.edu), facilitated by Virginia Tech. After receiving approval from the Institutional Review Board at Virginia Tech (IRB #10-1377), an email soliciting survey participation was distributed in April 2014 and was followed by a second email solicitation two months later. Survey responses may have been suppressed due to the Internet-based survey collection method (from those who do not have Internet access) or due to farmers' lack of affiliation with the survey distribution outlets specified above.

Results

GIS High Tunnel Mapping

Between January 2010 and December 2013, the NRCS high tunnel program (USDA, 2013) provided cost-share to qualifying growers for the construction of 9,489 high tunnels. Under the program, 1,810 high tunnels were contracted in 2010, 1,638 in 2011, 3,043 in 2012, and 2,998 in 2013. Assuming an average size of 2,000 ft^2 (186 m^2) per high tunnel (UIE, 2014), these high tunnels cover roughly 436 acres (176 ha) (0.027% of total harvested vegetable acreage in the U.S.) (USDA NASS, 2014). The states that adopted the most NRCS high tunnels were Alaska (513), Missouri (480), and Michigan (408); the states that adopted the least were Nevada (5), Arizona (22), and Wyoming (31). Mapping shows that NRCS high

Figure 1. Number of USDA Natural Resources Conservation Service (NRCS) High Tunnels in the U.S. Funded January 2010–December 2013, by County



tunnels are not uniformly distributed throughout the U.S. (Figure 1).

Regression Analysis

Biophysical factors showed the strongest relationship with NRCS high tunnel adoption compared to market and socio-demographic factors (Table 1). Latitude was the strongest predictor of NRCS high tunnel adoption in the U.S.; counties at higher latitudes adopted more NRCS high tunnels than counties at lower latitudes. States outside the arid Midwest were more likely to adopt NRCS high tunnels than states inside it. Average farm size was negatively correlated with the number of NRCS high tunnels per county, meaning that NRCS high tunnels are more abundant in counties with a higher proportion of small farms. Additionally, NRCS high tunnel numbers increased with increasing amounts of land used for field vegetable production (Table 1).

Market variables also influenced NRCS high tunnel adoption. As the median household income increased in a county, so did the number of NRCS high tunnels (Table 1). Furthermore, NRCS high tunnel adoption occurred where there were already relatively robust food systems. Where there was good access to grocery stores, NRCS high tunnel adoption was high (USDA ERS, 2014). Where direct-to-consumer sales were high in 2007, NRCS high tunnel adoption was also high. However, farmers markets and CSAs per county were not specifically related, individually, to NRCS high tunnel adoption.

Two significant relationships were found

Table 1. Relationships Between USDA Natural Resources Conservation Service (NRCS) High Tunnel Adoption and Biophysical, Market, and Socio-demographic Variables

	Variable	Estimate	*p*-value[a]
Biophysical	Latitude[b]	9.06e-02	<0.0001
	Outside the arid Midwest[c]	5.61e-01	<0.0001
	Average farm size (acres) (2007)[d]	–1.24e-04	<0.0001
	Vegetable production (acres)[d]	7.80e-05	<0.01
Market	Direct-to-consumer sales (%) (2007)[e]	4.33e-02	<0.0001
	Median household income (2010)[e]	4.60e-06	<0.01
	Food access (% of total population) (2010)[e]	2.86e-03	<0.01
	CSAs (% of total farms) (2007)[e]	5.17e-01	0.09
	Farmers markets (# per 1,000 people) (2009)[e]	1.26e-01	0.74
Socio-demographic	Non-white population (%) (2010)[b]	4.14e-03	<0.0001
	RUCC[f,g]	1.77e-01	<0.001
	Democratic votes (%) (2012)[h]	2.17e-03	0.21
	Non-white farmers (%) (2007)[d]	–1.33e-03	0.32
	Beginning farmers (%) (2007)[d]	–2.81e+00	0.19

[a] *p*-values ≤0.01 are considered significant.
[b] U.S. Census Bureau, 2014
[c] States were assigned the following codes:
0. Arid Midwest: AZ, CO, ID, KS, MT, NB, NV, NM, ND, OK, SD, TX, UT, WY
1. Outside arid Midwest: All other states
[d] USDA, 2009; [e] USDA ERS, 2014; [f] USDA ERS, 2013
[g] Rural Urban Continuum Codes (RUCC) (USDA, ERS, 2013). Counties with a RUCC of 3 or 4 were aggregated and coded as 1. All other counties were coded as 0.
[h] U.S. Geological Survey, n.d.

between NRCS high tunnels and the socio-demographic factors examined (Table 1). A growing non-white population in a county was related to increased NRCS high tunnel adoption. Additionally, more high tunnels were adopted in small metropolitan counties (population fewer than 250,000 people) or large urban counties (population greater than 50,000 people) than in other places. There was no significant correlation between NRCS high tunnel adoption and Democratic votes in the 2012 presidential election. Furthermore, there was no significant relationship between NRCS high tunnels per county and the percentage of non-white or beginning farmers (Table 1).

Farmer Survey

Sixty-five Virginia high tunnel growers participated in our survey, which included both farmers who did (n=47) and did not (n=18) participate in the NRCS high tunnel program. All together, these farmers managed 142 high tunnels (47 NRCS and 95 other high tunnels). While the total number of high tunnel producers in Virginia is unknown, our survey captured 15% of Virginia's 314 NRCS high tunnel recipients.

The surveyed high tunnel farmers answered questions about their demographics, growing practices, and sales venues, with results presented in Table 2. Survey participants reported their race as white (92%), black (3%), Hispanic (2%), or did not disclose their race (3%). The gender of participants was 41% female, 56% male, and 3% undisclosed. Forty-six percent of respondents reported using their high tunnel(s) for year-round production, and 54% use them throughout spring, summer, and fall. Respondents reported growing a wide variety of produce in their high tunnels; all grew vegetables, fruit, or both, and 65% also grew herbs and/or cut flowers. Survey responses strongly support the presumption that NRCS high

Table 2. Virginia High Tunnel Growers Survey (*n*=65, except where noted)

Demographics

1. What is your age?	2. What is your gender?	3. What is your ethnicity?
Average: 50	Male: 56%	White (non-Hispanic): 92%
Minimum: 23	Female: 41%	Black: 3%
Maximum: 72	No answer: 3%	No answer: 3%
Respondents <50: 37%		Hispanic: 2%
		Asian or Native American: 0%

Production

4. How many high tunnels do you have on your farm?	5. How many total square feet of high tunnel production do you have on your farm? [a]	6. What do you grow in your high tunnel(s)? [b]	7. Which season(s) do you use your high tunnel for production? [b]
Average: 2.27	Average: 4,595 ft^2	Vegetables: 92%	Winter: 65%
Minimum: 1	Minimum: 260 ft^2	Fruit: 25%	Spring: 97%
Maximum: 12	Maximum: 32,000 ft^2	Herbs: 38%	Summer: 83%
		Flowers: 27%	Fall: 90%

Marketing

8. How many miles from your farm to the market(s) is 75% or more of your high tunnel produce sold? [c]	9. Please indicate your marketing strategy(s). [b]	10. Please indicate the type(s) of direct market venues you use. [b]
50 miles or less: 82%	Direct-to-consumer/	Farmers market: 71%
51 to 100 miles: 13%	restaurant/food hub: 100%	Direct-to-restaurant: 38%
101 to 150 miles: 3%	Wholesale: 14%	CSA: 32%
151 to 200 miles: 0%		Roadside stand: 24%
More than 201 miles: 2%		On-farm stand: 20%
		Pick-your-own: 8%
		Other: 4%

Economics

11. Please select the range that best describes your annual revenue per high tunnel. (*n*=21; all in US$). [d]	12. Would you have constructed a high tunnel without NRCS funding? (*n*=44)	13. If you participated in the NRCS high tunnel program, please rank how likely you are to purchase a future high tunnel without NRCS funding. (*n*=47)
$0 to 500: 14%	No: 66%	Not likely: 15%
$501 to $2,000: 33%	Yes: 34%	Less than likely: 6%
$2,001 to $3,000: 19%		Undecided: 24%
>$3,000: 10%		Likely: 23%
I do not know: 24%		Very likely: 32%

[a] 1 ft^2=0.09 m^2
[b] Respondents could select multiple options.
[c] 1 mile=1.6 km
[d] Excludes data from respondents who did not participate in the NRCS high tunnel program and who had more than 1 high tunnel.

tunnels contribute to local food availability. Of the 65 respondents, 82% sold the majority of their product (at least 75%) within 50 miles (80 km) of their farm. All respondents also reported selling through direct-to-consumer venues, with farmers markets being the most popular venue.

The NRCS high tunnel program increased the willingness of farmers in Virginia to purchase future high tunnels. Forty-four percent of NRCS high tunnel recipients would, and 66% would not,

have built their NRCS high tunnel without the cost-share program. After using the NRCS high tunnel, 56% of survey respondents indicated that they are likely or very likely to purchase another high tunnel without a subsidy, while only 21% were not likely. Twenty-three percent of survey participants were undecided about purchasing a future high tunnel. All the farmers who reported generating more than US$2,000 per high tunnel per year of revenue were likely or very likely to purchase a future high tunnel without government support.

Discussion

Farmers

The strongest determining factors in the distribution of NRCS high tunnels are biophysical (Table 1). Not surprisingly, farmers at high latitudes are taking advantage of high tunnels because they can extend the growing season in cold climates (Figure 1; Smeenk & Nakazawa, 2011). Farmers outside of the arid Midwest also adopted high tunnels at higher rates than in landlocked states with hot, dry climates. Most farms in the arid Midwest are large, distant from metropolitan areas, and have little existing vegetable production. These factors are all significantly related to high tunnel adoption, according to our analysis (Table 1) (Low & Vogel, 2011).

High tunnels may present an opportunity for small-scale vegetable farmers (less than US$10,000 annual revenue) to grow their operations (Table 1). While globalization of the food system tends to favor large-scale operations (Jensen, 2010), many large farms depend on uniformity in management. High tunnels, on the other hand, require more nuanced management and labor that cannot be performed mechanically, and therefore may be better suited to use on small farms (Biernbaum, 2013). Furthermore, many small farms suffer from a lack of credit and an erratic flow of income (Dodson & Koenig, 1995). Our survey results show that farmers in Virginia are using high tunnels to extend their growing season, year-round in some places, which can increase total sales and stabilize income throughout the year (Table 2). As a bonus, high tunnel growers are also likely to receive premium prices for out-of-season, local produce (Arnold & Arnold, 2003; Lamont et al., 2002; Orzolek, 2013).

The NRCS high tunnel program was intended to benefit historically underserved farm operators (USDA NRCS, 2014; National Sustainable Agriculture Coalition [NSAC], 2014). Table 1 indicates that adoption of NRCS high tunnels is positively related to the percentage of the population that is non-white. However, there is no correlation between the percentage of non-white farmers or beginning farmers and the presence of NRCS high tunnels in a given county. On the other hand, analyses by NSAC show that underserved, and particularly beginning farmers, have enrolled in the NRCS high tunnel program at higher rates than non-underserved farmers (NSAC, 2014). Indeed, more than 70% of NRCS high tunnel contracts were awarded to historically underserved operators in 2013 (NSAC, 2014). While the NSAC analysis examined only data about NRCS high tunnel recipients, our data describe the underserved farmer populations of entire counties. Therefore, our data indicate that counties with high proportions of underserved farmers were not more successful than counties traditionally well-served by the USDA in obtaining NRCS high tunnel contracts.

Our survey conducted with farmers in Virginia indicates that high tunnels may particularly benefit female farmers (Table 2), which is encouraging in a traditionally male-dominated global food system (Trauger, 2004). When asked to identify their gender, 41% of surveyed high tunnel growers (n=65) identified as female principal operators. This is in contrast to national averages reporting females are principal operators of only 14% of all farms, 12% of vegetable farms, and 17% of small farms (USDA NASS, 2014). Most female farmers can be found in the west and northeast (USDA NASS, 2010), which is also where many of the NRCS high tunnels are located (Figure 1).

Consumers

This research highlights the possibility that consumers who lack access to grocery stores and are low-income may not be benefitting from the additional produce grown in NRCS high tunnels (see Table 1) (Colasanti, Conner, & Smalley, 2010; Hill, Wishaw, & Hargrove, 2013). In Virginia the survey

responses indicate that high tunnels contribute more to local than to global markets. Our national data further indicate that NRCS high tunnel adoption increased in or near small metropolitan counties with high incomes and easy access to grocery stores (Table 1). Therefore we can conclude that NRCS high tunnels may be doing little to alleviate food deserts or to provide fresh, locally grown food to low income-communities. In fact, they may be contributing to a problem with the local food system that many people criticize, namely, that it primarily serves upper-income, urban communities (Alkon & McCullen, 2011; Campbell, Carlisle-Cummins, & Feenstra, 2013; Johnston & Baker, 2005).

Local Food Movement

There may be a positive feedback between a strong local food market, the adoption of high tunnels, and the continued growth of that market (Sundkvist, Milestad, & Jansson, 2005). Our data show that direct-to-consumer sales in 2007 were highly correlated with consequent adoption of NRCS high tunnels (Table 1). In Virginia, high tunnel produce was sold primarily within 100 miles (161 km) of where it was grown. This is well within the limits of USDA's definition of local (400 miles, or 644 km) (Martinez et al., 2010). The adoption of new technologies does not occur in a vacuum (Adler, Fung, Huber, & Young, 2003). Farmers looking to enter local food markets may be finding success selling their high tunnel produce where the local food market is already strong.

High tunnels appear to be an emerging technology that will continue to contribute to the local food movement (Martinez et al., 2010). Our survey of Virginia farmers indicates that farmers find high tunnel technology profitable and are willing to purchase new high tunnels even without further government subsidies. Growing food in high tunnels is much more common in other countries, such as China, Spain, Japan, and Italy (Lamont, 2009). In 2007, before the advent of the NRCS high tunnel program, Carey et al. (2009) estimated that there were only 5,000 acres (2,023 ha) of high tunnel production in the U.S. (0.01% of total vegetable production acreage). Reasons for relatively low use of high tunnels and other protected production methods in the U.S. could include low transportation costs and highly centralized marketing systems. These tend to favor large-scale farms that supply cheap, but potentially lower quality, produce than food produced locally (Edwards-Jones et al., 2008).

Conclusions

High tunnels are a promising technology that can increase farmers' profits (Arnold & Arnold, 2003; Chase, 2012), supply fresh and healthy produce to consumers, and fuel growth in the local food movement (ATTRA, 2009). They can also fill a niche for out-of-season local foods that is unlikely to be filled by large-scale producers growing for the global food system (Biernbaum, 2013). As with many newly adopted technologies, high tunnels may be a double-edged sword. While many hope that they will equitably increase local food supplies and food security, our data show that the NRCS high tunnel program was not particularly successful in counties with low incomes or large, underserved farmer populations. Furthermore, those counties that already had diverse food choices now have even more choices because of U.S. government support. Future research efforts should continue to investigate the impacts of high tunnels on food deserts, poor communities, and underserved farm operators.

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Saving seeds: The Svalbard Global Seed Vault, Native American seed savers, and problems of property

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Abstract

This case study contrasts centralized *ex situ* conservation of food and crop plant genetic resources with many Native Americans' preference for informal, localized *in situ* conservation. First, I examine *ex situ* genebanks operated by governments and research institutions, with particular attention to the Svalbard Global Seed Vault built into the mountainous permafrost on a Norwegian island in the High Arctic. Second, I describe Native American seed-saving efforts in the United States, drawing primarily on projects to preserve culturally significant seeds and promote food sovereignty at the local or tribal level. In general, Native American projects focus on the integration of cultural heritage and food independence through understandings of seeds as a tribal commons. Through these contrasting cases—the Svalbard vault and localized Native American seed-saving projects—I analyze the ways in which divergent understandings of "seedness" and seed ownership are crucial elements in discussions of seeds as property. In conclusion, I point out that the Svalbard Global Seed Vault is unique in its potential ability to cross the political and cultural divide over the ownership and conservation of seeds and thereby promote the vital ecological need for both *ex situ* and *in situ* seed preservation. Furthermore, I argue that recognition of the divergent understandings of "seedness" provides a useful way of examining the complementarity and limitations of specific models of *in situ* and *ex situ* seed conservation and, more broadly, the future of farmers' rights to the genetic heritage developed over generations in the fields.

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Keywords
agriculture, genebanks, Native Americans, property, seeds

Introduction

Seeds are the essence of life. Without their varied yields, the earth would lack agriculture, livestock, food systems, and ecological stability. In all shapes, sizes, and distributions, seeds are genetic powerhouses that store life's codes. Nonetheless, mounting evidence demonstrates an erosion in the seed biodiversity that is necessary for viable food systems (Food and Agriculture Organization of the United Nations [FAO], 2010, 2013). Some seed varieties have been unable to adapt as habitats change or shrink, noncommercial seed-saving techniques have disappeared along with community elders, and a relatively small number of hybrid and transgenic commodity crop varieties—none of which yields seeds that can be saved for planting—dominate global agriculture. Meanwhile, the botanical populations of historic landraces (the historic localized varieties that exhibit far higher levels of variation than the modern named, uniform cultivars [Fowler & Mooney, 1990) and their wild cousins continue to decline (Kastler, Onorati, & Brac, 2013; Nazarea, Rhoades, & Andrews-Swann, 2013). War and social unrest have decimated seed banks in Afghanistan, and unique local varieties are at risk of permanent loss in other food systems (Cardinale et al., 2012; FAO, 2010; C. Gardner, personal communication, September 22, 2013).

A number of seed-saving projects from local to international levels work to slow this loss of seed biodiversity, alleviate environmental and health concerns, and proactively respond to climate change by protecting heritage food and agriculture varieties. One such project is the Svalbard Global Seed Vault, a centralized storage facility built into the mountainous permafrost on a Norwegian island in the High Arctic. At the same time, traditional seed-saving practices are regaining ground in recent years, and small seed libraries of open-pollinated varieties are springing up around the United States, as indicated by the growing list monitored by the Seed Library Social Network (http://seedlibraries.org). At the international level, indigenous and peasant movements such as La Via Campesina (http://www.viacampesina.org) promote seed-saving and use of traditional seed varieties, citing political and cultural as well as ecological reasons.

At the same time, however, the rise of hybrid seed lines throughout the 20th century and the more recent commercial development of genetically modified varieties mean that many farmers choose from an increasingly limited catalog. Patented or licensed seed varieties must be purchased anew each growing season rather than produced and saved by growers. These changes in the availability and ownership of agricultural seeds can have significant ecological, political, and cultural consequences (Aoki, 2008). Both scholars and food sovereignty activists have characterized the increasing dominance of proprietary seeds as a trend that dampens local efforts to save seed, maintain diverse food crops, and control agricultural production (Barker, Freese, & Kimbrell, 2013; Kastler et al., 2013; Pechlaner, 2012; Shiva, Lockhart, & Shroff, 2013). Some contend that plant breeding has shifted dramatically from community knowledge shared across generations to a privatized system dominated by a few seed monopolies (e.g., Barker, Freese, & Kimbrell, 2013, p. 9) and warn that this trend leads to a more centralized and vertically integrated seed economy (McIntyre, Herren, Wakhungu, & Watson, 2009; Shiva, Shroff, & Lockhart, 2012). In addition, critics of the shift toward seed privatization argue that plant genetic resources must remain part of a common heritage, questioning the dominant approach to the creation and maintenance of property rights. In accordance with 17th century English political theorist John Locke's labor theory of value, which has provided the foundation for understandings of property in liberal democracies (Tully, 1980), legal stipulations at both national and international levels hold that research and development on crop variety traits add human-created value and thus secure the legal right to ownership of seed genetics in the form of intellectual property rights (Shiffrin, 2001).

The most significant international document on this issue, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), was implemented in 2004 (Pant & Ramisch, 2010) and took shape amid concerns

about the trend toward corporate intellectual property rights, particularly on the part of negotiators from developing states. Negotiations on the ITPGRFA elicited difficult debates on the political problems of seeds as property and yielded provisions of particular importance to continuing issues of seed ownership. For example, the treaty addresses farmers' access to seed varieties through their right to save, use, exchange, and sell their own seed as well as communities' rights to share in the benefits of seed research based on indigenous germplasm (Cooper, 2002; Correa, 2003; Coupe & Lewins, 2007; Helfer, 2003; Senior, 2004). More than a decade after implementation, these treaty provisions continue to evolve in terms of public-policy structure (Andersen & Winge, 2013; Brush, 2007; Nazarea et al., 2013).

In addition to explicit policy debates, the political problems of seeds as property also arise from a subtler source that involves divergent understandings of the meaning and identity of the seeds themselves. Scientific research that is dedicated to preserving genetic resources, improving its productivity, and developing new varieties tends to approach seeds as discrete material objects—in essence, as active storage containers of genetic material. From this perspective, empirical knowledge is gained through *ex situ* conservation and controlled experimentation in research plots outside of the plants' natural habitat. The fact that farmers cannot save usable seeds for replanting from their hybrid and transgenic crops is balanced by the advantages of new productive efficiencies and disease and pest resistances gained from plant breeding (Fedoroff, 2010). In contrast, however, many global indigenous groups view seeds as responsive beings that are inherently embedded within ecological and spiritual webs of kinship. According to this perspective, knowledge is relational and narrative and is gained through *in situ* community-based care and cultivation (Booth, 2003; Brascoupé, 2002). Saving seed is seen as an inherent part of the cycle of farming, and seeds saved for the next year's crop are an essential part of a community's wealth (Nelson, 2008; G. L. Wilson, 1987). In this sense, the very notion of what it means to be a seed can lead to different understandings of whether *in situ* or *ex situ* conservation is necessary and whether seeds should be legally and politically defined as objects of property.

To probe these divergent perspectives on seed-saving and seeds as property, this case study is part of a larger project in which I examine recent shifts in the collection, protection, and possession of plant genetic resources and the ways in which these changes reflect divergent understandings of seeds as property in an increasingly globalized system. As a component of that project, this case study contrasts scientific and/or technological approaches to *ex situ* conservation of food and crop genetic resources with many Native Americans' preference for informal, localized *in situ* conservation. To do so, I first examine the role of *ex situ* genebanks, with particular attention to the Svalbard Global Seed Vault. Second, I describe some of the Native American seed-saving efforts in the U.S., drawing primarily on projects to preserve heritage and culturally significant seeds and to devise food sovereignty policies at the local or tribal level. Through these contrasting cases—the Svalbard vault and localized Native American seed-saving projects—I examine the ways that divergent understandings of "seedness" and seed ownership are crucial elements in the political problem of seeds as property. In conclusion, I point out that the Svalbard Global Seed Vault is unique among *ex situ* facilities in its potential ability to cross the political and cultural divide regarding ownership, and I suggest that the Svalbard vault is particularly well positioned to promote the vital ecological need for both *ex situ* and *in situ* conservation. Furthermore, I argue that recognition of the divergent understandings of "seedness" provide a useful way of thinking about the complementarity and limitations of specific models of *in situ* and *ex situ* conservation and, more broadly, the future of farmers' rights to the genetic heritage developed *in situ* over generations.

In terms of methodological approach, this case study is a political project that is rooted in the subfields of normative political theory and the history of political thought regarding property. In addition, this study highlights an empirical element based on long-form personal interviews and personal experience. This integration of philosophical and empirical work echoes a point made by political theorist Iris Marion Young, who argued that the distinction

between normative and empirical statements does not lead to separate methodologies. Just as normative theory must be grounded in empirical inquiry, she wrote, any empirical study inherently includes normative research judgments (Young, 2011). Likewise, in the case of this project, the political problems of seeds as property must involve an integrated approach. To accomplish this task, this case study's theoretical analysis draws on empirical work associated with (1) research visits and interviews at the Svalbard Global Seed Vault, the U.S. Department of Agriculture's National Center for Genetic Resource Preservation in Fort Collins, Colorado, and the USDA North Central Regional Plant Introduction Station in Ames, Iowa; (2) research visits and interviews I conducted with leaders of Native American seed-saving projects in the Cherokee Nation, Tesuque, Taos, and Zuni Pueblos, Navajo Nation, and Tohono O'odham Nation[1]; and (3) a curricular development project on Anishinaabeg farming and gardening conducted by the University of Minnesota, Morris, in partnership with the White Earth Land Recovery Project, in which I served as co-investigator.

The Svalbard Global Seed Vault: *Ex Situ* Conservation

Amateur plant breeders have modified seeds and altered genetic resources since the dawn of agriculture 10,000 years ago. Likewise, growers have saved seeds and used seed caches in caves and other cool, dark locations for many centuries to protect landraces. The wealth of food and agricultural genetic resources is not equally spread around the world, however, and today's less developed nations in the global South are home to most of the gene-rich biodiversity hotspots. The industrialized and colonizing global North, in contrast, has been relatively gene-poor, an imbalance that the Columbian Exchange attempted to eradicate via expeditions and colonization beginning in the 15th century (Crosby, 1972). This acquisition process is one that persistently (although not exclusively) involved exploitation and theft and which critics within the food sovereignty movement describe as biopiracy, meaning the fraudulent acquisition of ownership over genetic materials (Brush, 2002; Mgbeoji, 2006; Mushita & Thompson, 2007; Robinson, 2010; Shiva, 1997). Historically, plant specimens and their genetic material were brought to botanical garden collections in the North and were also propagated as privatized commercial enterprises through research stations and high-output production plantations in colonized regions of the South, a competitive design that could cause economic collapse when the originating areas were deprived of markets (Fowler & Mooney, 1990; Kloppenburg, 2005; Mann, 2011).

In addition to botanical gardens and research stations, *ex situ* gene depositories first arose in the 1920s, in large part due to the leadership of Soviet geneticist and botanist Nikolai Vavilov, one of the premier figures in the modern history of seed collections. With the needs of crop breeding in mind, Vavilov began the systematic collection and centralized propagation of seeds and plant tissue samples, thus instituting *ex situ* depositories as an intrinsic part of agricultural research and development. The Vavilov All-Russian Scientific Research Institute of Plant Industry remains one of the four largest national genebank collections in the world, along with the United States' National Plant Germplasm System, the National Bureau of Plant Genetic Resources in India, and the Institute of Crop Germplasm Resources in China (Harlan, 1995; Westengen, Jeppson, & Guarino, 2013). The immense size of these collections means that although farmers' fields in the global South have provided the original materials for the world's contemporary genebanks, the growth and cataloging of *ex situ* collections in the global North through acquisition, research development, and propagation has been so extensive that they now are the main source of genetic resources for plant breeding and research. In contrast, the more fragile *in situ* fields and gardens are prone to deterioration or complete loss due to economic, political, technical, and/or climatic instability. Rather than make expeditions to the centers of diversity, as was done earlier, plant breeders now turn to the genebanks' extensively documented collections of wild varieties,

[1] The University of Minnesota Institutional Review Board categorized this element of the project as interviews of recognized experts rather than generalizable research of human subjects and therefore deemed it was exempt from IRB review.

landraces, and developed cultivars (Fowler, Smale, & Gaiji, 2001), and genetic engineering has turned seed companies' attention to the genes rather than the plants themselves (Kastler et al., 2013). Field research for acquisition and cataloging has not ended, by any means, but *ex situ* genebanks have assumed crucial importance in the contemporary world of biodiversity preservation and plant breeding, along with pharmaceutical and food system research, all of which hold significant economic implications.

One of the newest of the *ex situ* collections is the Svalbard Global Seed Vault, an architecturally innovative storage facility bored into the permafrost of a High Arctic island. The vault is located on Spitsbergen, the only island in the Svalbard archipelago that is permanently inhabited and has a human population of fewer than 2,500 (and a polar bear population of nearly 3,000, according to residents). Svalbard is under Norwegian sovereignty but subject to international law according to the 1920 Spitsbergen Treaty (Grydehøj, Grydehøj, & Ackrén, 2012). The government of Norway owns the Svalbard vault, the multinational Nordic Genetic Resource Center (NordGen) manages the vault's deposits and database under the direction of the Nordic Council of Ministers, and the Global Crop Diversity Trust (GCDT), a nongovernmental organization with an international board of directors, provides operating funds and works with seed deposits (C. Fowler, personal communication, February 25, 2014; GCDT, n.d.; Government of Norway, n.d.; R. Von Bothmer, personal communication, February 25, 2014). Prior to passage of the ITPGRFA in 2004, disputes among developing countries, industrialized nations, and the commercial seed industry over access and control of the seeds had hindered proposals to construct a global seed vault at various locations for more than two decades. With the new treaty in place, Norway's history of political non-alignment, economic stability, and environmental preservation, in addition to its geological suitability and willingness to pay construction costs, made a vault project politically possible under international governance (Coupe & Lewins, 2007; C. Fowler, personal communication, February 25, 2014).

The vault, which opened in 2008, has three vaults with the capacity to store 4.5 million seed samples. Assuming an average size of 500 seeds per sample, the vaults allow a maximum of 2.25 billion seeds, enough to hold duplicates of the 1.5 million unique seed samples now held in seed banks worldwide (Fowler, 2008). The Svalbard vault currently holds 820,000 samples from 53 genebanks and includes more than a third of the accessions of 156 crop genera stored as seeds in global genebanks (R. Von Bothmer, personal communication, February 25, 2014; Westengen et al., 2013). Most of the samples in the Svalbard vault are no longer found in the field, and its geological location and infrastructure means that it faces no foreseeable threats from rising sea level or melting permafrost (C. Fowler, personal communication, February 25, 2014).

Significantly, the Svalbard Global Seed Vault is distinct from all other centralized depositories in a crucial sense. Unlike research-oriented genebanks that are focused on current plant breeding developments, the Svalbard vault operates solely as a backup *ex situ* conservation facility to preserve food and crop genetic resources for the next 10,000 years (Fowler, 2008). Governments, research institutions, and organizations can deposit seed samples in the Svalbard vault, but in each case the depositor's national government must authorize the act through an extensive agreement in accordance with the ITPGRFA's placement of seed sovereignty at the national level (R. Von Bothmer, personal communication, February 25, 2014; FAO, 2009). The seeds are marked and permanently stored within the vaults, which are cooled to 0 degrees F, approximately 25 degrees colder than the location's average permafrost temperature. Unless the depositor chooses to reclaim the container for plant grow-outs to refurbish viable seed, the container sits untouched and can be accessed only by the depositor. This contractual arrangement is a so-called "black box" agreement designed to guarantee that depositors, through their national governments, maintain control and sole ownership of the seeds. The vault does not include research facilities, its governing bodies have no subsidiary contracts with research institutions, and its High Arctic location does not allow for propagation. As stated by Cary Fowler, the retired executive direc-

tor of the Global Crop Diversity Trust who drafted the original plan for the vault and oversaw its approval, construction, and operation, "This is not the place for anything but conservation" (C. Fowler, personal communication, February 25, 2014).

The vault's unique mission and design are significant for questions of food sustainability, food resilience, and food sovereignty. By storing seeds in a low-tech permafrost environment that is internationally governed, politically stable, and logistically feasible, and by excluding research activities in favor of a 10,000-year vision focused on seed preservation, the vault affords a high probability that germplasm will survive anticipated bottlenecks of diversity depletion (E. O. Wilson, 2002) and be accessible if or when the germplasm is needed. The vault is, in a sense, the ultimate backup collection, ensuring the most secure "black box" arrangement that is currently possible under international law and providing the widest degree of sample diversity for food and crop sustainability.

Native American Seed Savers: *In Situ* Conservation

Although they clearly share strong concerns about the preservation of seed biodiversity, many Native American seed savers are unwilling to join the move toward *ex situ* seed depositories and reject the ITPGRFA's placement of seed sovereignty at the national level. Overall, my research with Native American seed-saving activists and programs revealed persistent skepticism of centralized *ex situ* depositories and indicates that this skepticism is more than a tactical disagreement. Not surprisingly, counterarguments made by Native seed savers point to historical precedents of government deception and greed and, as described below, they describe community-based *in situ* alternatives that they believe will maintain local control and seed viability, in contrast with national *ex situ* approaches. Interviews with researchers at U.S. Department of Agriculture (USDA) depositories confirmed this reluctance to participate in genebanks, as the scientists voiced concerns about the need for greater participation from tribal communities in the face of threats to *in situ* seed preservation from climate change and inadequate storage facilities.

Before examining perspectives from Native American communities and seed savers toward *ex situ* genebanks, it is important to stress that neither Native Americans nor indigenous communities more broadly are monolithic in their views, despite some common patterns. Not only are indigenous groups disparate in environment, culture, and history, but also individuals within those groups are distinct in terms of political and cultural identification and personal experiences. While this case study addresses patterns of Native American responses to *ex situ* genebanks, it does not and cannot present a unitary Native American perspective.

With that cautionary note, the pattern that stands out during research interviews is one of skepticism toward participation in centralized seed depositories and a preference for relying on local alternatives. Despite plant-breeding researchers' long-standing pleas for tribal contributions to genebanks and despite evidence of the various ecological, economic, and political threats that constitute the case for *ex situ* depositories, I have found little support for participation. Information collected with the assistance and cooperation of Native American seed savers and tribal food sovereignty activists strongly supports the conclusion that these individuals and groups are deeply dedicated to the preservation of plant biodiversity and that their reluctance or refusal to make deposits to genebanks is not an indication of ecological ignorance or apathy. On the contrary, as they point out, Native American seed savers and food sovereignty activists have historical and political grounds for their skepticism regarding *ex situ* genebanks operated by government institutions for preservation of seed genetics. Native American seed savers whom I interviewed repeatedly expressed the conviction that the national government and its research institutions are the last parties that should be entrusted with the protection of tribal heritage seeds.

Likewise, skepticism toward *ex situ* genebanks is not a rejection of seed saving; the essential role of seeds in traditional farming is a persistent theme in the study of Native American farmers (Mt. Pleasant, 2011; Nabhan, 2002; G. L. Wilson, 1987), as is the importance of seed cultivation and devel-

opment within indigenous cultures as a means to food sovereignty (LaDuke & Alexander, n.d.; Nabhan, 1997, 2002; Ross, Sherman, Snodgrass, Delcore, & Sherman, 2011; G. L. Wilson, 1987). In one relevant example, concerns about the role of traditional seeds drove the Anishinaabeg farming and gardening course jointly developed by the University of Minnesota, Morris (UMM), and the White Earth Land Recovery Project (WELRP) in 2012. This pilot project, which produced a summer course and curricular modules for adaptation by other institutions, sought to address the intersections of Anishinaabeg (Chippewa/Ojibway) food sovereignty with issues of culture, history, economics, and health. The course drew together students, University of Minnesota, Morris, faculty and staff, and Anishinaabeg elders and teachers under the leadership of principal investigators Winona LaDuke, an Anishinaabeg activist and founder of WELRP, and Sandra Olson-Loy, University of Minnesota, Morris, vice chancellor of student affairs. The course met for three immersion sessions throughout the 2012 growing season for class work and experiential learning at the Morris campus and the White Earth Reservation. The teaching team of University of Minnesota, Morris, faculty and staff and the enrolled students included both non-Native and Native members from several tribal nations. In sessions that focused on planting, midsummer, and harvest, the course highlighted gardening, harvesting, cooking, and learning from members of the White Earth Nation and at the campus Native American garden, with a consistent emphasis on the importance of heritage seeds. In addition to botany, history, and nutrition, the curriculum included discussions of colonialism, property theory, and seed sovereignty.

In a second example, the Tesuque Pueblo community farm project in northern New Mexico also stresses the importance accorded to community seed saving. Under the leadership of Emigdio Ballon, a plant geneticist from the Bolivian Quechua community, pueblo members reclaimed a section of floodplain for a small but intensive agricultural project that has received grants from private foundations such as the Christensen Fund to build an irrigation system, greenhouses, and a new seed-storage building and workshop. The project uses heritage seeds from pueblo elders and concentrates on teaching the youth of the community about food, nutrition, and pueblo heritage as they stabilize the community's seed library. The Tesuque Pueblo also sponsors an annual conference with the Traditional Native American Farming Association that draws Native seed savers and ranchers from a large area of the Southwest (E. Ballon, personal communication, July 31, 2013; C. Brascoupé, July 29, 2013; L. Hena, personal communication, July 29, 2013).

While both the Anishinaabeg curriculum and Tesuque Pueblo farming operation are directed toward reclaiming and preserving seeds at the local level, the Cherokee Nation, based in Oklahoma, provides a third example of following a different model in its approach to seed heritage and sovereignty. A garden dedicated to seed production near the tribal administrative headquarters in Tahlequah, Oklahoma, includes food and tobacco varieties associated with the tribe's history. The seeds are saved, sorted, bagged, and labeled, and each fall the Cherokee Nation president gives a bag of seeds to any registered member, a ceremony tied to the traditions of the Cherokee gift economy. Because the tribe's membership rules are relatively open, Cherokee members constitute the nation's second largest tribal group (second to the Navajo Nation), and the membership list extends broadly across the United States. As a result, at the same time that the seeds are viewed as a common heritage, the annual ceremony of sharing has raised internal questions about the implications of such wide geographic distribution and resulting access to commercial seed companies. In effect, the Cherokee gift economy is coming into tension with the tribe's contrasting need to maintain sovereignty over its heritage seeds. A group of tribal elders is working to resolve this tension by formulating a seed policy that will clarify access and control (P. Gwin, personal communication, July 25, 2013).

These examples, and others, lead to consideration of the political problems associated with seed ownership. In a discussion of seeds as property, it is important to remember that seeds currently being used for commercial food and crop production originated, either directly or indirectly, from the heritage seeds grown and selected by peasant

farmers around the world. In accordance with that fact, in all three of the examples described above, Native American growers and seed savers stated their concerns that centralized *ex situ* collection of those seeds' genetics would constitute a confiscation of their cultural heritage and denial of their collective rights to use, exchange, and sell their seeds (also see Kastler et al., 2013, p. 48). When I asked whether they had considered depositing duplicates of their seeds into one of the U.S. depositories, such as the National Center for Genetic Resource Preservation, the Native farmers I interviewed repeatedly drew parallels between participation in genebanks and loss of control, equating public seed depositories and seed corporations' privatized collections and the resulting loss of access through Plant Breeders' Rights (PBR), seed patents, and contract law governing growers (see Aoki, 2008). Genebank administrators' and researchers' assurances that seed deposits can be made within a black-box arrangement appear to be unconvincing. "Money opens black boxes," said Clayton Brascoupé, program director of the Traditional Native American Farmers Association, expressing a commonly stated skepticism about the trustworthiness of black-box arrangements (C. Brascoupé, personal communication, July 29, 2013). When seed corporations want germplasm, Brascoupé and others said, they will find a way to get it from the public depositories, regardless of contract stipulations, citing historical examples of government duplicity and fraud to tribes. Depositing seeds into a centralized genebank, they contend, is directly linked to loss of ownership and access.

When asked about the *in situ* alternatives and whether centralized genebanks are a necessary response to the fragility of local storage and the threats of climate change, Native Americans whom I interviewed and with whom I have worked expressed confidence that traditional ways of local seed conservation are sufficient or superior to the centralized *ex situ* approach and pointed to anthropological evidence of seed caches that maintain viability for long periods. However, none of the Native American seed-saving projects I visited was currently using these long-term preservation techniques. Instead, *in situ* seed selection and conservation were focused on propagation, i.e., providing seed stocks for immediate planting, and distribution to other Native American growers with the goal of improving nutritional health and food sovereignty. Some projects in the Southwest, such as the San Xavier Cooperative Farm operated by the Tohono O'odham Nation, have informal relationships with Native Seeds/SEARCH, a nonprofit seed bank in Tucson, Arizona, that has collected, propagated, and redistributed indigenous seeds and others suited to the Southwest climate since 1983 using both *ex situ* and *in situ* methods (B. Dorman, personal communication, August 6, 2013; M. Kruse-Peeples, personal communication, August 6, 2013; C. Schlaefli, personal communication, August 7, 2013; E. Sofro, personal communication, August 7, 2013). At the farm level, however, Native seed savers repeatedly expressed confidence in their ability to ensure long-term backup of their selected seed varieties by planning for duplicates in multiple locations and sharing seed stocks with Native farmers in other communities and tribes, thus maintaining local collective control of the common genetic resources.

These reasons for skepticism of centralized depositories are consistent with Native American writings and other research accounts on indigenous agriculture and Native American attitudes toward government projects (e.g., Bartecchi, 2009; Bell-Sheeter, 2004; Brascoupé, 2002; Deloria, 1995; LaDuke, 2005; Ross et al., 2011). However, during interviews some Native seed savers raised an additional conceptual objection regarding the meaning and identity of seeds that has received comparatively little attention. As stated by Louie Hena, a tribal elder of Tesuque Pueblo and one of the leaders of New Mexico pueblos' efforts to enact tribal and state seed sovereignty laws, the methods of long-term storage used by federal genebanks face ethical problems based on the essential nature of seeds. According to Hena, because seeds are living beings that exist within a web of relationships, they are connected to the human who plants the seed, the microbes that live in the soil alongside the seed, the soil itself, the harvester, and those who use and/or consume the plant. These relationships are reciprocal and constitutive, which means that both seeds and humans are entities formed by and simultaneously forming life's actions around them-

selves. According to this perspective, humans must recognize and protect those relationships through prayers or other signs of respect and connection. In other words, said Hena, relationships are the essence of what it means to be a seed, and that web of connections is denied by the long-term storage techniques used in most *ex situ* genebanks. In particular, he said, the use of liquid nitrogen tanks to create cold temperatures that are artificially extreme is ethically indefensible because this method physically isolates the seeds in ways that fundamentally deny the nature of life. To put Hena's point another way, he believes that these kinds of genebanks negate the essence of "seedness." Seeds are alive within a perpetual and dynamic cycle of planting, growth, and harvest, and their isolation in genebanks—despite the scientific goal of *preserving* genetic resources—works *in opposition to* their needs, he believes. Hena's view was echoed in various ways during interviews by other Native farmers and seed savers; various writers also have described the reciprocal relationships between humans and their crops. As noted by Dennis Martinez, chair of the Indigenous Peoples' Restoration Network, "The elders say that if you don't take care of the plants and talk to them and relate to them, they get lonely and go away" (Martinez, 1998, p. 1).

At one level, this perspective on the identity of seeds highlights an understanding of nonhuman nature as a network of relationships built on mutual need and respect. This view is reciprocal, collectivist, and based on tradition, in contrast to the more dominant unidirectional, individualist, and legalistic understandings of nature as property. At a second level, a description of seeds and their requirements as living entities highlights an epistemological distinction—a significant theoretical gap—that addresses the political problems of seeds as property. In a discussion of seeds as genetic resources that should be collected and preserved, what counts as knowledge? Can a description of seeds as relationship-constituted beings be discounted as spirituality rather than science and therefore be excluded from the scientific discussions of biodiversity and germplasm preservation that rely on the definition of seeds as property (Bielawski, 2003)? Conversely, does the provisional and dynamic nature of local knowledge and embodied understanding of seeds undermine the scientific argument for *ex situ* collections as a way to maintain food and crop biodiversity (Briggs, Sharp, Yacoub, Hamed, & Roe, 2007; Brush & Stabinsky, 1996)? Or, more hopefully, as I will argue, does recognition of the divergent understandings of "seedness" provide a useful way of thinking about the complementarity and limitations of specific models of *in situ* and *ex situ* seed conservation and, more broadly, the future of farmers' rights to the genetic heritage developed over generations in the fields?

Conclusion: The Problems of Property

Issues of ownership are inherent in the discussion of food systems and the seeds that constitute their foundations. For this reason, seed sovereignty is an essential component of food sovereignty, for "those who cannot ensure through ownership or other forms of control that they will reap benefits from the resources cannot be expected to go to the expense of conserving them for the use and aggrandizement of others. Thus, the very existence of the resource which feeds humanity is tied to patterns and arrangements of ownership and control and how these affect the way in which the benefits of diversity are shared, or not" (Fowler, 1994, p. xv). If we do not address the problems of property as they relate to seeds and the genetic resources they contain, we cannot hope for a vigorous response to the imminent threats to genetic biodiversity and the narrowing of food and crop varieties. As indicated in the previous section, many Native Americans reject the legitimacy of the historical, ongoing, and potential loss of access to and collective control over tribal heritage seeds and are concerned that the solicited deposits in centralized *ex situ* genebanks will exacerbate that loss.

As part of this discussion, however, we first must explicitly recognize the legitimacy of deep concerns raised by the fragility of *in situ* conservation. As stated above, the Svalbard Global Seed Vault already holds nearly a million samples, more than half of which are no longer found in the field. Local seed collections and distributions are not inherently faulty; on the contrary, these community conservation projects are the lifelines of small

sustainable farming and subsistence gardening. Nonetheless, even those collections that are not immediately threatened by war or the effects of climate change are frequently subject to the inadequacies of volunteer labor, poorly trained growers and harvesters, administrative changes, and insufficient and unstable financing. Any viable effort to conserve food and crop varieties that have been developed through centuries of agriculture must recognize the value of both *ex situ* and *in situ* programs to biodiversity conservation.

Second, in response to the well founded concerns of Native American seed savers, political understandings of germplasm as intellectual property and the application of this perspective to indigenous and heritage seeds must incorporate a recognition of local knowledge—a multifaceted and complex concept that requires considerable wrestling before it can be brought usefully into the dialogue (e.g., see Brush & Stabinsky, 1996). When we speak of indigenous or, more accurately, local knowledge and its implications for intellectual property rights, whose knowledge do we mean? As noted earlier, Native Americans are not a uniform corporate body—there is no unitary "Native American position"—and the interests of one tribal Nation may either conflict or harmonize with those of another. With these cautions in mind, seed preservation and the role of centralized *ex situ* collections must proceed from the foundation of local knowledge as both legitimate and necessary.

Some scholars working in conservation and environmental management have proposed ways that local knowledge and the Western scientific method can be brought together for the purpose of ecological preservation (e.g., Lertzman, 2010; Menzies, 2006; O'Flaherty, Davidson-Hunt, & Manseau, 2008). The understanding of "seedness" as constituted by relationships, I argue, provides an additional insight for dialogue, particularly in regard to *ex situ* genebanks and the problems of property. On the one hand, the financial and legal integration of genebanks with industrial plant breeding corporations poses significant difficulties for projects that seek to bring scientific and indigenous knowledge together, such as Ecosystem-Based Management (Lertzman, 2010). On the other hand, the Svalbard Global Seed Vault demonstrates that *ex situ* seed banks are not necessarily research-oriented or tied to plant-breeding corporations. In effect, the Svalbard vault provides the most dependable guarantee of a backup depository with a black-box arrangement that can be devised under current international law. Furthermore, the permafrost and low-technology refrigeration that hold the seeds in below-freezing temperatures are more akin to traditional seed caches than to liquid nitrogen tanks and may be less objectionable on ethical grounds to the reciprocal, collectivist understanding of seeds, particularly if the Global Crop Diversity Trust increases its efforts to integrate representatives of local knowledge into its decision-making. In this sense, the Svalbard Global Seed Vault in Norway offers a particularly promising avenue toward *ex situ* deposits that can protect and enforce indigenous seed sovereignty and increase preservation of vital genetic resources for food and agriculture.

Analysis of the political problems of seeds as property also suggests directions for food and crop policy that would affect seed savers of all groups, not just Native Americans. First, because seed biodiversity and sustainable food systems need both *in situ* and *ex situ* conservation, financial support and training are essential. Funding for *in situ* seed projects can easily fluctuate due to the economic and political (in)stability of individuals, communities, and nonprofit organizations, and localized projects rarely have access to or funding for adequate technology that ensures long-term conservation of viable seeds. In addition, while centralized depositories use low-temperature vaults and liquid nitrogen tanks, *in situ* seed libraries and collections often must rely on cardboard boxes or household refrigerators or freezers that can lead to rapid declines in seed viability. Furthermore, despite recent improvements in educational materials for amateur growers and seed savers, many seed savers lack scientific knowledge, leading to unintentional cross-pollination, poor germination rates, absent or incorrect documentation, and the potential loss of important genetic resources. This problem is particularly acute for local seed libraries that allow or expect seed recipients to make replenishing contributions from their home gardens. In addition, even the most carefully administered *in*

situ seed projects can be abandoned or destroyed in times of political unrest. Centralized genebanks are not immune from such dangers, of course, but have been more secure due to professional and political institutionalization. One policy direction, therefore, is to counter the fragility of *in situ* alternatives through funding for seed-saving projects and education on seed-saving techniques at the community level. In return, community seed savers, including those involved in tribal projects, can share their expertise with other farmers and gardeners as well as plant breeders and researchers. Such an approach recognizes the multidimensional aspects of shared knowledge.

Second, the analysis suggests the importance of further revision and development of property law at the national and international levels. At the national level in the United States, intellectual property law and resulting court rulings have encouraged the seed industry's hybrid and transgenic domination and helped reduce Native and non-Native access to open-pollinated heritage seeds (Kloppenburg, 2005; Mascarenhas & Busch, 2006). The open-source model launched in 2014 by the Open Source Seed Initiative (http://osseeds.org/) is an innovative alternative but may not find favor among tribal seed savers. The agreement at the core of the open-source model prevents privatization of seed genetics (although it does not prohibit commercialization), but in doing so it deliberately casts any open-source seed into the shared world of unrestricted access. Like the Cherokee seed giveaway described above, this approach may not resolve Native American seed savers' concerns about loss of a tribal heritage that is partially defined by a distinctive set of seed varieties.

At the international level, activists for increased seed sovereignty argue that the FAO must move to strengthen farmers' rights, access, and benefit-sharing of proceeds from food and crop genetic resources. As stated above, strong demands from less developed member nations of the FAO ensured that the treaty implemented in 2004 included components on these issues. Sovereignty remains at the national rather than community or regional level, which continues to concern Native American and other indigenous and peasant communities, and the FAO has interpreted its responsibility to share benefits by soliciting proposals for competitive investment.

At the same time, recognition and implementation of farmers' rights have moved forward in localized projects and yielded success stories (Andersen & Winge, 2013), emphasizing the ongoing tension in international law in response to pressures for intellectual property rights. Further work can include considerations of sovereignty at the subnational level in addition to clarification and implementation of the ITPGRFA's access and benefit-sharing provisions.

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"La misma realidad de cada lugar es diferente" ("The same reality of each place is different"): A case study of an organic farmers market in Lima, Peru

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Abstract

Studies of alternative food networks have proliferated in Europe and North America while relatively little attention has been paid to similar networks in the global South. An organic farmers market in Lima, Peru, serves as a case study to examine developments in the domestic market for organic produce in Peru. Drawing from interview data and participant observations with pioneering organic farmers and nongovernmental organizations (NGOs) affiliated with the farmers market, this paper investigates how the context of a developing country reaffirms and/or challenges alternative food network (AFN) conceptualizations derived from Northern research sites. The aim of this research is to expand our understanding of alternative food networks in a global context. Findings suggest that while the farmers market in Peru replicates many challenges and opportunities ascribed to similar market-based initiatives in the global North, the developing country context encourages a different reading of these similarities. This exploratory examination of an AFN in Peru suggests that this organic farmers market has created novel economic opportunities for ecologically minded entrepreneurs and organic farmers in rural communities far from the point of sale. Although constrained by a relatively small demographic of affluent, conscientious consumers, the organic market demonstrates the potential to improve rural livelihoods while raising consumer awareness about the benefits of organic agriculture.

Keywords

farmers market, organic agriculture, alternative food networks, Peru

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The long row of vendors at the farmers market present an array of fruits and vegetables, hand-ground coffee, and vegan wraps. There are vendors selling artisan handicrafts and books on nutrition, and organizations promoting organic agriculture. Artisan cheeses and breads are complemented by fresh-cut salad greens and a colorful array of potatoes. In the center of the row a number of people on folding chairs listen attentively to a presentation on micronutrients and the health benefits of eating organic produce. Someone is passing out fliers for an upcoming weekend-long course on permaculture. Customers at the market reflect the demographics of this neighborhood: affluent locals and tourists from Europe and North America. This market is at once completely familiar, given it could just as well be somewhere in California, and yet totally foreign. After all, we are in Peru.

The organic farmers market (FM) described above takes place in a relatively affluent district of Lima, Peru, and is the most economically successful and well-attended of its kind. Known as a *Bioferia*, it is unlike the other open-air produce markets that are commonplace throughout the country. The most notable distinction is the organic certification claimed by the more than 50 vendors at the market, which is composed mostly of individual entrepreneurs and farmers associations. As with FMs in the U.S., farmers here can charge more for their products given its location in Miraflores, an affluent district of Lima, and the increasing consumer demand for organic produce. At first glance the market appears to be a win-win scenario: consumers gain access to fresh organic produce, and producers benefit from a price premium, supporting a small-farm sector increasingly marginalized by agro-industrialization (Flores, 2014. Scholarship from the global North, however, has championed these kinds of markets for both their social embeddedness and the economic opportunities they provide (Brown & Miller, 2008; Feenstra & Lewis, 1999; Feenstra, Lewis, Hinrichs, Gillespie, & Hilchey, 2003; Gillespie, Hilchey, Hinrichs, & Feenstra, 2007), and problematized such market-based approaches to promoting agrarian change (DeLind, 2002; Guthman, 2008; Hinrichs, 2000; Hinrichs & Allen, 2008).

This research draws upon Northern-based scholarship on alternative food networks (AFNs) to examine aspects of a similar empirical context in Peru: the domestic market for organic produce. I focus on a popular organic FM (or *Bioferia*) modeled after a type of FM found in the global North that caters to affluent, health-motivated, environmentally minded consumers. An emergent scholarship has provided initial insights into the potential for AFNs in the North and South to support sustainable food systems that encompass diverse economic, racial, and cultural backgrounds (Abrahams, 2007; Freidberg & Goldstein, 2011). However, given the Northern geographic bias in the scholarship, there is relatively more to learn about how AFNs are being developed in the global South and how these developments might contribute to "globally useful conceptualizations of AFN" (Abrahams, 2007, p. 95). Thus, this paper examines how the context of a developing country reaffirms and/or challenges AFN conceptualizations derived from Northern research sites, ultimately drawing attention to how expanding the scope of analysis to encompass the global South requires reconceptualizing the workings and implications of AFNs in a global context.

Based on critical and promotional scholarship on AFNs, I consider how "place-based contingency shapes outcomes" (Guthman, 2008, p. 1172) in the development of Peru's domestic market for organic produce. Unsurprisingly, the *Bioferia* reproduces some of the problematic tendencies also found in Northern markets: the *Bioferia* caters to a relatively small population of affluent Peruvians and foreigners, while "organic nongovernmental organizations (NGOs)"[1] promote farmer livelihoods and market integration over food security for rural and urban populations. Moreover, organic NGOs' emphasis on consumer choice may impede collective action on issues related to social justice while reifying organics as the domain of privileged elite. As one of the pioneering organic farmers in this study remarked, "The same reality of each place is different," provoking a closer examination into not only the similarities between FMs in the

[1] I use this term to describe the loose assortment of NGOs promoting organic agriculture and new marking opportunities for small-scale, ecologically oriented farmers.

North and this market in Lima, but also the context surrounding the *Bioferia* that makes it so distinct.

One reading of the *Bioferia* is to view it as an example of how market forces tend to subvert agrarian values and create subjects with a myopic focus on their own personal choices and well-being (Guthman, 2003, 2008). However, drawing from Gibson-Graham (2006) and the concept of "reading for difference rather than dominance" (p. xxxi), many of these critical analyses are complicated by the unique Peruvian context in which this market has emerged. I contend that expanding the geographic frame of reference of AFNs opens up discussions of poverty, development, and the "historical forces" and "contemporary conditions" under which alternative food initiatives either "take root or whither" (Freidberg & Goldstein 2011, p. 24). This exploratory examination of an emblematic instance of AFNs in Peru shows that the *Bioferia* has created novel economic opportunities for ecologically minded entrepreneurs and organic farmers in rural communities far from the point of sale. Although constrained by a relatively small class of affluent and conscientious consumers, the domestic market for organic foods in Peru has the potential to improve rural livelihoods by ascribing economic value to already existing organic farming practices, while at the same time inspiring critical reflection among organizers and advocates about the limitations of market-based agrarian change.

First, I review relevant literature about the challenges and opportunities associated with FMs and organic agriculture, introducing the concept of "reading for difference" as a strategy for revealing an alternative interpretation of AFNs in the global South. After an overview of my research methods, I provide background on the development of an organic sector in Peru focusing on a popular *Bioferia* and organic NGOs.[2] In my findings section, I first highlight the challenges associated with the growth of the organic sector, including the questionable sustainability of institutions developed to support emerging organic markets, and then show how the *Bioferia* has opened up new opportunities for ecologically oriented producers and their rural communities. I conclude by showing how this case study lends itself to an alternative reading of critical scholarship on FMs and organic agriculture, despite the similarities between this market in Peru and other upscale organic markets in the global North.

Farmers Markets and Organic Agriculture: Assessing Market-based Agrarian Reforms

Northern-based AFNs are defined by processes that reorient social and spatial dimension of food systems, bring producers and consumers into closer contact, provide economic opportunities for small-scale farmers, and support visions of economic, social and environmental sustainability (Goodman & Goodman, 2009; Jarosz, 2007; Renting, Marsden, & Banks, 2003; Watts, Ilbery, & Maye, 2005). Farmers markets have become a hallmark of AFNs and are associated with wide-ranging benefits, from economic gains for small-scale farmers unable to access larger wholesale markets (Brown & Miller, 2008; Gillespie et al., 2007; Griffin & Frongillo, 2003; Hardesty & Leff, 2010; Thilmany & Watson, 2004), to the cultivation of trust, reciprocity, and regard between producers and consumers (Lee, 2000; Sage, 2003).

Another market-based mechanism said to facilitate agrarian change, certified organic agriculture[3] has been heralded as a boon to small and medium-sized farmers who receive a price premium for their certified organic products (International Fund for Agricultural Development [IFAD], 2003; Pugliese, 2001) while also benefiting the environment through reductions in the use of synthetic fertilizers and pesticides (Allen & Kovach, 2000). Organic agriculture in the global South has evolved along a very different trajectory than the North, where the vast majority of organic produce is consumed. In the global South, organic agriculture is primarily export-oriented, destined for markets in North America and Europe (Willer

[2] I focus principally on two different organic NGOs: The National Association of Ecological Producers (ANPE), and Huayuna.

[3] Throughout this research, "organic agriculture" refers specifically to that which has been certified in one form or another, as compared to a de facto organic agriculture common among more traditional subsistence farmers.

& Lernourd, 2014), and promoted by NGOs as a way to improve rural livelihoods of small-scale farmers (Beban, 2014; Flores, 2014; IFAD, 2003; Parrott, Olesen, & Høgh-Jensen, 2006; Pugliese, 2001; Thavat, 2011; Vaarst, 2010). The results, however, have been mixed. Programs developed to support organic exports in the global South have proven problematic for their imposition of Northern-based market and regulatory requirements on rural communities undergoing their own unique processes of agrarian transition (Beban, 2014; Raynolds, 2004; Thavat, 2011). And while there is a well established and occasionally critical literature examining the impacts of organics and fair trade in export commodities like coffee (Bacon, 2005; Beuchelt, & Zeller, 2011; Jaffee, 2007; Raynolds, 2004), there has been very little work done in exploring emerging domestic markets for organic produce and corresponding AFNs in the global South (Abrahams, 2007; Freidberg & Goldstein, 2011). This research helps to fill this gap by asking how and to what extent these Southern markets reflect similar tendencies and challenges associated with market-based agrarian reforms found in the global North.

The alleged social, economic, and environmental benefits of FMs and organic agriculture have been problematized by AFN scholars in the global North who are skeptical of the progressive nature of market-based socio-agrarian reforms (Alkon, 2008; Allen & Guthman, 2006; DeLind, 2002; Guthman, 2008; Guthman, Morris, & Allen, 2006; Hinrichs, 2000; Hinrichs & Allen, 2008; Slocum, 2007). This critical scholarship on AFNs points to how an emphasis on market-based solutions fails to address systematic social injustice and reinforces neoliberal emphases on individual choice and entrepreneurialism as sufficient drivers of social change (Alkon & Mares, 2012; Guthman, 2008; Hinrichs & Allen, 2008). Farmers markets in particular have been critiqued for being overly determined by market mechanisms as opposed to the social and ecological values they are said to represent (DeLind, 2002; Hinrichs, 2000). According to DeLind (2002), the FM is a market-based initiative where "the principal players (however friendly and personalized) are still producers and consumers; their basic identities are still framed by the economic or commercial transaction" (p. 218). This is not to say that the social relations and ecological values embedded within the market are nonexistent, but rather to acknowledge the tendency of the market to subsume these types of social values. With regard to the market for organic agriculture, Allen and Kovach (2000) caution that over the long run, ecological and social benefits are likely to be compromised by the incursion of large-scale agrarian capital. Indeed, this trend is evident in the conventionalization of organics across the globe (Buck, Getz, & Guthman, 1997; Coombs & Campbell, 1998; Raynolds, 2004).

Another critique of FMs is that they are ill-suited to address food justice[4] concerns because of the tendency to privilege producer livelihoods over those of low-income consumers (Guthman et al., 2006). Allen (2004) claims that such "farm-centrism" overinflates the importance of farmers in the alternative food movement to the exclusion of, for example, food-industry and farm workers (p. 120). That the vast majority of organic exports from the global South are consumed in the North further illustrates the strong relationship between affluence and organic consumption (Flores, 2014). As this case from Peru will demonstrate, the tendency for AFN organizers and advocates to privilege farmer livelihoods and to rely on affluent consumers is evident in organic FMs in the North as well as the South.

"Reading for Difference"

At first glance it appears that the above U.S.-based critiques apply handily to developments in Peru's organic sector. However, the application of these critiques to the upscale FM in Peru depends upon how findings are interpreted, or "read." This paper adopts a "reading for difference" approach (Gibson-Graham, 1996, 2006; Harris, 2009), which seeks to avoid reinscribing neoliberal emphases on market-based reforms, individual consumption, and entrepreneurialism. According to Harris, activist/scholars have a role to play in cultivating

[4] According to Alkon and Mares (2012), "the concept of food justice speaks to the multiple ways that racial and economic inequalities are embedded within the production, distribution, and consumption of food" (p. 348).

alternatives to neoliberalism through our theoretical engagements. He argues that,

> by adopting Gibson-Graham's practice of 'reading for difference rather than dominance' (2006, p. xxxi) we might learn to read the landscape of alternative food politics not as reproducing the dominance of hegemonic neoliberalism, but as populated by a variety of emergent institutions and practices (paraphrasing Gibson-Graham, 2006, p. 54). In so doing, we might better acknowledge attempts to imagine and enact a food politics that achieves different socio-environmental justice outcomes to those of conventional food systems, and offer a more constructive academic critique. (Harris, 2009, p. 60)

Geographical and historical locations, then, are essential to determining difference in the case of alternative food initiatives like the FM, as demonstrated by case studies of emerging AFNs in South Africa (Abrahams, 2007) and a community supported agriculture (CSA) box scheme in Kenya (Freidberg & Goldstein, 2011). As the following "reading for difference" analysis demonstrates, the organic FM in Peru has—rather than merely replicating the challenges pointed to in Northern AFMs—opened up a variety of unforeseen opportunities to further social and ecological commitments to the burgeoning organic movement.

Methodology and Case Selection

Data collected for this research reveal aspects of Peru's domestic market for organic products through interviews and participant observation with individuals and institutions associated with one of the country's most well-established *Bioferias*. My entry point into this research, and the subsequent methodology, is a result of working closely with a group called the Multinational Exchange for Sustainable Agriculture (MESA).[5] MESA alumni constituted a convenience sample of individuals working in organic agriculture in and around Lima. They also provided access to communities of farmers participating in the *Bioferia* and introduced me to the staff of two NGOs (the National Association of Ecological Producers [ANPE] and Huayuna) and members of two organic cooperatives. Numerous alumni are particularly active in an agricultural region near the district of Mala, approximately one hundred kilometers (62 miles) south of the city. Mala became an epicenter of this research, much as it has been for the organic movement in Peru since the late 1990s, when Huayuna began offering trainings in organic methods and helping organize two organic cooperatives.

Over the course of three months, spanning two research trips in 2011 and 2009, I made frequent observations at the *Bioferia*. I also conducted semistructured interviews with eight MESA alumni, three pioneering organic farmers, and several representatives from ANPE and Huayuna. Informal interviews were conducted with members of two organic cooperatives as well as dairy farmers in a rural community supplying the milk for an artisanal cheese-making operation at the *Bioferia*. Informal conversations with customers and vendors provided data on the demographics of the market and the motivations of producers and consumers to attend the market. In-depth data was collected with four MESA alumni in particular with whom I conducted multiple interviews, in addition to observing their work on their respective farms and in the rural communities where they live. Each of these individuals is engaged in different productive endeavors associated with the *Bioferia:* one is an entrepreneur, another is a farmer and market organizer, and two more work as laborers on an organic farm, in addition to selling produce at the market. All of these interviews were recorded, transcribed, and coded in an effort to derive common themes that emerged in the form of both challenges and opportunities in the domestic market for organics in Peru.

[5] In this program participants from around the world (though mostly from Peru and Ecuador) come to live and work on a variety of U.S. organic farms for approximately nine months. The intention is to provide them with opportunities to learn valuable skills and gain experiences they will be able to apply once back in their home countries.

Background: Organic Markets and NGOs in Peru

There are a number of distinctive features of an emerging AFN in Peru that have contributed to the formation of the *Bioferia* in Miraflores. Organic agriculture in Peru, like in many other developing countries around the world, is primarily export-oriented, although there is evidence of a growing movement focused on organic production for domestic markets in the form of high-end supermarkets, natural food stores, and FMs like the *Bioferia* (Flores, 2014; Olsen, 2008; "Organic Products and Market" [*Productos Ecológicos y Mercado*], 2012). While as little as 5% of organic products in Peru is sold in domestic markets (Olsen, 2008), the volume of sales fails to represent broader cultural and political trends within Peru's emergent AFN.

In the cultural sphere, the domestic market for organic produce has been given a significant boost by the Peruvian Gastronomy Society and the rise of a movement celebrating Andean cuisine (Flores, 2014). One initiative of the Gastronomy Society is to create farmer-chef alliances that support the production of indigenous crops and ecological or organic methods of production. In an interview with the executive director of ANPE, Peru, he said: "The Peruvian gastronomy boom is another phenomenon that is pushing the growth of the organic movement and organic production. It is an important engine. They are now looking for certified organic products, mostly for restaurants." Famous Peruvian chefs like Gastón Acurio have been enormously influential in drawing international attention to Peruvian cuisines and inspiring the use of organic and indigenous products in high-end restaurants in Peru. An event started by Acurio and others called *La Mistura,* a gastronomy fair in Lima celebrating regional cuisine and agricultural products of Peru, has drawn as many as 500,000 attendees in recent years (Mistura, 2014). Events like *La Mistura* illustrate distinct aspects of an emerging AFN in Peru focused on the country's diverse agricultural history and traditions.

In the political sphere, efforts are underway to promote organic and sustainable food production as a way to improve farmer livelihoods and ensure environmental and consumer safety. The Peruvian Congress established a law promoting organic agriculture[6] and instituted a 10-year moratorium on all genetically modified organisms (GMO) foods (Murphy, 2013). Various organic certification agencies[7] are managed by SENASA (the National Agrarian Health Service), in coordination with private-sector NGOs. In 2001, the public and private sectors together created the National Organic Products Commission, designed to implement certification standards from the point of production to the point of sale. NGOs like ANPE have introduced bills on food sovereignty to the national legislature. Overall, the growing domestic market for organic produce in Peru provides an opportunity to expand analyses of AFNs that encompass geographic areas in the global South. An especially intriguing development in Peru is the emergence of organic farmers markets.

"Las Bioferias"

The *Bioferias,* or organic farmers markets, are one of the most visible and influential elements of Peru's domestic market for organic produce. Outdoor markets selling traditional and local produce are the norm throughout rural Peru. What makes the *Bioferias* distinct is their explicit focus on the *ecológico,* or organic, methods of production. All the produce at the *Bioferia* is alleged to be grown without pesticides or herbicides, thus providing a "healthier" product for the consumers who choose to pay a premium for their produce. These organic FMs are a main distribution outlet for organic produce and one of the most visible indicators of what could be considered an emerging AFN in Peru.

There are *Bioferias* in all parts of Peru,[8] but the

[6] The Law for the Promotion of Organic and Natural Production (Law No. 29196) is meant to promote organic and sustainable agriculture as an avenue for poverty reduction, food security, and environmental conservation (Ferreira, 2008)

[7] There are currently five private certification agencies recognized by U.S. and European regulators: Bio Latina, BCS OKO, Control Union-SKAL, IMO Control, and OCIA. Bio Latina works in Bolivia, Columbia, Peru, and Nicaragua and is the primary certification agency for domestic organics in Peru; the others work mostly with large export markets.

[8] There are *Bioferias* in other, less affluent districts of Lima and in other regions of Peru, which have achieved limited success according to farmers at the market in Miraflores. An unpublished study of a *Bioferia* in Huancayo, a tourist destination in the Andean highlands, found significant

most widely recognized, well-attended, and lucrative is the *Bioferia* in Miraflores. This particular market was established in 1999 with the support of an influential NGO called *Grupo Eco-lógico*. According to Aponte (2013),[9] the organizers had to overcome the stigma associated with outdoor markets among the more affluent population who perceived these markets as "noisy" and "chaotic." Unofficial estimates are that the market takes in about 1 million soles a year (about US$335,000).[10] In 2009 there were 50 vendors in 48 stands at the market composed of associations and individual producers as well as agro-food processors. It is estimated that there are around 1,000 farmers represented at the market through the various associations. Farmers and farmer associations from all over Peru are drawn to this market where they charge prices up to 30% higher than in nondifferentiated markets. This particular *Bioferia* is the only one of its kind where all the vendors are certified by a third party, such as BioLatina. Other *Bioferias* in more remote locations utilize the Participatory Guarantee Systems, certification systems based on "participation of stakeholders [that] are built on a foundation of trust, social networks and knowledge exchange" (IFOAM Organics International, 2014). PGS are in some ways an institutionalized version of the social embeddedness associated with FMs in the U.S. (Hinrichs, 2000; Sage, 2003).

Customers at the *Bioferia* reflect the demographics of this area: affluent Peruvians and tourists from Europe and North America for whom Miraflores is a popular destination in Lima. According to one vendor with whom I spoke, customers inquire about the origins and qualities of the produce, but never about the price. Customers appreciate the fact that there is a marketplace providing certified organic produce, a distinction rarely made in other produce markets in Peru. The notions that organic produce is healthier than its conventionally grown counterparts, and that price was less relevant, were common themes that emerged in my conversations with vendors.

Organic NGOs in Peru

The *Bioferia* in Miraflores and much of the domestic market for organic agriculture in Peru has been made possible in part by an active NGO sector with ties to the international development community. The international development community has joined forces with Peruvian NGOs and small-farmer advocates to promote an organic sector designed to improve farmer livelihoods and create a domestic market for their products. Beginning in the middle 1980s, a number of NGOs that promote organic production began to emerge in Peru. These NGOs operate in conjunction with other NGOs in the country and are affiliated with global and international organic and agroecological movements. Organic NGOs' missions (to promote the production and consumption of organic produce) are similar; however, they differ in the degree to which producers have leadership roles within the organization and in the amount of direct farmer training they provide (Aponte, 2013). What is most striking, however, is that they have all converged on one particular strategy, to varying degrees: encouraging farmers to adopt organic methods of production as a way to get better prices for their products.

The predominance of NGOs in the promotion of organic agriculture follows trends in the development sector more broadly in Peru, which has seen a rise in civil society networks since the era of privatization beginning in the 1990s (Bebbington, 2001, 2004; Ortiz, 2006). During this time, NGO orientations began to shift from technical innovations "to entrepreneurial approaches prioritizing access to markets" (Ortiz, 2006, p. 484). This has certainly been the trend among the organic NGOs in Peru. They have, according to Aponte (2013), played a key role in establishing organic markets by "providing funding for the *Bioferias,* organizing training on organic farming techniques and on certification schemes, coordinating with municipali-

limitations to their organic market due to poor organization and marketing, coupled with a lack of supply of organic goods, and a lack of consumers willing and able to pay for organic produce (Loomis, 2010).

[9] Data drawn from W.V. Castro Aponte (2013) will be featured prominently in the following sections on *"Las Bioferias"* and "Organic NGOs in Peru."

[10] According to a report by USDA's Global Agriculture Information Network (GAIN) on Peru's organic sector, domestic sales of certified organic products reached US$500,000 in 2003 (Olsen, 2008).

ties, and influencing policy makers for institutionalizing the *Bioferias*" (p. 86).

One NGO in particular, Huayuna, was instrumental in training and organizing organic farmers in the region where the present research was conducted. Nonetheless, according to an agronomist with the organization, "the principal focus [of Huayuna] is the market…We focus on the market because in the end the necessity of the producer is to earn money." Price premiums for organic produce were seen as an ideal way to improve farmer livelihoods in this region less than two hours south of Lima. The farmers they work with were already involved in markets for commodities that were becoming increasingly less reliable, like cotton and apples, both of which are commonly grown using chemical fertilizers and pesticides that are associated with negative health and environmental impacts. The creation of an organic market was seen as a way to both reduce the negative impacts of conventionally grown produce and support a vulnerable population of farmers whose pre-existing markets were being threatened by overseas competition (Finan, 2007).

Both the organic NGOs and the *Bioferias* are evidence of a growing organic movement in Peru. An organic discourse has found its way into mainstream culture through events like La Mistura, and into the political sphere through laws banning GMOs and promoting organic agriculture. These characteristics of what could be considered an emergent AFN in Peru are in some ways comparable to developments in Northern-based AFNs: the emphasis on market-based agrarian change, privileging of producer livelihoods over low-income consumers, and dependence on an affluent consumer base that can afford to pay organic price premiums. Just as these developments have been problematized in the U.S. (Alkon, 2008; Allen 2004; Guthman 2008; Guthman et al., 2006), the *Bioferia* in Miraflores presents similar challenges and limitations that are, nevertheless, conditioned by the distinct Peruvian context.

Awareness Does Not Equal Access: Limitations of the Organic Market

Farmers at the *Bioferia* and the NGOs promoting organics have come up against various constraints to the growth of the organic market and the sustainability of institutional frameworks supporting the organic sector. Challenges associated with the domestic organic market mentioned by representatives of various organic NGOs and pioneering organic farmers include a lack of awareness and/or knowledge by both consumers and producers, a lack of consumers due to the relatively small affluent population willing and able to pay organic premiums, and challenges around the institutional sustainability of NGOs and producer cooperatives. These challenges are linked to deeper structural challenges like systemic poverty, inequality, and the lack of state support for small-scale farmers, issues that are not necessarily being addressed by promoting organic farmers markets.

The greatest challenge to the growth of the organic market, according to interviews conducted with organic farmers, organizers, and NGO leaders, is a lack of awareness on the part of both producers and consumers. In an interview conducted with the executive director of ANPE, he said that many of the *campesinos* (peasant farmers) they work with lack awareness about how to improve their economic situation and how to add value to their products. Helping farmers find ways to commercialize their products is an important goal of each of the organic NGOs. Up until this point, the main commercial strategy has been to develop and promote the *Bioferias,* with additional efforts going toward the creation of producer cooperatives better able to supply wholesale markets.

An agronomist for Huayuna expressed a similar sentiment about a lack of awareness among producers, some of whom had to be convinced of the benefits of organic beyond the price point. In a simplified account of farmer motivations, she said:

> I think that here in Peru there are two types of organic producers, one that enters with awareness, without much convincing, and the other that enters because they have expectations that the price will be better than conventional. I think the majority enter for this reason.

If indeed the majority of organic farmers enter the organic market due to economic motivations,

this does not bode well for the sustainability of organic agriculture in the region, as prices will tend to come down as more producers enter the market.

It is not just a lack of awareness on the part of producers, or their short-sighted economic motivations, that may stifle the growth of the organic market. Consumers also have an important role to play. The agronomist for Huayuna said a major problem for the organic market is:

> a lack of awareness by consumers about the quality of the product. [Organic] is a better quality product. But this is a characteristic that is not concrete. You have to accept this in your head, that it is better quality. This is the work we have to do at the consumer level. This is what is missing, in my opinion. There is a group of consumers, but very few.

How then to convince consumers that there are intangible benefits to eating organic produce, especially when they can buy conventional produce that appears the same for a fraction of the cost down the street? Organic farmers and alternative food advocates face similar challenges in the U.S. Consumers need to believe that the organic product is somehow superior *and* be able and willing to pay for the difference in quality. According to the same agronomist, who has been working in the field of organics since the late 1990s, "Only in the market in Miraflores can they afford to pay these prices. Nobody else can pay. Nobody else is going to pay." Indeed, other *Bioferias* in Lima have proven less economically successful, and even greater challenges emerge in the case of a rural *Bioferia* in the Andes regarding insufficient supply of and demand for organic produce (Loomis, 2010).

In addition to the NGO representatives, pioneering organic farmers and cooperative members expressed concerns about the long-term viability of domestic organic markets. One such farmer, Pablo, described what he saw as some of the primary challenges facing organic producers in the region. One concern was the costly certification process, which for one cooperative was about US$900 per year for the group. Others have shown certification to be a high barrier for small-scale farmers wanting to enter the organic market, especially those interested in exporting their products (Barrett, Browne, Harris, & Cadoret, 2002; Raynolds, 2004). Another farmer, Juan, acknowledged the tremendous growth of the organic market in Lima, but also recognized that the lack of knowledge among consumers and of differentiated markets spaces were limiting the growth of the organic sector. He said that many farmers send their organic products with the highest quality grade to the *Bioferia* and the rest to a common market where the organic certification is essentially meaningless, at least in terms of a price premium. He still took satisfaction in knowing that he was growing and selling what he called a "healthier" product, regardless of the final destination.

Another concern expressed by Pablo, an organizer of the *Biofrut* organic cooperative, was the "sustainability of the institutions" built up to serve an organic market. This particular cooperative, for example, went from about 10 members in 1998 to only 5 members in 2013. Pablo was concerned that there would be no one to continue his legacy and that of the other organic pioneers: "What interests me most is the sustainability of organic agriculture." Pablo's concern, in part, was that organic agriculture would not persist in the region given the incentives for using synthetic fertilizers and pesticides that produce more immediate short-term gains via higher yields. According to interviews with cooperative members, organic apple producers (apples are the most common organic product in the region) have to compete with up to 40% lower yields than their conventional counterparts, in addition to having fewer marketing outlets for their produce. They say they are able to compete by selling a higher quality product at a better price.

As further indication of a lack institutional sustainability, during the course of this fieldwork news began to spread that the European NGOs funding Huayuna were defunding the organic training program and demonstration farm, choosing instead to focus their efforts in Africa. Employees of the NGO who worked on the demonstration farm and with the cooperatives were in jeopardy of losing their jobs, and the farm itself was in jeopardy of

being dismantled.[11] Because this particular NGO has been instrumental in training new farmers in organic methods of production, its absence in the region could further jeopardize the creation of new organic farmers and marketing strategies to sell their produce.[12] While farmer field schools and farmer-to-farmer–like exchange programs exist in Peru (Godtland, Sadoulet, Janvry, Murgai, & Ortiz, 2004), which may safeguard against this type of NGO withdrawal by empowering farmers to generate and share knowledge among one another, these types of organizations appear to be more active in the Andean highlands with a greater emphasis on improving subsistence production over market integration. Farmers in this coastal region of Peru, however, have historically been linked into markets for commodities like cotton, and more recently to various fresh fruits and vegetables, especially asparagus (Escobal, Agreda, & Reardon, 2000; Finan, 2007), making them more attractive to NGOs interested in helping farmers establish new marketing opportunities.

Emergent Opportunities: Organic Entrepreneurs and Rural Development

Despite the challenges posed by the creation of an organic market that caters to an affluent clientele, the *Bioferia* also presents a number of opportunities for individual entrepreneurs and farmers in rural communities far from the point of sale. Organic NGOs have been instrumental in creating and supporting the organic market, but the knowledge and dedication of organic producers is what makes this market possible. Examples of a cooperative of organic farmers and a value-added dairy operation show how the *Bioferia* provides a space for the expression of social and ecological values previously subsumed by more conventional marketing outlets.

In the district of Mala, south of Lima, existing organic farmers were able to benefit from the commercialization of organic agriculture by establishing multiple organic cooperatives. Pablo is one of the "organic pioneers" who began working with the NGO Huayuna in the late 1990s to help develop an organic sector, which for him is still predicated on ecological values passed down from previous generations and not purely on economic incentives. He was one of the first farmers to become involved with Huayuna, was one of the first to be certified organic by Bio Latina, and is a founding member of the organic growers' cooperative. He describes his initial interaction with a Huayuna representative at a meeting of agronomists this way:

> They always talked to us in the classes because we always farmed in a traditional manner. Ancestrally, our parents, they made us do work in line with lunar rotations, the sun cycle, a series of factors that we took into account. But we never knew why we did these things, scientifically…We only saw that it gave us results. So, [the representative] invited us [to the meeting]. To me it seemed interesting because all the knowledge I received from my grandfather, there are practices that I did, and I realized why I did these things.

For him, the organic methods of production replaced the traditional methods, whereas for other farmers, traditional practices were replaced with conventional ones. He continued to work with Huayuna, demonstrating what was possible with these traditional methods, which further inspired the trainings and workshops on organic agriculture on topics like integrated pest management and crop rotations.

For Pablo and the other founding members of the *Biofrut* cooperative, the economic incentive was not their primary motivation for growing organic fruits and vegetables. He said that for the group, "the organic [*ecologica*] for us is a living philosophy." He takes a holistic approach to farming, one governed by a deep understanding of ecology, including how livestock, orchards, and vegetable produc-

[11] The demonstration farm is located a few hundred feet above the valley floor and is irrigated by a rather costly pump that sends water to a tank located high above the farm. Gravity is then used to irrigate the crops. Without the NGO to pay the electricity bills, it seemed unlikely that the water would continue to flow.

[12] Since this research was conducted it remains unclear the extent to which Huayuna maintains an active presence in the region.

tion work together. The cooperative was formed to make a case for this holistic type of farming as much as for the economic benefits of organic agriculture. According to Pablo:

> We began in *Biofrut* with a difficult challenge. We didn't start to go into business. We organized to show how you could do organic agriculture, not for business. We showed Huayuna it was possible to grow these things. Before this, Huayuna was not interested in organic agriculture, not at all. We demonstrated it was possible. This was our reason to be, our philosophy, knowledge of country, climate, pests, soil. They saw we know all these things and said we should enter the market.

This may have been the case in the early days of the cooperative, with a consensus among members about a deeper set of ecological/organic values they brought to the table. According to an interview with one of the main organizers of the cooperative, many members ultimately left *Biofrut* due to the costly certification process, relatively low yields, and/or insufficient economic incentives.

Despite *Biofrut's* decline in membership, a different organic cooperative has seen tremendous growth in its volume of sales, mostly as a result of establishing wholesale accounts in Lima. Antonio, who has worked with Huayuna since its first trainings, projected that total sales from the cooperative could be up by fourfold over the previous year. The cooperative maintains an active presence at the *Bioferia*, selling mixed fruits and vegetables in relatively small volumes, but also has recently expanded its business by selling things like apples and purple corn to larger, relatively new, wholesale markets for organic produce.

In addition to fostering cooperative marketing arrangements, the *Bioferia* has created opportunities for a new kind of socially embedded entrepreneurialism. Scholars have applied Polanyi's concept of embeddedness to farmers markets in the U.S. (Hinrichs, 2000) and to the fair trade movement (Raynolds, 2012) to illustrate how markets can be reshaped with social and ecological concerns in mind. Gloria is one such example of an organic entrepreneur who is helping re-embed markets by linking her products and production to social and ecological, as well as economic, values. She and her family are running a small business making cheese and yogurt with milk purchased from a rural community of dairy farmers outside of Lima. They bring to the business a deep commitment to the rural community that supplies their milk and are optimistic about the potential of the market to promote more sustainable food systems. Their business has been so successful that they recently opened a *"biobodega,"* a brick and mortar storefront where they sell their dairy products as well as local honey, olives, meats, and vegetables, creating a more permanent and visible presence within the organic food movement in Lima.

Gloria's family business offers one of the clearest examples of how the creation of organic markets can improve rural livelihoods far from the point of sale. They have formed strong social ties with members of the community, especially those inclined toward ecological agriculture. They offer farmers a good price for their milk, better than what they were getting at nearby markets. But to her, the relationship is more than one just based on an economic exchange. She said, "In reality, we share with the people of the community we live with and learn from each other, economically as well, and it is actually profitable to do so." She spoke of wanting to find other ways to support the community through things like agritourism, and of wanting to make more connections between people of the community with consumers in Lima. In speaking with dairy farmers who supply the milk for this artisan cheese and yogurt, it was clear they appreciated the opportunity to sell their milk at a good price to a reliable buyer at the point of production. Previously, they would have had to transport the milk themselves to markets up to two hours away. This case is a small, but prime, example of socially embedded entrepreneurialism that speaks to the potential of organic markets to promote rural development.

An Organic Farmers Market in Peru: Challenges and Opportunities

Challenges associated with the domestic market for

organic produce in Peru, evident in the workings of this particular *Bioferia* in Miraflores, reveal some of the same challenges associated with similar markets in the U.S. The relatively high cost of organic produce at the *Bioferia* still puts the organic movement squarely in the domain of an affluent and health-conscious consumer base. Many key figures in the movement point to a lack of awareness by both consumers and producers of the importance of eating and growing organic produce, but no amount of awareness can compensate for a lack of access due to financial constraints. The *Bioferia* could have the effect of reifying organic agriculture as the domain of privileged elite, while drawing attention away from things like costly third-party certification for producers or the inability of low-income consumers to access certified organic produce. Market-based initiatives like the *Bioferia* are often ill-suited to address these kinds of structural limitations. Farmers market managers in the U.S. make similar claims about a lack of awareness among consumers as a limiting factor, drawing attention away from other more practical reasons why people might not choose to shop at these kinds of markets (Guthman et al., 2006).

A unique feature of the organic landscape in Peru, compared to that of the U.S., is the predominance of organic NGOs that, on the one hand, have been invaluable in helping establish organic markets and farmer cooperatives, in addition to training new organic farmers. On the other hand, a myopic focus on the market combined with unstable funding sources may leave farmers who have come to depend on this support in jeopardy. Such organizations and farmer associations have been shown to be important to the promotion of markets for organic agriculture in developing countries (IFAD, 2003). However, reliance on the NGO sector may prove detrimental in the long run as funding sources dry up or NGOs and/or their funders shift priorities. A better strategy might be for local NGOs to facilitate the kinds of decentralized farmer-to-farmer exchanges that have proved successful in generating and sharing knowledge (Holt-Giménez, 2006; Rosset, Machin Sosa, Roque Jaime, & Ávila Lozano, 2011). This could include knowledge about how to access and benefit from newly emerging organic markets.

In many ways, the opportunities created by the development of an organic market outweigh the limitations and negative implications associated with such high-end markets. The *Bioferia* expands marketing opportunities and economic incomes, conferring economic value on already existing social and ecological commitments of farmers and entrepreneurs. The market, in a broad sense, may be insufficient in instilling these non-economic values, but it does create a positive reinforcement for those who may already be interested in promoting rural development, improving farmer livelihoods, and supporting the environment. For Gloria and her family, participation in the *Bioferia* provided the context to incubate and grow their artisan cheese and yogurt business. The organic cooperative has benefited from the networking opportunities at the market that have opened up access to wholesale accounts. Both these findings reaffirm important benefits ascribed to FMs in U.S. scholarship that go beyond the price premium (Feenstra & Lewis 1999, Feenstra et al., 2003; Gillespie et al., 2007).

Another potential opportunity associated with this market, and one not easily reflected in the data, pertains to the critical reflection displayed by interview subjects. According to the NGO representatives and farmers I spoke with, a lack of consumer awareness is one of the main challenges to the growth of the organic market in Peru. And yet these same individuals also recognized that Miraflores was one of the only places in the country where this kind of organic FM could be a success. They were aware that the *Bioferia* was not a panacea to improve livelihoods of farmers throughout the country, or a way to address the persistent poverty and inequality throughout the country. However, they continued in their efforts with the *Bioferia* because there were improvements being made in the lives of those farmers fortunate enough to have access to this market and to organic certifications. Their awareness is similar to the "reflexive localism" championed by Dupuis and Goodman (2005) that encourages an examination of inequalities and social justice within and among various conceptualizations of the "local." These actors, in their own ways, demonstrate critical, reflexive awareness of the possibilities and limitations of the organic mar-

ket. This is a first step toward addressing some of the deeper structural problems facing Peruvian campesinos and urban dwellers unable to afford and/or access organic produce—issues of interest and/or awareness aside.

"Reading for Difference" in Peru's Organic Farmers Market

Despite its parallels with AFNs in the global North, Peru's burgeoning organic sector must be studied in its distinct developing-country context, which encourages "reading for difference rather than dominance" (Gibson-Graham, 1996) in AFNs. NGOs promoting rural livelihoods in Peru are less susceptible to the criticism of AFNs in the North for being overly focused on farmers at the expense of underserved populations (Allen, 2004). This is because these NGOs *are* serving one of the most vulnerable populations in Peru: small-scale farmers. Organic NGOs like Huayuna that promote market integration have focused on farmers who are already dependent on the market, as opposed to mostly subsistence farmers. While the farmers in the coastal region of Peru may not be the most impoverished in the country, their reliance on shifting domestic and international markets has made them more vulnerable to global processes of agro-industrialization (Escobal et al., 2000; Finan, 2007; Reardon & Berdegué, 2002).

Markets like the *Bioferia* may be ill-suited to address the root causes of broader structural issues affecting levels of poverty and inequality that require policy-level change. However, NGOs in Peru working with the *Bioferia* are also championing legislative reform to promote rural development. For example, ANPE has long been working to petition the government for better food security laws, and it has proposed a law that codifies the right of food sovereignty, a concept largely developed for and by peasant producers in the global South. Peru is also the first country in the Americas to ban GMOs, putting a 10-year moratorium on their use and barring the entry of GMO seeds and products into the country (Murphy, 2013).

As for consumer awareness, the gastronomy event mentioned earlier, *La Mistura,* is a testament to the widespread interest in celebrating distinctly Peruvian products grown by a traditional agricultural sector. The culinary renaissance in Peru has a tremendous amount of support among a cross-section of the population, evident in the huge numbers of attendees at this annual event. The national celebration of an incredibly diverse Peruvian cuisine evades the kind of entrenched localism found in parts of the U.S. alternative food movement, while also drawing attention to the challenges and opportunities in utilizing organic agriculture as a tool for promoting rural development.

Conclusion

This paper has argued that the *Bioferia* in Miraflores creates socially embedded economic opportunities for ecologically minded farmers and entrepreneurs while also promoting rural development and contributing to the growth of an organic movement in Peru. Importantly, this research expands on conceptualizations of AFNs relevant in both the global North and South, in addition to highlighting distinctive features of AFNs in a developing-country context. Interviews and participant observation with NGO representatives, organic farmers, and cooperative organizers affiliated with this particular *Bioferia* showed that the growth of the domestic organic-product sector in Peru is compromised by the emphasis on market-based agrarian change and consumer and producer awareness, as opposed to access. However, avoiding the temptation to view the *Bioferia* as yet another example of neoliberalism in AFNs (Harris, 2009), this reading shifts the focus to the possibilities for an emergent organic market in a country where a traditional farming sector is being ascribed new economic, social, and ecological value.

As the exploratory research presented here is intended to open up perspectives on AFNs in a global context, it also points to several fruitful avenues of future research. Such research would do well to consider the potential ramifications of increased competition in the domestic market for organic produce in Peru, especially given the tendency toward conventionalization in Northern markets (Buck et al., 1997; Coombs & Campbell, 1998) and the already existing export-oriented organic sector in the global South that shares some of these tendencies (Finan, 2007; Raynolds, 2004). Survey data of organic consumers in Peru might

also be compared with survey data among organic consumers in the global North to determine if there are unique concerns or motivations among consumers in less and more developed countries. Lastly, more research is necessary to assess the extent to which organic farming for domestic markets in Peru is a viable strategy for improving rural livelihoods. These potential research endeavors would increase dialogue and interaction between the related, but too often separated, fields of sociology of development and sociology of agriculture, thus contributing to an increasingly globalized discourse on the importance of building sustainable food systems.

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Rewriting the call to charity: From food shelf volunteer to food justice advocate

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Abstract

Consider the food shelf volunteer (or any charity worker) who is inspired to practice good work on behalf of those who are poor and hungry. Her beneficence is praiseworthy. But a simple call to charity may also blind the volunteer to certain facts about food justice. First, it leaves out why clients who utilize the food shelf are hungry. Second, it suggests that the generous volunteers who staff the food shelf have met their political responsibilities. In this viewpoint I argue that hunger relief advocates may be transformed into policy advocates only if they are epistemically positioned to do so. What we need is a new practical strategy or technique for rewriting the very nature of what it means to engage in charity. This strategy involves using stories or narratives that profile particular people who are food insecure, but that also include systemic background conditions describing the social, political, and economic positions of more than one person. To make visible these background conditions I employ the philosophical concept of a "counterstory." Counterstories reveal structural inequities that identify how groups of people are unfairly disadvantaged. Acquiring this point of view is necessary for undertaking our collective responsibilities for achieving food justice because it positions us to see what structural conditions must change. In this way food justice activism becomes a real goal, made possible by the creation of a knowledgeable and informed citizenry.

Keywords

charity, food justice, moral responsibility, activism, narratives

Political Responsibility and Knowledge

The sign above the entrance to the Interfaith Food Shelf reads, "I was hungry and you gave me food." There is no doubt that this religious evocation is

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inspirational for most of the volunteers who help distribute emergency food to members of our local community. But this simple call to charity also blinds us to certain facts about food justice. First, it leaves out *why* these individuals who visit the food shelf are hungry. And second, it suggests that the generous volunteers who staff the food shelf (and others) have met their political responsibilities by engaging in charity work. But as Young (2011) argues, the issue of our respective responsibility for justice is more complicated:

> We should also ask whether and how we contribute by our actions to structural processes that produce vulnerabilities to deprivation and domination for some people who find themselves in certain positions with limited options compared to others. (p. 73)

If Young's argument—that individual citizens have a responsibility to alleviate social and political injustice—is plausible, then we should ask how to best *epistemically* position the volunteer. One obstacle that interferes with transforming ordinary citizens into policy advocates is lack of knowledge about systemic injustices that unequally oppress and constrain the choices of individuals who are attempting to live well. In this viewpoint essay I argue that what we need is a new practical strategy or technique for revealing the structural conditions that more fundamentally explain the causes of poverty and hunger. This practical strategy involves using *stories* or *narratives* that profile particular people who are food insecure, when these stories in addition include descriptions of social, political, and economic background conditions of more than one person. To this end I borrow the concept of a *counterstory* (Nelson, 2001). By reading, watching, or even writing a counterstory, the volunteer, ordinary citizen, or student becomes alert to a way of seeing structural inequities that position some groups of people to unfair disadvantage. Acquiring this point of view is necessary for undertaking our collective responsibilities for achieving food justice, because it positions us to *see* what structural conditions must change.

The Food Justice Lens

The tensions existing between food justice advocates and hunger relief advocates are well documented in much of the literature about alternative food movements. For example, Gottlieb and Joshi (2010) identify the need to redescribe hunger as an issue about economic justice in such a way as to transform earnest and motivated food shelf volunteers into policy advocates. Winne (2008) and Holt-Giménez (2011) both urge an alliance between the charity worker and the food justice advocate. In particular, Winne (2008) laments that even though food banks and charity work attract the attention of many influential people, rarely do those people participate in public policy discourse about poverty and hunger. Holt-Giménez (2011) remarks that, "Where one stands on hunger depends on where one sits" (p. 319). He recommends a "radical" approach to food justice issues that targets structural changes in the food system, creating opportunities for increased equity in land ownership and working towards a redistribution of wealth. But as Holt-Giménez reminds us, what we also need in order to advance such large-scale systematic policy changes are coalitions between those who are working for underserved populations, and those who are directly involved with the structural transformation of our food system.

Allen (2010) suggests that local food movements can aspire to food justice goals by (a) increasing understanding of structural conditions, (b) analyzing local food priorities and activities, and (c) evaluating criteria for social justice (pp. 297–300). She also emphasizes the need for structural change in the form of public policy, citing Gutierrez (1995) on the importance of changing beliefs and attitudes to work toward social change by developing a sense of what she calls "critical consciousness." Allen and Guthman (2006) claim that the priority of alternative food movements must involve changing policies and economic patterns, rather than merely making better personal choices. And Guthman (2008) urges more structural activism about inequity.

What will facilitate this shift in focus in the direction of social and political change? Guthman (2008) recommends that we move toward a politics of "listening, watching, and not always helping"

(p. 443). Sbicca's (2012) case study of People's Grocery examined how this food justice organization addresses food justice goals in order to mobilize volunteers to target the structural causes of hunger and poverty. Sbicca's research reveals that one problem facing People's Grocery, in particular, is finding an ideological underpinning to support the mobilization of these activists' efforts. Hassanein (2003) argues persuasively that to achieve even incremental change in the food system requires the method of food democracy, which depends on an informed citizenry and a deeper engagement by ordinary citizens. Additionally, Gilson (2014) argues that the citizen-consumer has political responsibilities for food justice beyond merely "voting with her fork" (p. 113) These responsibilities extend to "interrogating the political-economic structures that are part of the normal conditions of the industrial, global food system" (p. 14). But in order to envision what ought to be done, ordinary citizens need also to reevaluate assumptions about personal responsibility.

Regarding issues of food insecurity, the need for political and structural change is clearly identified by all these writers. But we might still want to know *how* to implement these suggestions practically in order to increase understanding of structural conditions, or *how* best ordinary citizens should become informed, or *how* they will develop a critical consciousness. One overlooked aspect of the food justice lens is determining what ordinary citizens should know in order to develop tactics and strategies for bringing about justice. This is an epistemic obstacle that must be overcome before we can expect that volunteers at the food pantry, for example, can transform into policy advocates. This is especially problematic for those who do charity work on behalf of the hungry, since they must be able to see beyond the culturally entrenched idea that charity is the solution to hunger. Poppendieck (1998) describes the "moral safety valve" (p. 8) function of charitable organizations that feed the hungry, which is the idea that by donating time, food, or money to various kinds of emergency food programs, we relieve ourselves of the need to work on changing the more fundamental causes of poverty.[1] In the next section I describe another kind of epistemic obstacle to food justice advocacy. This involves identity-constituting narratives of those who are food insecure.

The Personal Responsibility Script

Young (2011) writes that in the last two decades we have seen a shift in the discourse about those who are poor. This discourse implies that the causes of poverty and hunger depend on the characteristics and behavior of the poor themselves. One way of describing this "deviant" behavior is that those living on the margins of our society fail to exhibit a sufficient degree of personal responsibility for their lives. This purported lack of responsibility is used to explain how some, but not others, have become poor and dependent on social service programs. This way of thinking and talking about those who are in poverty is pervasive in a variety of settings, some of which I will examine below. By virtue of its rhetorical power this kind of discourse qualifies as a "master narrative" that explains why individual people are hungry.

Nelson (2001) characterizes master narratives as "stories found lying about in our culture that serve as summaries of socially shared understandings…often archetypal, consisting of stock plots and readily recognizable characters types" (p. 6) that we use to make sense of our experiences, and which inform our moral intuitions. In this case the master narrative about why individuals are hungry might be articulated in the following way: those who are food insecure are personally responsible for their plights. These individuals may have made wrong choices, or perhaps they have not tried hard enough to provide for themselves and their families. Still it is not inconsistent with this characterization to participate in food charity. For example, Poppendieck (1998) writes that charity is an appro-

[1] On a similar theme, Poppendieck (1998) describes the "[King] Wenceslas syndrome" in the following way:

> The process by which the joys and demands of personal charity divert us from more fundamental solutions to the problems of deepening poverty and growing inequality, and the corresponding process by which the diversion of our efforts leaves the way wide open to those who want more inequality, not less. (p. 19)

priate response to hunger since charity involves giving to people who are "not like us" (p. 306), and as income inequalities increase the poor seem even more different from those who are economically comfortable.

Another version of this master narrative about food insecurity is that hunger is the outcome when someone has suffered some tragic accidental misfortune that interfered with his or her ordinary ability to take full responsibility for his or her life. The salient feature of both versions of this master narrative is that they appear to explain the complex social conditions of food insecurity by reference to individuals and by reference to the idiosyncratic actions or events that surround their particular lives. This kind of master narrative is best described as the "personal responsibility script" (Brownell & Warner, 2009, p. 266).

The personal responsibility script is misleading about the causes of hunger. It gains a certain amount of traction as a plausible explanation, however, because in fact it represents some partial truths about the world. It is true that some people who use food stamps may not want to work, for example. And it is also true that some people who are hungry are in this predicament because they have suffered accidental misfortunes for which they themselves cannot be blamed. But the main problem with the personal responsibility script is that it is incomplete, and by virtue of its incompleteness it misrepresents some more fundamental conditions about hunger and poverty that explain how populations of people, as opposed to individuals, are similarly and unjustly disadvantaged by virtue of occupying the same social and political "position."

Why does this matter? Nelson (2001) describes how identities can be damaged by master narratives, contributing to the oppression of individual people or the subgroups to which they belong. One of the ways oppressive master narratives can damage identities is by deprivation of opportunity, when a master narrative imposes a degrading identity on a person or a group, characterizing them as morally subnormal or abnormal. When oppressive master narratives find their way into public policy debates about Supplemental Nutrition Assistance Program (SNAP) benefits, for example, what hangs in the balance is the very real possibility that those who are food insecure may suffer a serious deprivation of opportunity to nourish themselves. For example, consider Representative Steven Fincher, a Republican congressman from Dyersburg, Tennessee, elected in 2010 by tea party constituents. Between 1999 and 2012, Fincher collected close to US$3.5 million in farm subsidies for corn and soybeans from the federal government. He recently voted for a farm bill that omitted SNAP benefits—a position he defended by stating, "The role of citizens, of Christianity, of humanity, is to take care of each other, not for Washington to steal from those in the country and give to others in the country" (Stolberg, 2013, p. A1). In response to a Democrat who invoked the Bible during the food stamp debate in Congress, Fincher cited his own biblical phrase: "The one who is unwilling to work shall not eat" (Stolberg, 2013, p. A1).[2] Fincher's remarks capture a presumed general truth that many accept, especially if there is no countervailing reason to believe otherwise. The presumed truth is that the recipients of charity owe their food insecurity to individual choices, in particular to the choice not to work. Essentially, those who are food insecure are personally responsible for the plight in which they find themselves.

A variation on the personal responsibility script emerges also from those who advocate for hunger relief. The website feedingamerica.org of the Feeding America network of food banks collects and publicizes research and statistics about hunger in America (Feeding America, 2014). It also reveals the "faces" of hunger by profiling real stories of actual people who are hungry. These are accompanied by pictures of those who use food stamps or are forced to accept food at a food shelf, and sometimes include short videos of the family. These stories are fascinating as much for the information included as for what they leave out. For example, the story of Marvin, a Georgia resi-

[2] Poppendieck (1998) notes that many of the people who participate in charitable food programs are motivated to do so for religious beliefs. She remarks, "The emergency food system is permeated with religion. More than 70 percent of the pantries and kitchens affiliated with the Second Harvest Network are sponsored by churches or other religious organizations" (pp. 188–189).

dent 51 years old, begins with his loss of hearing as a child, and the gradual loss of his vision as an adult. Devoted to finding work even though he does not see well, he is forced to seek menial labor such as washing windows or mowing lawns. But then he is hit by a car, and now he is unable to work at all, though he still strongly desires to do so. Marvin hopes that he will eventually "get back on his feet." In the meantime he is grateful for receiving food stamps because they keep him from going hungry.

Marvin's story elicits sympathy from us largely because it is about how bad luck can bring a person down. Significantly, the conditions that impede Marvin from working are illnesses and accidents for which he is not to be blamed. This allows us to see him as an agent who has all the right motivational states for living a better life: he *wants* to work. But at the same time his actions are constrained by circumstances out of his control. His inability to work and thus to feed himself is shaped by these contingencies. The reader of this story senses that if life had dealt Marvin a slightly different hand, then he would surely make good on his responsibility to provide food for himself.

Each version of the personal responsibility script illustrated here is a damaging master narrative about who is hungry and why. They are damaging in the sense that each kind of story interferes with an ordinary citizen's understanding of the need for advocacy and justice, although in slightly different ways. In the first case, if we accept that the poor and hungry are essentially different than us and in some way morally at fault, then we will see this inequality as a natural outcome of poor choices or as a failure of moral character. We may pity those who are hungry and continue to feed them through acts of charity, but we may not believe that changes in public policy and advocating for political justice are necessary because in these cases it is not *deserved*. Alternatively, individual stories like those of Marvin that reveal the "faces" of hunger demonstrate that under normal circumstances most of us can realize our responsibilities to work and thus to feed ourselves. Nevertheless, these ordinary circumstances sometimes go awry, creating obstacles to living well through no fault of those individuals who suffer the consequences. In fact, we may well imagine that life could have gone the same way for any one of us: a series of unfortunate events due to illness and accidents that create obstacles to living well. In this account of things we may believe that those who suffer food insecurity are morally deserving. But this kind of master narrative preserves our inclinations to extend food charity in one form or another rather than motivating us to undertake responsibility for justice (Shklar, 1990). Indeed, this is a reasonable response, since accidental misfortune is not something we should expect to protect against by changing laws, policies, or institutional arrangements. While well intentioned, these individual stories about accidental misfortune obscure some more fundamental explanations about the causes and conditions of hunger that apply systematically to groups of people.

Structural Background Conditions

If we explain the causes of food insecurity by referencing the failure of individual responsibility, then we are more likely to ignore the background conditions that contextualize circumstances that constrain individual choice and action. And if these background conditions are obscured then it is much more difficult to identify what needs to be done in order to correct these systemic injustices. In other words, it is unlikely that we will seek to change systemic and structural conditions of poverty and hunger if we cannot *see* or identify these structural causes in the first place, as well as see how these causes unjustly operate to disadvantage certain populations.

According to Young (2011), structural injustice differs from two other types of injury. A person may be wronged by actions perpetrated by other individuals, as when a person's integrity or self esteem is harmed by a racist comment or a woman is denied employment because of sexist attitudes by someone in a position of authority. Alternatively, a person may be harmed by a specific action or policy implemented by states or institutions. For example, if that person is denied employment because of her age and there is a corporate policy that institutionalizes age discrimination, then she is wronged by an unjust corporate policy. But Young insists that structural injustices do not reduce to

either of these kinds of wrongs. Structural injustices create conditions of vulnerability for individuals by virtue of the social structural position these individuals occupy. To understand structural injustice requires us to take a "macro" view of society, in which we attempt to bring into focus some general conditions that operate on individuals with diverse life histories, attributes, and goals (Young, 2011, p. 56). These conditions are complex, multiple, large-scale, and typically long-standing circumstances that are attributable to many individuals as well as to public and private institutional policies. The salient feature of these sets of social circumstances is that they operate according to "normal rules and accepted practices" to create vulnerabilities and disadvantages for subgroups (Young, 2011, p. 52). The practical problem I address in the next section is how to convey these kinds of background conditions about food insecurity to ordinary citizens, including the charity worker.

Rewriting the Personal Responsibility Script

By virtue of its wide and pervasive influence as well as its rhetorical power to subvert and shape our ideas about who is hungry and why, the personal responsibility script qualifies as a master narrative. Elsewhere I have argued that one appropriate way of correcting this kind of narrative is to write or read a counterstory that includes context and particular circumstances of lived experience, especially the identities of those who seek to nourish themselves (Dixon, 2014). In this essay I apply the concept of counterstory in a new way to capture background conditions that contribute to food insecurity. The basic idea of a counterstory originates with Nelson (2001), who describes a counterstory as resisting and responding to oppressive master narratives that deprive individuals and social groups of opportunities to live well. A counterstory contributes in a positive way to repairing oppressive identities by replacing damaging narratives with ones that command respect for individuals and groups. In Nelson's own use of counterstories to repair damaged identities she recommends telling these stories in two steps. The first step is to identify what parts of the master narrative misrepresent persons and situations. The second step involves a retelling of the story to make visible the morally salient details of the master narrative that were suppressed (Nelson, 2001). As I have described above, the personal responsibility script *misrepresents* a more fundamental explanation of the causes of food insecurity. But in order to make visible what is suppressed by this kind of master narrative we need to *retell* the story of food insecurity so as to reveal background conditions that specify structural injustices. In other words, in order to correct the personal responsibility script I recommend a counterstory that makes perspicuous these structural background conditions of poverty and hunger and that describes a generalized position of disadvantage that applies to groups (single mothers, fast-food workers, etc.). Most importantly, a counterstory should be one that can match the rhetorical power of the personal responsibility script.

From this perspective let us return to the stories we tell about individual people who are vulnerable specifically to food insecurity. What is it about these stories that will enable us to see how structural injustices operate? An example is the popular documentary film, *A Place at the Table* (Jacobson & Silverbush, 2013), which includes several stories of people who experience some degree of food insecurity. One story introduces Barbie, a single mother of two young children in Philadelphia who actively searches for work after losing her job. She aspires to attend college for training and to increase her earning potential, but realizes how impossible this goal is for her now. Her immediate urgent problem is to feed herself and her children. She relies on public assistance to do so, including food stamps, food pantries, and free meal programs for her children. But even so she is barely making ends meet, even when she is eventually employed full-time at a job that pays US$9.00 per hour. It seems that being employed at this wage creates further obstacles. Barbie is now US$2.00 over the monthly income limit for food stamp eligibility, and her children no longer qualify for the free meal programs they received when she was not working at all.

Why does Barbie's story qualify as a counterstory? Telling Barbie's story in this particular way defies some assumptions of the personal responsibility script we have already discussed. Barbie

wants to work and she eventually gets a full-time job. So she hardly fits Rep. Fincher's description of a person who is "unwilling to work." Moreover, Barbie's food insecurity is not due to bad luck, misfortune, or some idiosyncratic temporary lapse in her personal responsibility to support herself and her children. The background conditions that the filmmakers use to explain her food insecurity are systemic and structural. They include lack of accessible food or nearby fully stocked supermarkets, difficult and lengthy travel to find these cheaper food markets, low-wage pay scale, eligibility limits for receiving SNAP benefits, and qualifying income levels for children's free meal programs. Most importantly, what the audience of this film should notice is that these conditions operate collectively to disadvantage Barbie *and others* who occupy the same generalized position (single mothers, working low-income families, etc.). But no one law or policy is actually designed to harm them. In fact, social services are designed to help people like Barbie who are struggling. Even so, the obstacles that constrain Barbie's choices combine to disadvantage her, and these circumstances are beyond her individual ability to control. Additionally, the filmmakers direct our attention to structural background conditions such as U.S. Department of Agriculture (USDA) subsidies and lobbying. We learn, for example, that 84% of USDA subsidies have gone to mega-farms and agribusiness to support commodity crops such as corn, cotton, soy, wheat, and rice. Not coincidentally, in 2011 agribusiness spent US$124.7 million in special interest lobbying, outspent only by oil and gas corporations. As Congress has continued to support the large corporate food industry, it has also gradually decreased funding programs—including SNAP benefits, National School Lunch, housing subsidies, programs for seniors, and Aid to Families with Dependent Children (AFDC)—that support those living at the margins of society (Jacobson & Silverbush, 2013).

Telling Barbie's story together with this explanatory context directs the viewer's attention to more systemic conditions that are complex, large-scale, and attributable to many individuals, institutions, and public policies. Despite the complexity of this macro view of food insecurity, at least the background conditions are sufficiently articulated so that we can inquire about their ethical justifiability. The deeper and fuller story of hunger revealed by the counterstory makes it possible to ask, "What social and political conditions should change?"

Counterstories can function as a practical strategy for achieving food justice advocacy. In order to do so they should satisfy two conditions. First, a counterstory should correct the damaging master narrative that I am calling the personal responsibility script. Second, a counterstory should position ordinary citizens epistemically to identify structural injustices that contribute to food insecurity, especially those structural conditions of poverty and income inequality that disadvantage populations.

A number of recent documentary films and texts satisfy these main conditions of a counterstory. For example, the documentary film *Fed Up* (Soechtig, 2013) illustrates the tragedy of childhood obesity. The poignant aspect of this health issue is portrayed by the voices of the children themselves. In spite of their own protestations about how they cannot seem to lose weight and make healthier food choices, the film repositions us to see this not as an individual failure, but as a public policy issue involving an environment of ubiquitous junk food in school lunch programs and in grocery store aisles. The documentary film *Inequality for All* (Kornbluth, 2013) profiles the structural conditions of inequality by identifying rising costs in housing, health care, higher education, and child care together with stagnating wage increases. These conditions are not presented as inevitable market forces, but as a consequence of corporate profits and lobbying that secure wealth for a few by keeping labor costs and wages down for many. Leonard's (2014) exposé of Tyson Foods can be read with a particular eye to structural conditions that disadvantage contract farmers in the meat industry by a combination of practices that include vertical integration (corporate ownership of the entire meat supply chain), "tournament" ranking systems of pay, debt, bankruptcy, and federally insured lending practices, as well as lobbying by the meat industry to restrict federal regulations intended to protect contract farmers.

These examples are intended for popular audiences, not merely for academics and theorists who

write about food justice. This makes them ideally suited to the ordinary citizen who, through focusing on the ethically salient features of these narratives, can become alert to those structural conditions that contribute to hunger, poverty, and inequality. In the next section I consider the practical application of counterstories: how they might be used and by whom.

Back to the Food Shelf

Today the editors of our local newspaper awarded a public "cheer" to the owner of a laundromat and car wash (Cheers and Jeers, 2014). The owner was commended because he treated a homeless man with respect, "a gesture that other people may not have been able to muster" (p. A5). The owner also gave the homeless man a US$1 token for being a good customer. The editors concluded, "It was a small gesture but an important one, maintaining the dignity of the homeless man. Wouldn't it be wonderful if everyone treated less fortunate people with kindness and compassion instead of disdain?" (p. A5). Two questions about this story immediately come to mind. First, why is it newsworthy that a person treats a homeless man with respect rather than disdain? This is remarkable behavior only relative to the background assumption that homeless people are undeserving of respect. And second, how does giving the homeless man a US$1 token imbue him with dignity? Perhaps this small act of charity by those of us who have something should be welcome by those of us who have nothing. But this relationship of charity does nothing for the dignity of the recipient (see Poppendieck, 1998, chapter eight) Unintentionally, the editors of our local paper demonstrate in the public domain the real need to correct identity-damaging narratives about those who have no place to live and, by extension, those who visit our local food shelf. Los Angeles FEMA local board director Gene Boutillier remarks that the "main political task in dealing with poverty is for people to identify with the poor so they can't be demonized and they can't be discounted and they can't be ignored" (as quoted in Poppendieck, 1998, p. 310). The move toward food justice advocacy begins with a good counterstory that replaces a damaging oppressive narrative with one that commands respect (Nelson, 2001).

In addition, the move toward food justice advocacy begins with the volunteer. Poppendieck (1998) believes that the entry point to advocacy work is the charity worker who is active in hunger relief programs, since these people are already knowledgeable about who is hungry and are poised to challenge unfairness and to address increasing inequalities. There are, of course, national organizations that emphasize public policy work and advocacy as a solution to hunger, such as Bread for the World and the Food Research and Action Center (FRAC). But many local food shelves, ours included, declare a commitment to social justice as part of their mission. This may be interpreted and acted upon in a number of ways. So it makes sense to enlist the volunteers at the food pantry to show a film, lead a book discussion, or form a local food justice committee to inquire how to initiate policy change as part of rewriting the call to charity. Some of us are teachers and can use already existing counterstories or an assignment to write a counterstory as a way of profiling how hunger is structurally caused.

Ideally, a counterstory should inspire ordinary citizens to undertake individual or collective action on behalf of food justice, shaping our moral imaginations about what is possible. We might also insist that counterstories illustrate activist roles for individual action, or collective or coordinated activity to address injustices. For example, the charity worker may come to see possibilities that depend on existing organizations such as church groups, unions, cooperatives, or food policy councils, and how members can act together to initiate change. In this way an ordinary citizen who works for a charitable organization can become more thoughtfully aware of systemic injustices, if not an activist, in order to discharge her responsibility for justice.

The recommendation I make in this viewpoint is a practical one. Many writers have identified the need for political and structural change in order to achieve food justice (Allen, 2010; Allen & Guthman, 2006; Gottlieb & Joshi, 2010; Guthman, 2008; Hassanein 2003; Sbicca, 2012). But if practitioners and ordinary citizens are to be usefully directed to become food justice policy advocates, then we should be prepared to answer *how* they can become advocates. Reading, watching, and reflect-

ing on counterstories of the kind I describe here epistemically position the food shelf volunteer or the charity worker to see more effectively what systemic conditions need to change. This is merely one mechanism for achieving what Hassanein (2003) believes is crucial to transforming the food system: an informed citizenry. 

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Increasing local procurement in farm-to-school programs: An exploratory investigation

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Abstract

Farm-to-school (FTS) programs have become more widely adopted in recent years because of their potential to mitigate childhood obesity, as well as their economic development and educational benefits. As a result of FTS programs' diverse purposes and grassroots nature, the types of activities they encompass vary considerably from program to program and no systematic measures of impact have emerged. Furthermore, FTS programs launched in colder climate regions may be particularly challenging due to a shorter growing season and narrower range and volume of available products. In this exploratory study, we set out to learn more about the factors that lead to increased procurement of local food in FTS programs. To do this we analyze the results of three recent studies of the impact of FTS programming on school purchases of locally produced foods in Vermont, conducted in 2012 and 2013. The results of a census of FTS programs in Vermont and an evaluation of the Fresh Fruit and Vegetable Snacks program indicate that price subsidies do not necessarily increase local food procurement in Vermont, while a study of FTS programs working with food hubs in Vermont suggests that social capital in the form of viable partnerships and relationship-building holds promise for increasing the procurement of local food. Implications for FTS programming and future research are discussed.

Keywords

farm to school, local food procurement, impact analysis, best practices, social capital

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Introduction and Background

Farm-to-school (FTS) programs gained attention during the 1990s and have flourished since then, with FTS programming in place at nearly half the schools in the U.S., or over 40,000 schools (National Farm to School Network [NFSN], 2015). This remarkable growth is due in part to the belief that FTS programs may help stem the increase in childhood obesity (Green, Sim & Breiner, Committee on Evaluating Progress of Obesity Prevention Efforts, Food and Nutrition Board, & Institute of Medicine, 2013; Keener, Goodman, Lowry, Zaro, & Kettel Khan, 2009; Powers, Berlin, Buckwalter, Kolodinsky, & Roche, 2011; Roche, Conner, Kolodinsky, Buckwalter, Berlin, & Powers, 2012; Turner & Chaloupka, 2010; U.S. Department of Agriculture [USDA], n.d.a; White House Task Force on Childhood Obesity, 2010). Yet because these programs have evolved independently and organically, there has been no uniform definition of FTS programming. FTS programs are often characterized by activities that link farmers and schools that serve kindergarten through twelfth grade (K–12) with the goals of contributing to nutritious meals and education for youth, along with increasing opportunities for farmers who market locally.

As a result of FTS programs' diverse purposes and grassroots nature, the types of activities they encompass vary considerably from program to program. Despite this diversity, most FTS programs serve locally produced foods in the school cafeteria (Kloppenburg & Hassanein, 2006; Schafft, Hinrichs & Bloom, 2010), often highlighting fresh or processed fruits and vegetables (e.g., kale, squash, tomato sauce), dairy and meat products, eggs, beans, and other value-added items (e.g., pesto, granola, cider). In addition to locally sourced food served in the cafeteria, components of FTS activities common to many programs include taste tests, lessons on healthful food choices, farm visits, school gardens, recycling activities, and composting systems. Programming aimed directly at children can have many impacts, from "close in" impacts such as enhancing knowledge and skills of participants, to "far out" impacts such as improving public health (Powers et al., 2011; Roche et al., 2012).

Despite methodological challenges, many evaluations have reported evidence of positive outcomes across a broad range of issues as a result of FTS programming. Some researchers argue that FTS can address issues of hunger and food security (Bendfeldt, Walker, Bunn, Martin, Barrow, 2011; Campbell, 2004). Furthermore, although often limited to self-reported consumption, students in school districts across the U.S. have described a *preference* for fruits or vegetables after participating in FTS programs (Bontrager Yoder, Liebhart, McCarty, Meinen, Schoeller, Vargas, & LaRowe, 2014; Powers et al., 2011). Joshi, Azuma, and Feenstra (2008) reviewed findings of the effects of FTS and found that several studies showed positive effects on student food choice and attitudes and especially on increased participation in school meals, although they called for more research to determine the sustainability of the behavior change.

Additional FTS program impacts have been suggested, including economic development opportunities (Joshi et al, 2008; Kane, Kruse, Ratcliffe, Sobell, & Tessman, 2011; Robinson-O'Brien, Story, & Heim, 2009; Tuck, Haynes, King, Pesch, 2010), and increased farmer income (Conner, Knudson, Hamm, & Peterson, 2008). In addition, other scholars assert that FTS affects students' appreciation of the environment through programming such as lunchroom composting, school vegetable gardens, and better understanding of the food cycle (Blair, 2009; Ratcliffe, 2007, 2012; Robinson-O'Brien et al., 2009).

However, the wide range of activities, diverse implementation of these activities, and frequent adaptations of programming that are typically part of FTS programs make it difficult to study these impacts. Recently both the USDA and NFSN suggested that measures of food procurement are a useful and accessible indicator of FTS success (NFSN, 2015; USDA, n.d.b). Indeed, it has previously been suggested that local food procurement may actually serve as an indicator of improved child nutrition, as some studies have found that availability and accessibility, especially of fruits and vegetables, is related to consumption (Cullen, Baranowski, Owens, Marsh, Rittenberry, & de Moor, 2003; Hearn, Baranowski, Baranowski, Doyle, Smith, Lin, Resnicow, 1998). It should be noted, however, that not all studies have found an

association between access to fresh produce and consumption, with at least one study finding that students in two schools who chose more fruits and vegetables as a result of a new policy consumed less and wasted more (Yon, Taylor, Amin, & Johnson, 2014). Still, the preponderance of the available evidence supports FTS's positive impacts on behavior and nutrition.

While dollars spent on local food may not capture the full range of possible FTS outcomes, procurement of local food is considered an easy-to-measure, accessible proxy for economic and child nutrition goals. Though food procurement (measured by volume and/or expense) is a common metric, little has been published on strategies to increase local procurement. Previous research has concluded that several barriers exist to adopting or increasing local procurement (Conner, et al., 2008, 2012; Harris, Lott, Lakins, Bowden, & Kimmons, 2012; Izumi, Wright, & Hamm, 2010). Interviews with food-service professionals in northern states like Alaska and Michigan reveal common barriers to those experienced in a northern climate like Vermont. These barriers include the cost of local products, unreliable supply, safety and procurement regulations; the cost of maintaining multiple relationships; and the desire for single-source suppliers (Colasanti, Matts & Hamm, 2012; Harris et al., 2012; Herron, 2013; Janssen, 2014). So while much has been written on the barriers and challenges to procuring local food for school meals, the factors that lead to increased procurement in FTS programs have not been noted in the literature.

To begin to fill this knowledge gap, we set out to explore the hypothesis that increases in procurement of local food for FTS programming may result from more from increased relationships and trust (that is, social capital) than it does from lower effective prices on local foods. Our approach included examining the results of three separate but related studies focused on FTS procurement in Vermont: (1) a census of Vermont public schools, (2) an assessment of fruit and vegetable procurement for the USDA Fresh Fruit and Vegetable Program in Vermont, and (3) an evaluation of local procurement from food hubs in Vermont by schools participating in a USDA Farm to School Implementation grant.

Methods of the Three Studies

Study 1: Vermont Statewide Census (VSC)

The first study we analyzed is a Vermont statewide census (VSC) of Vermont public K–12 schools. In VSC, data were collected through a telephone survey consisting of 15 questions conducted during the 2012–2013 school year. Eighty-six percent of the 315 public schools in the state participated (a total of 271 schools). The schools that participated were coded for school enrollment, grade levels served, free and reduced lunch eligibility rate, and whether they had received an FTS grant from the state (based on information provided by the Vermont Agency of Agriculture, Food and Markets and the Vermont Agency of Education). The overall goal of the VSC was to determine the prevalence of FTS programming and related activities in Vermont schools, so the brief telephone survey was conducted with the school representatives who could answer the questions (including receptionists, office managers, or principals). The full list of questions and additional information that were coded can be found in Table 1, including "does your school's cafeteria serve local food?" and "are local foods indicated on school meal menus?"

Schools were coded as having elementary grades if the school included one or more elementary grades and similarly, they were coded as having middle grades if they included one or more middle grades and high school if they included one or more high school grades. Some Vermont schools include more than one type of grade, such as K–8 which includes elementary and middle grades.

Frequency and bivariate analyses were performed using SPSS v.21. Bivariate analysis included chi square tests and t-tests of significance. Schools that had received a Vermont state grant to support FTS efforts since 2007 were coded and compared to schools that had never received the state grant.

Study 2: Fresh Fruit and Vegetable Snacks (FFVS)

In the Fresh Fruit and Vegetable Snacks (FFVS) study, we reviewed school purchase records submitted by Vermont schools participating in the USDA Fresh Fruit and Vegetable Program (FFVP). The goal of this study was to determine how much of the total reimbursement through

FFVP was for *local* fruits and vegetables, as well as what *types* of local fruits and vegetables were purchased.

In Vermont, 115 schools (approximately one third of Vermont's 315 public K–12 schools) participated in the FFVP during the 2012–2013 school year, representing nearly 20,000 students. To be eligible to participate in the FFVP, schools must serve elementary grades, have a student body with at least 50% of students eligible for free or reduced lunch, and apply to participate in the program. Participating schools are reimbursed for the purchase price of the fresh fruits and vegetables purchased for the snack program. On the invoices they submitted for reimbursement each month, schools were asked to itemize the type of fruit or vegetable, the quantity purchased, the amount spent, and whether each item was produced in Vermont. Monthly purchase totals, product-by-product totals, and month-by-month comparisons were performed using Microsoft Excel 2013.

Data were analyzed by coding each type of fruit and vegetable, calculating values for total monthly reimbursement for each school and the overall monthly reimbursement, as well as total reimbursement by product.

Study 3: Food Hubs and FTS

The Food Hubs and FTS study was an evaluation of a grant to the Vermont Agency of Agriculture, Food and Markets awarded by the USDA Farm to School Grant Program. As part of this grant, four Vermont regional food hubs delivered FTS technical assistance to both school food-service staff and local food producers. This assistance included but was not limited to matchmaker events to bring food service and food producers together; food safety trainings for food-service and food producers; and recipe creation using local foods. Local purchase data was collected from the participating schools by the regional food hubs during September or October 2012 (for the 2012–2013 school year) and 2013 (for the 2013–2014 school year), for a year-over-year comparison of the percentage change in local purchasing. Fifty-five schools across six counties were included in this study and represented approximately 6,000 students who participate in the National School Lunch Program (NSLP) at their school. Purchase data was provided by the food hubs in Microsoft Excel spreadsheets. All data was analyzed using Microsoft Excel 2013.

Table 1. VSC Questions and Additional Information about Vermont Public Schools

Questions Asked on VSC	Additional Information Obtained
Does your school have a farm-to-school program?	Number of students enrolled
Does your school's cafeteria serve local food?	Grades served
Has anyone at your school held taste tests of new foods with students?	Vermont FTS recipient
Are local foods indicated on school meal menus? (For example, dishes made with local foods are starred.)	Percent of students eligible for free or reduced lunch
Are local foods promoted in the cafeteria? (For example, via posters, signage, or food service staff)	
Does your school grow any food in a school garden?	
Has your school held student cooking classes or demonstrations?	
Have students gone on field trips to visit farms?	
Have farmers visited the school?	
Are there farm or food lessons taught in the classroom?	
Are teachers trained to integrate food and farm education into existing curricula?	
Do you utilize volunteers from the community to support local food and nutrition education?	
Have you held harvest festivals, community meals, or a FTS open house?	
Do you communicate food-related activities through the school newsletter, community websites, or local media?	
Do you have any full- or part-time staff dedicated to farm to school?	

Table 2. Summary of Vermont School Demographic Information (*N*=271)

Characteristic	Source of Data	Descriptive Statistic: Percent or Mean (Range) Standard Deviation
School received an FTS grant	VT Agency of Agriculture, Food and Markets	17% of schools received a FTS grant
FTS program	VT FTS Census	54% of schools have FTS program, .50
Number of students enrolled	VT Agency of Education	267.78 (17, 1278), 220.56
50% or more students are eligible for free or reduced-price lunch	VT Agency of Education	44% of schools have 50% or more students eligible, .50
School includes elementary grades	VT Agency of Education	78% of schools include elementary grades
School includes middle-school grades	VT Agency of Education	41% include middle grades
School includes high-school grades	VT Agency of Education	19% include high-school grades

Results

Study 1: Vermont Statewide Census (VSC)

The census of Vermont's public schools in the 2012–2013 school year revealed that they had varying degrees of FTS programming, with just over half (54%) of the schools that participated in the VSC in Vermont having a FTS program. As shown in Table 2, 17% of these schools had received a Vermont FTS grant since 2007. Based on the records provided by the state Agency of Education, these schools had enrolled an average of 268 students. Most of the schools (78%) included elementary grades, while 41% included middle-school grades and just 17% included high-school grades. Forty-four percent (44%) of the 271 schools included in the VSC have at least half their students eligible for free or reduced-price lunch.

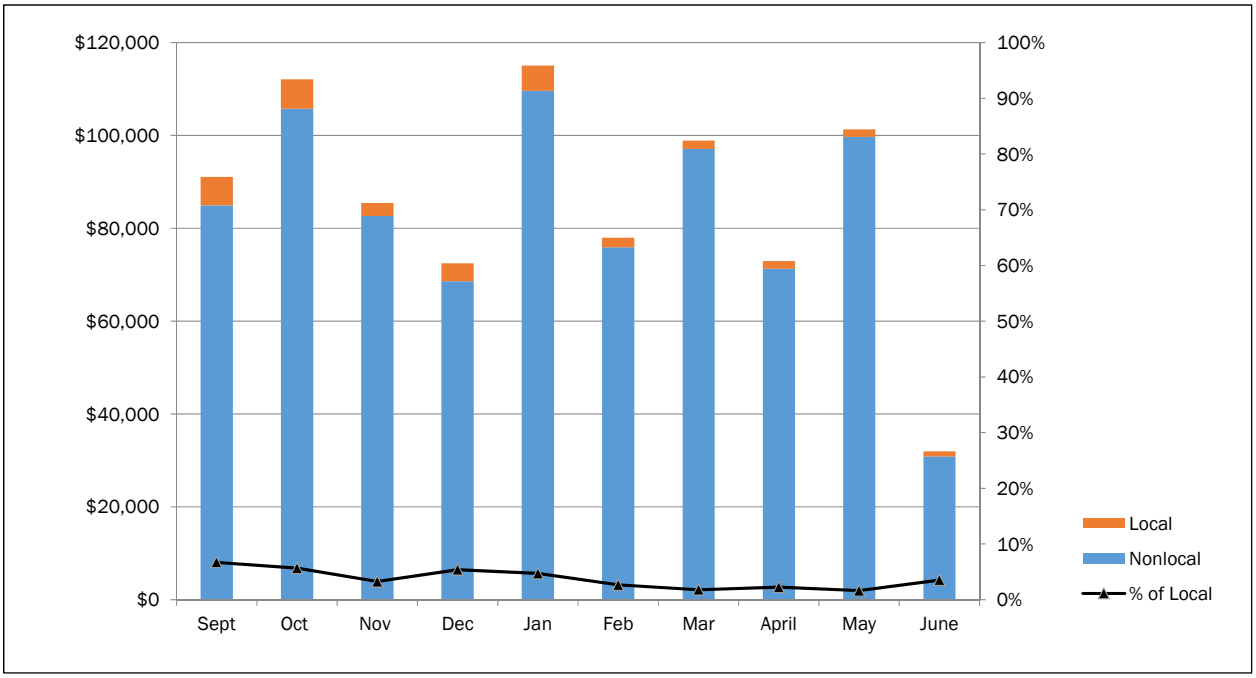
Table 3. Schools Receiving a State FTS Grant Compared to Those with No Grant (*N*=267)

Element	FTS Grant (*n*=44)	No Grant (*n*=223)
Have FTS program	80%	50%***
Serve local food	98%	90%
Taste tests	89%	70%**
Highlight local foods on menu	77%	66%
Promote local foods in cafeteria	77%	72%
School garden	86%	70%***
Cooking classes	80%	78%
Farm field trips	91%	75%*
Farmer visits	59%	41%**
Farm/food lessons in class	57%	53%
Teachers trained	57%	31%**
Community volunteers	75%	63%
Harvest festivals, etc.	80%	52%***
Communications	89%	80%
Paid staff	46%	19%***

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

As shown in Table 3, a higher percentage of those schools that received a state of Vermont FTS grant had an FTS program (80%), compared to those who had not received a grant (50%). In addition, a statistically significant higher percentage of schools that had received a state grant held taste tests, had a school garden, had farmers visit, had trained teachers in FTS, held community gatherings, and had at least a part-time staff position responsible for FTS activities. There was, however, no statistical difference in several of the elements, including schools that serve local food, highlight local foods, or promote local foods. Unlike some states, Vermont schools do not necessarily designate themselves as having an FTS program just based on their serving or promoting of local foods.

Figure 1. Total USDA Fresh Fruit and Vegetable Program (FFVP) Purchases by Vermont Public Schools, Local Versus Nonlocal (*N*=115) and Percentage of Purchases That Are Local



Study 2: Fresh Fruit and Vegetable Snacks (FFVS)

In 2012–2013, the FFVS project collected data about local and nonlocal fresh fruits and vegetables purchased as part of the USDA Fresh Fruit and Vegetable program (FFVP). The results show the not-surprising seasonal ebb and flow of local purchasing of fresh fruit and vegetables for school snacks, related to when fresh products are most available in Vermont. These results further reveal that the proportion of spending on local fruits and vegetables, while always quite small, is higher in the fall and early winter months than in the spring (Figure 1).

The FFVS also tracked the types of fruits and vegetables purchased through the Fresh Fruit and Vegetable program. Table 4 shows the highest volume (by dollar) fresh fruits and vegetables purchased by schools in the FFVP program during the 2012–2013 school year. While the USDA Fresh Fruit and Vegetable Program is not FTS programming per se, because schools are reimbursed for the full cost of the fruits and vegetables purchased, this may provide an opportunity to increase local spending on fruits and vegetables. Schools spend more on apples (both local and nonlocal) in this program than any other fruit or vegetable. The top 5 nonlocal products are all fruits, while carrots and toma-

Table 4. Most Purchased Fresh Fruits and Vegetables by Schools Participating in the USDA Fresh Fruit and Vegetable Program (FFVP) in 2012–2013 (*N*=115)

Local Produce	Total Amount Spent in FFVP (US$)	Percent of Total Local or Nonlocal Spending
Apples	$20,133.82	61.42%
Carrots	$3,257.88	9.94%
Grapes	$1,645.25	5.02%
Cantaloupe	$1,528.50	4.66%
Tomatoes	$1,018.32	3.11%
Nonlocal Produce		
Apples	$114,430.92	13.85%
Grapes	$84,063.53	10.17%
Strawberries	$56,939.33	6.89%
Bananas	$46,667.65	5.65%
Pears	$48,249.71	5.84%

toes are two of the top five products purchased locally. It should be noted that the top two local products, apples and carrots, are available year round in Vermont.

Study 3: Food Hubs and FTS

In the Food Hubs and FTS study, each food hub provided at least one matchmaking, safe food-handling, and food-safety training in their area. A total of 58 schools and 165 farms participated in these activities. As a result of these activities, a best practices guide entitled *Using Food Hubs to Create Sustainable Farm to School Programs* was developed by the Vermont Agency of Agriculture, Food and Markets (VAAFM, 2015).

As shown in Figure 2, there was a 58% overall increase in same-period, year-over-year spending by the 55 participating schools from fall 2012 to fall 2013.

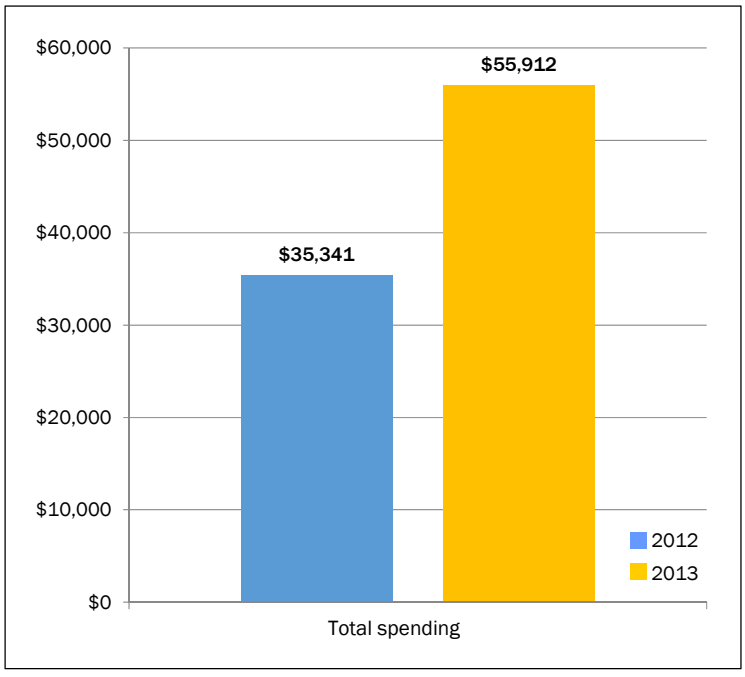
Discussion

FTS programming has become so widespread that both the USDA and the National Farm to School Network have promoted the importance of measuring its impacts across the nation. The USDA launched a grant program to support FTS programming, providing nearly US$5 million in grants in each of the past four years (USDA, n.d.b). Grantees are expected to complete evaluation activities that attempt to measure the success of their efforts. The NFSN seeks to honor the grassroots nature of FTS programming and has developed an evaluation framework to provide guidance in measuring FTS impact without being prescriptive (NFSN, 2015). Both USDA and NFSN embrace the multiple outcomes and areas of impact that FTS programming can have and both are engaging in the challenging effort to facilitate a better understanding of the impact of the diverse programming that makes FTS such a powerful tool for behavioral and cultural change.

Both NFSN and USDA describe increasing local procurement of school food as an element of FTS programming, although neither is prescriptive in how to increase purchasing from local producers. In this paper we provide evidence about two strategies employed to increase local purchasing for school meals in communities throughout Vermont. The results of the VSC and the FFVS studies suggest that providing subsidies (in the form of state grants) or reimbursements (through the FFVP) for local purchasing alone may not result in increased amount of local food in school meals. However, the Food Hubs and FTS study provides evidence that barriers such as quality, food safety, and availability can best be overcome through activities like matchmaking and food-safety trainings. This research implies that strategies to increase local purchasing rely more on education and partnership development than upon deep discounts or subsidies.

Although establishing local partnerships and building relationships with local producers are often included in descriptions of FTS programming, the contribution of social capital to achieving FTS goals has not been clear. The results of this exploratory study set the stage for further research that may more concretely demonstrate the value of efforts to cultivate strong partnerships

Figure 2. Local Spending by Schools Participating in the Food Hubs and FTS Project, 2012 and 2013



between food-service staff and producers.

Further, the most effective partnerships and relationships are built around addressing known barriers, such as price, availability, quality, and safety. The Food Hubs and FTS study included relationship-building activities that brought together food-service staff and producers in professional development activities that promoted better understanding of food safety, product quality, and expectations about pricing and availability. In addition, the intervention activities likely benefited from being coordinated through regional partners with existing relationships with both food-service staff and area producers, and not just from lowering the costs of local food.

While the results presented here encourage us to believe that our hypothesis of the importance of social capital to increase local procurement may be valid, more geographically widespread research is needed, as is longitudinal research in order to confidently demonstrate the impact of intensive relationship-building in maximizing procurement of local food for FTS programs. We concede that while this research shows that price is not the only consideration, school food budgets are not elastic and increasing the purchase of locally produced food will likely need to consider financial constraints.

While FTS programming is abundant throughout the U.S., collecting the data needed to understand its effects remains a challenge. The data reviewed in this study relied primarily on food-service purchase records. These records were not easily obtained, despite the fact that the schools have to maintain these records. Food-service directors are busy and are asked to do many small favors in the course of a day—for parents, students, teachers, and administrators—and providing records to researchers was not their highest priority. To understand the impact of FTS programming, more data and research are needed. FTS practitioners can help by looking for ways to make purchase data more accessible and by actively seeking researchers who have capacity to thoughtfully review the available data.

Limitations

Several limitations of this study should be noted. First, while the schools in all three studies are Vermont K–12 public schools, the Fresh Fruit and Vegetable Snacks (FFVS) and Food Hubs and FTS studies provide data from only a subset of these schools; therefore they do not provide a true triangulation of the data. Second, while school food purchase data is generally reliable and schools typically must track what they purchase throughout the school year, these data should not be interpreted as a direct measure of what is consumed. It is also important to note that as a result of its complexity, the impact of FTS on local procurement is not limited to the time frame in which it is delivered. Further, this type of "far out" behavior change requires multiple and ongoing treatments, as FTS programming may show its largest impact when delivered repeatedly, year after year.

Conclusions

Increasing purchases of locally produced food is commonly a goal of FTS programming. Increased access to local food may help improve child nutrition as well as economic opportunities in the community. Efforts to increase local procurement have met with mixed results. This research suggests that addressing the cost of local food alone is not sufficient to increasing purchasing, but that programming that builds relationships between school food-service buyers and producers can result in increased local procurement.

Relationship-building takes effort. Just offering networking events likely is not sufficient to build the trusting relationships needed to change purchase patterns. In this research, the most successful intervention included professional-development opportunities in food safety and safe handling, as well as facilitated matchmaking activities between producers and buyers.

While this research was geographically limited to Vermont, the implications for practice could be applicable to any community with relatively mature FTS programming. More evidence, especially of a longitudinal nature, will be needed to fully determine the relative contributions of FTS practices to increasing local procurement. Nevertheless, the results presented here provide evidence of partnership-building as a valuable strategy to increase local procurement.

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Farm-to-school (FTS) programming is complex and engages multiple stakeholders. Even in a small state like Vermont, many stakeholders have contributed to the growing body of FTS research thus far: the University of Vermont; the Vermont Agency of Agriculture, Food and Markets; the Vermont Agency of Education; the Vermont Department of Health; Shelburne Farms; Northeast Organic Farming Association of Vermont; Food Connects; Upper Valley Farm to School; Green Mountain Farm to School; Vermont Public Schools; and the many food service directors who have shared their data and their reflections.

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Dissolved: Lessons learned from the Portland Multnomah Food Policy Council

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Abstract

The city of Portland, Oregon, is often hailed in news and popular media as the capital of the U.S. alternative food movement. In 2002, the Portland Multnomah Food Policy Council (PMFPC) was established to address the region's growing interest in cultivating a sustainable local food system. Council members contributed to many notable achievements, including a healthy corner store initiative, a beginning farmer training program, and changes to zoning codes to expand urban agriculture. However, the PMFPC was dissolved in the summer of 2012 after local government agencies expressed that the council was losing relevancy. After a decade of conducting food policy and advocacy work in a region praised for fostering both citizen engagement and sustainable food systems, what can we learn from the story of the

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PMFPC? In this reflective case study, we explore the challenges associated with citizen engagement in local food policy. Through semistructured interviews and analysis of PMFPC documents, we provide insight into how particular obstacles might have been avoided or overcome. Our research speaks to the broad arena of public participation and highlights the importance of negotiating and clearly articulating the roles and responsibilities of council members, government staff liaisons, and elected officials; regularly evaluating the usefulness of established roles, structures, and processes; and making the changes necessary to maintain the relevance of the council throughout its life. We conclude with lessons learned and recommendations for both citizens and government agencies hoping to foster productive public engagement and to advance local food systems policy.

Keywords
food policy councils, food systems, policy, public participation

Introduction

The city of Portland is often hailed in news and popular media as a capital of the U.S. alternative food movement.[1] A commitment to local, sustainable, and organic food is embodied in an urban landscape of abundant farmers markets, widespread availability of local and artisanal products, and a vibrant scene of farm-to-table restaurants. The city is home to scores of bountiful community gardens and numerous nonprofit organizations dedicated to promoting urban agriculture, food security, and access to healthy foods. This commitment by farmers, volunteers, entrepreneurs, and foodies to building and sustaining a healthy local food system appears to be matched by a political climate of progressive food and land use policies.

In 2002, the Portland Multnomah Food Policy Council (PMFPC) was established to address the region's growing interest in sustainable food system strategies (City of Portland, 2002; Multnomah County, 2002). The fledgling citizen advisory board was in good company; between them, the city and county host upwards of 70 active citizen boards, commissions, councils, and/or groups that tackle issues ranging from housing and human rights to youth advocacy and agriculture. The PMFPC flourished in this environment so hospitable to citizen engagement. In the last few years of the council's existence, members contributed to many notable achievements, including the creation of the Multnomah Food Action Plan, which laid out a 15-year vision and plan for the county's food system; the Healthy Retail Initiative, which provided funding and technical assistance to corner stores interested in increasing healthy options; the Beginning Urban Farmer Apprenticeship Program, which trained new farmers and producers; and updates to the Urban Food Zoning Codes, which relaxed regulations to increase opportunities for urban agriculture.

In light of these successes, many PMFPC members and community supporters were surprised when the city and county dissolved the council in the summer of 2012. While the details of the dissolution were murky at the time, these governing bodies indicated that the PMFPC was losing relevancy and that they had no intention of restructuring or resurrecting a joint food policy council (FPC) in the future. After a decade of conducting food policy and food systems advocacy work in a region praised for high levels of citizen engagement and dedication to building sustainable food systems, what might the dissolution of the PMFPC teach us about the challenges of public participation in local food policy?

Over the past two decades, much-needed research has been conducted on the emergence, development, and structure of FPCs in the United States and Canada. This literature includes important findings related to the specific barriers and challenges these councils face in their efforts to impact food policy. Perhaps unsurprisingly, constraints related to budgets, resources, and time are the most commonly cited hurdles (Borron, 2003; Fitzgerald & Morgan, 2014; Harper, Shattuck, Holt-Giménez, Alkon, & Lambrick, 2009; Hatfield, 2012; Scherb, Palmer, Frattaroli, & Pollack, 2012).

[1] National news outlets reporting on Portland's sustainable food scene include the New York Times, Los Angeles Times, and National Public Radio (NPR) (Asimov, 2007; Burros, 2006; Norris & Block, 2009; Robbins, 2005; Timberg, 2008).

FPCs often struggle to obtain adequate funding for their work, and because most members are volunteers, coordinating schedules and finding the time to devote to council work can be difficult. These issues can also create hurdles related to the recruitment, engagement, and support of council members (Fitzgerald & Morgan, 2014; Harper et al., 2009; Hatfield, 2012; Scherb et al., 2012). Productively engaging a diverse constituency is difficult when stakeholders have "differing positions on specific policies and differing abilities to engage in policy" (Scherb et al., 2012, p. 10).

FPCs also face a set of challenges related to navigating complex political climates (Harper et al., 2009). Councils commonly cite a lack of support from government staff as a major barrier to effective and efficient policy change (Borron, 2003; Fitzgerald & Morgan, 2014; Scherb et al., 2012). Oftentimes councils are faced with trying to coordinate among different government agencies (Hatfield, 2012). Proving the relevancy and usefulness of a FPC can also be difficult, especially when food policy is unfamiliar to government and the public (Borron, 2003). Likewise, members' distrust of government can stand in the way of effective engagement in food policy on the part of government staff and officials (Scherb et al., 2012).

Finally, FPCs often struggle to design and maintain an effective and adaptive organizational structure (Harper et al., 2009). Maintaining strong and consistent leadership while not depending too much on one person is critical to a council's success (Borron, 2003). Harper et al. (2009) cite "balancing focus between policy and program work and between structural and specific foci" (p. 5) as a major challenge experienced by FPCs. Additionally, without systematic evaluation and measurement procedures, it can be difficult if not impossible to adequately evaluate a council's impact (Harper et al., 2009; Hatfield, 2012; Yeatman, 1994).

While this body of literature provides valuable research on the efforts, activities, and struggles of a broad collection of FPCs, it lacks the depth necessary to glean insight from the complex struggles of individual FPCs. A handful of recent individual in-depth case studies attempt to fill this gap. These include research on the Oakland Food Policy Council's efforts to influence zoning policy to expand urban agriculture (McClintock, Wooten, & Brown, 2012); the Toronto Food Policy Council's "nutrition-sensitive food systems approach" (Mah, Baker, Cook, & Emanuel, 2013); the development of the Food Alliance, a food policy-oriented organization aimed at integrating public health and ecological issues in the Australian state of Victoria (Caraher, Carey, McConell, & Lawrence, 2013); citizen efforts to formulate food policy to protect farmland in Edmonton, Alberta (Beckie, Hanson, & Schrader, 2013); the development of "new political spaces" to support urban agriculture in New York City (Cohen & Reynolds, 2014, p. 221); the Rhode Island Food Policy Council's capacity to model inclusivity and democracy through a food justice orientation (Packer, 2014); and Baltimore's efforts to increase healthy and affordable food access through collaborative food policy (Santo, Yong, & Palmer, 2014). This body of research seeks to understand the intricacies of particular FPCs while also offering guidance for food systems advocates engaging in public policy.

Our research follows in the footsteps of this important work and provides qualitative evidence that supports many of the challenges identified by the scholars reviewed here. More importantly, we contribute insight into the challenges associated with citizen engagement in local food policy through the lens of the PMFPC. We begin with a brief description of our research methodology. We move on to provide context and background for our research by drawing on literature related to public participation in policy, outlining a short history and typology of FPCs, and detailing the formation and structure of the PMFPC in particular. Next we present the findings from our research on the specific challenges faced by the PMFPC over the course of its lifetime. We conclude with a short summary of these challenges coupled with insight into how particular obstacles might have been avoided or overcome. We present lessons learned and recommendations for both citizens and government agencies hoping to foster productive public engagement and advance local food systems policy.

Applied Research Methods

We conducted semistructured interviews with 10

key informants identified using a purposive sampling frame. We chose interviewees who represented the diversity of stakeholder roles on the PMFPC, including four former members and chairs, two city and one county staff liaison, an expert in public policy, and two longtime supporters who attended PMFPC meetings regularly. We recruited interviewees who were present during various stages of the lifetime of the PMFPC, including its formative years, its dissolution, and stages in between. To maintain confidentiality we refrain from using names, but we identify council affiliation to provide context for interview excerpts.

We analyzed interview transcripts, PMFPC documents, and monthly meeting minutes using the Dedoose qualitative coding application. It is important to note that one of the authors was a member of the PMFPC and served as council chair during the time of dissolution.[2] The other author was new to Portland in 2012 and attended meetings of the PMFPC in the summer of 2012, but had no formal affiliation with the council. We recognize that our positionality has influenced all stages of this project, including the research design, data collection, and data analysis, as is the case with all research (Burawoy, 1998). We attempted to balance our "insider"/"outsider" perspectives by working together throughout each stage of the research process, including co-developing interview guides, cross-coding interview data, and seeking input from and fact-checking by individuals with various affiliations and relationships with the PMFPC over its lifetime.

Background

Public Participation

Public participation in policy-making takes many shapes and serves a variety of functions. Opportunities include public hearings, citizen forums, community meetings, outreach, citizen advisory boards, individual citizen representation, citizen surveys, and focus groups (Wang, 2001). Motivations for participation in policy-making are also numerous and include a desire to be engaged in the public sphere, to hold a more active role in decision-making, and to act as a government watchdog (Irvin & Stansbury, 2004; Wang, 2001). Public participation has the potential to enhance two-way communication and education between governments and the citizens they serve. In particular, it can provide policy-makers with insight into issues of public concern. Likewise, it can increase public awareness of policy-makers' jurisdictional limitations. Policy-makers can use public participation as a vehicle for managing the public's expectations and educating citizens in regard to identifying efforts that have the most potential to affect policy, while providing a platform and structure for obtaining public input (Irvin & Stansbury, 2004; Wang, 2001).

Public-participation processes ideally employ strategies to maximize citizen engagement and a sense of ownership among participants. These strategies, however, have varying degrees of efficacy and differ in regard to the level of decision-making power they grant to citizens. Scholars of public participation have worked to classify degrees of citizen power in decision-making. Sanoff (2000) distinguishes between "pseudo" and "genuine" engagement, where the former might consist of policy-makers simply informing citizens of existing processes used in decision-making, while the latter describes arrangements by which citizens are granted jurisdiction, authority, and control over decisions. "Genuine" engagement involves citizens working in partnership with policy-makers to serve as owners and "co-producers" of public policy (Sanoff, 2000; Wang, 2001).

Arnstein's (1969) ladder of citizen participation is also useful for conceptualizing varying degrees of citizen power in decision-making. At the lower rungs of her virtual ladder are "manipulation" and "therapy" — stages of nonparticipation. Continuing upward on the ladder, "informing," "consultation," and "placation" indicate stages of the tokenization of participants or the process or both. Moving further up the ladder toward "partnership," "delegated power," and "citizen control,"

[2] Monica Cuneo was a member of the PMFPC from January 2011 to December 2012, and served as the vice chair from January 2012 to August 2012 and then as chair from September 2012 to December 2012.

the integration of citizen input and shared power in decision-making increases.

Municipal governments often have trouble seeking input from broad, diverse segments of the population. This gap in participation allows a narrow group of individuals to dominate the public participation process and limits access by traditionally underrepresented communities. A lack of participation can be interpreted by government bodies as apathy or lack of interest (Irvin & Stansbury, 2004; Yang & Callahan, 2005). However, citizens often consider the process of creating policy to be overly academic and removed from community experiences (Schiff, 2008). Formal group and meeting structures may be unfamiliar and intimidating to community members, thereby inhibiting active participation from a diverse citizenry (Duran, Wallerstein, Avila, Belone, Minkler, & Foley, 2012). While specific expertise may be needed in areas such as budgeting, personnel, and procurement policies, when citizens and government staff operate with narrow definitions of expertise, they limit participation and fail to consider community knowledge as being "equally legitimate" (Duran et al., 2012, p. 52). A broader definition of expertise encourages public engagement from a larger segment of the population (Wang, 2001).

Food Policy Councils

Food policy councils (FPCs) began to emerge in the 1980s as cross-sectoral groups focused on engaging a broad range of stakeholders to develop sustainable local food systems (Schiff, 2008, p. 206). In the mid-1990s, the Local Food Systems Project, a three-year project funded by the W. K. Kellogg Foundation and managed by the Minnesota Food Association, provided technical assistance to develop FPCs in six U.S. cities and documented this work to guide future food policy efforts (Dahlberg, Clancy, Wilson, & Donnell, 1997). As of September 2014, there were 200 FPCs nationwide, existing in a variety of forms and with a range of functions (Center for a Livable Future, 2014). FPCs typically fall into three main categories. Governmental FPCs, like the former Portland Multnomah Food Policy Council (PMFPC), advise government agencies as commissions, task forces, or advisory boards; utilize government staff support; and have limited decision-making power (Fox, 2010; Scott, Scott, Oppenheimer, Walton, & Gahn, 2011). Nonprofit and independent FPCs operate autonomously, without formal government affiliation (Dahlberg, 1994; Schiff, 2008). Finally, quasigovernmental and hybrid FPCs may be affiliated with government agencies, but like independent councils, maintain full decision-making power within the organization (DiLisio, 2011; Schiff, 2008).

The objectives of FPCs vary based on the perceived needs and concerns of the community, the backgrounds and interests of council members, the funding opportunities available, and the current political climate (Burgan & Winne, 2012; Dahlberg, 1994). However, some common objectives include developing programs to address community needs; advocating for particular food policies; educating the public; convening disparate stakeholders; and strategizing for more sustainable food systems (DiLisio, 2011; Schiff, 2008; Scott et al., 2011). Notably, research suggests that interest in policy versus projects versus programs often shifts over time; groups that start with a projects or programs focus sometimes shift to a policy orientation and vice versa (Schiff, 2008). However, as we will demonstrate, the lines between policy, projects, and programs are not well-defined or commonly shared. Goals, objectives, and roles and responsibilities are also terrains of debate and misunderstanding. Therefore, it is important to agree upon a shared vision, to define the council's role and purpose during its formative stages, and to revisit these periodically to ensure that the group remains effective (Fox, 2010).

Formation of the PMFPC

In February 2002 a group of concerned citizens, farmers, and organizational representatives working on issues related to food security, food production, community gardening, hunger, and nutrition held a community food forum that gathered over 100 food systems stakeholders. The forum signaled the increasing political relevance of food, demonstrated the momentum of citizens organized around food issues regionally, and helped to place food systems issues on the radar of government

officials. Over the course of several hours, participants identified six main food system problems that they saw as important to tackle from a policy angle:

- food practices in medical and government institutions that promote unhealthy diets and poor environmental stewardship;
- a lack of awareness by local residents regarding nutrition, food skills and the source of their food;
- a high rate of hunger and barriers preventing access to affordable, nutritious food for local residents, regardless of income level or geographic location;
- urban land use policies and rules negatively affecting local food production and distribution;
- business and economic issues affecting the viability of local farmers; and
- the environmental impacts associated with food production, consumption, and waste disposal (City of Portland, 2002, p. 1; Multnomah County, 2002, p. 1).

Forum organizers sought to establish a formal relationship with government and targeted City Commissioner Dan Saltzman, who attended the forum at their request, as a political champion who would bring food policy issues to the agenda of the city council. City and county government officials also began to recognize the advantages of a formalized, food-focused citizen advisory board: it would be an opportunity to establish a commitment to food systems and to identify food-related problems and potential policy interventions. One former government staff liaison to the PMFPC reflected,

> [The PMFPC] was viewed as the logical first step for the city and county to try to take input on food issues, because none of us had staff or programmatic attention at that point…so it provided a formal place for that discussion to play out and, you know, it led to the City dedicating resources to creating a food program.

Commissioner Saltzman ushered in the May 2002 city resolution, followed by a corresponding county resolution in June, which established the PMFPC as a joint citizen advisory board between the city and the county (City of Portland, 2002; Multnomah County, 2013).[3] The PMFPC was housed as a subcommittee under the Sustainable Development Commission, which also served as a joint advisory board. As a citizen advisory board, the PMFPC had no official decision-making power, and policy-makers were not bound to its recommendations. Rather, the founding resolutions stated that the PMFPC's initial charges were to provide ongoing advice to the city and county on food policy issues; to establish governing principles to guide decision-making related to food issues; to identify and report to the city and the county on options for improving local policies, rules, and practices related to food production, availability, and demand; and to develop a work plan, proposed structure, and potential funding opportunities (City of Portland, 2002; Multnomah County, 2002).

The first 11 members of the PMFPC were selected by the city and county and were what one former council chair referred to as the "cream of the crop": restaurant and grocery store owners, university faculty and staff, health-care researchers and providers, a former farmer, and other seasoned practitioners in the field of food systems, hunger, and nutrition. The founding resolutions defined the make-up of council members and participants as "representing the diversity of the local community and providing a wide range of expertise on local food issues including hunger relief; nutrition; food business and industrial practices; local farming; community education[;] and institutional food purchasing and practices" (City of Portland, 2002, p. 2; Multnomah County, 2002, p. 2). Following the

[3] The relationship between the city of Portland and Multnomah County governments is dynamic, overlapping, and not clearly documented. The city generally manages water, sewer, solid waste, and parks. The county manages libraries, health and human services, and judicial systems. Both governments manage transportation infrastructure, education, public safety, and housing (Griffin-Valade, Kahn, & Gavette, 2013). Joint advisory boards, like the PMFPC, are sometimes formed when both governments identify a need or stake in a particular issue.

initial membership selection, the mayor of Portland and the Multnomah county commissioner implemented a formal application process to appoint new members. This consisted of prospective members submitting a statement of interest and responses to a series of questions related to the applicant's experience with food and policy. Recruitment and review of applications occurred annually for any open seats on the PMFPC, and members served two-year terms for a maximum of two terms. While council members engaged in recruitment activities, they did not initially advise on or take part in the selection process, and the selection criteria used by the city and county were not public. In the last two years of the PMFPC's lifetime, efforts were made to make the process more transparent, including the formation of a committee dedicated to recruitment and selection.[4]

In addition to the appointed council members, the PMFPC was staffed with liaisons from both the city and county. Their role was to attend PMFPC meetings; to coordinate meeting logistics such as space use, minutes, and agenda; to serve as liaisons between the PMFPC and elected officials; to advocate for the PMFPC and its recommendations; to advise the PMFPC on city and county priorities; and to assist the PMFPC with the creation of work plans based on city and county goals (City of Portland & Multnomah County, 2012). However, perceptions about the degree to which staff should support the PMFPC and what form that support should take, the extent to which they should control agenda setting, and their specific role and function as liaisons to elected officials varied significantly among our interviewees, an issue we discuss in further detail below.

Research Findings

"Welcome to the Big Leagues": The PMFPC's Lack of Autonomy, Authority, and Influence

Former PMFPC members we interviewed generally conceived of an ideal food policy council as a body working in partnership with government and having some level of autonomy and authority to influence policy. However, they expressed frustration with regard to the PMFPC's overall lack of influence and felt that the government failed to foster good communication and "genuine" citizen engagement in the policy process. Placing the PMFPC on the "pseudo" end of Sanoff's engagement spectrum (2000) and on the "informing" rung of Arnstein's ladder of participation (1969), one former government employee and active supporter of the PMFPC noted that "the county and the city would report on what they were doing" by "dumping" information rather than engaging in "a two-way relationship" or "an exploration going both ways." According to another interviewee and former member, "there was very little effort to kind of empower [the PMFPC] to do useful work and to give them some autonomy and authority to do that work." Another former member shared the perception that it is the responsibility of government liaisons to empower citizens and yield them autonomy and authority: "the food policy council is about the public — the public's will and role with respect to creating a food system that works. And unless you can power that role, then you're not doing the work of a food policy council." One former staff liaison indicated that the council members themselves were ultimately in control of the level of power and influence they yielded, noting that "depending on how effective [they are] at the work that they do and making their voice heard, I think that any council…can be as effective and as present and vocal and as high profile as [they] want to be."

Both former PMFPC members and government staff we interviewed agreed that the ideal role of a staff liaison was to navigate the council through the policy process. But there was some disagreement about who should be driving the agenda. Former staff liaisons considered the two main roles of the council to be (1) advising on issues that government had identified as high priority, and (2) calling attention to important issues that are not currently on the radar of elected officials. However, former liaisons expressed frustration about what they viewed as council members' lack of interest in the projects that elected officials were actively engaged in. "We

[4] This new selection process was used only once before the Council was dissolved the following year.

would say, 'here are the issues that we are working on, it would be really great to have help with this, because this is what will be of highest profile among the elected,'" recounted one former staff liaison, "but there wasn't anyone that wanted to follow, you know, who wanted to work on those particular issues."

One former PMFPC member had quite a different vision of the role of a staff liaison: "the job of a staff person is to mostly listen—figure out what it is [council members] want to see happen and why they want to see it happen and to facilitate that happening." Another former member expected government liaisons to provide "guidance and direction" and to facilitate a process whereby members could identify food system issues ripe for tackling from a policy angle. This ideal vision conflicted with how former members experienced government support on the ground.

Several former PMFPC members recounted experiencing staff liaisons as "gatekeepers" who controlled access to the political process and sought to impose their own agenda on the PMFPC. For one former member, "gatekeeping" included staff refusing to publish food system reports and research that the PMFPC had produced, blocking communication with policy-makers perceived to be "higher up," and limiting access to materials that would facilitate group process. Another former member noted that although "the initial FPC did awesome at getting the issues on the radar of the elected officials," in later stages "it seemed that most staff people were handlers and gatekeepers — preventing people from having interesting conversations." This interviewee continued,

> Having [government liaisons] sort of driving the agenda towards their specific projects or what they needed to have happen really kind of kept the playing field kind of small and prevented citizens from having direct access to elected officials to really tell them what they were thinking. And to me it seems like a citizen advisory group really should have its own agenda and its own mission, and its goal is to provide input into elected officials and staffers. And based on having the handlers in the middle it sort of watered down the message and made it so we couldn't be honest. I couldn't be honest about the situation because the handlers were there and I didn't want to basically affect their jobs.

For many former members, their experience with "gatekeepers" was disempowering and was considered a primary reason for lack of traction and progress made toward advancing food policy. When asked to explain why policy-makers sometimes did not respond to the recommendations of an advisory board, a public-policy expert we interviewed replied bluntly, "welcome to the big leagues." A former government employee and self-identified longtime PMFPC advocate expanded on this, suggesting that advisory groups' policy objectives do not always align with those of government officials:

> Don't forget, elected officials like to have the appearance of high capacity advisory groups or policy influencing groups and ultimately know that they are going to make their own decisions and it's predicated not on those same factors that that policy group necessarily is using to make their recommendations. And that's just the nature of the political process.

As a citizen advisory board, the PMFPC did not have the authority to make policy decisions. Yet council members expected that staff and elected officials would hold their advice and recommendations in high regard. They were frustrated by what they perceived as a failure on the part of government to facilitate two-way communication and productive public engagement in the policy process. Former members felt that the PMFPC was met with a lack of government support, which Borron (2003), Fitzgerald and Morgan (2014), and Scherb et al. (2012) identify as one of the main challenges facing FPCs. Former staff liaisons, on the other hand, felt as though the PMFPC was not interested in supporting or advising on the issues that were of top priority to elected officials. Rather than serving as "co-

producers" of policy, sharing power, and achieving a public partnership, former members and staff liaisons were operating with disparate agendas and were ultimately unable to have the type of meaningful policy impact they had hoped for.

"A Slow, Painful Death by Bureaucracy": The Absence of Strategic Planning, Communication Breakdown, and Fractionalization

According to Harper et al. (2009), FPCs require well designed organizational structures, strategic planning, and evaluation processes to remain productive and sustainable over time. The PMFPC lacked a formalized strategic planning schedule, which contributed to its inability to participate in and develop both long- and short-term advocacy strategies. The 2002 founding resolutions were never revised to reflect changes to the council's structure or function. For example, the Sustainable Development Commission (the joint city-county advisory board under which the PMFPC was a subcommittee) was dissolved in 2007, and although the PMFPC then began operating independently, the original resolutions were never updated to reflect this. Many of the council's tasks, responsibilities, and regularly scheduled activities had evolved or dropped off altogether, having since been completed or considered no longer relevant to the group. These changes were never documented, which made evaluating the council's impact difficult, if not impossible.

Former members cited the importance of communicating directly with city and county commissioners on a regular basis; it was an opportunity for the PMFPC to make recommendations in its own words and to communicate progress, goals, and research findings. However, over the years, members received less and less face time with elected officials, instead communicating almost exclusively through government staff liaisons. One former staff liaison attributed this to a "radical change" in the composition of the PMFPC and the composition of the food policy landscape over time. A founder and former chair described the consequences of this growing disconnect on the efficacy of the council: "I think gradually the Council started to lose its teeth, its momentum, and its profile in front of those commissioners."

According to one former chair, without a direct link to elected officials, the PMFPC "got stuck in the administrative process" and began "a slow painful death by bureaucracy." The loss of direct communication between the PMFPC and elected officials also made it difficult for the council to productively navigate complex relationships with two government bodies, each of which had separate jurisdictional responsibilities and oftentimes disparate goals related to food policy. Consistent with Harper et al.'s research, which identifies "working in complex political climates" as one of the six main challenge facing FPCs (2009, p. 5), former council members emphasized that growing conflict between city and county staff was negatively affecting the efficacy of the PMFPC. As one citizen at large and longtime advocate of the PMFPC reflected,

> What I gathered was happening was increasing lack of cooperation between the city and county. Whether that was personality driven, or policy driven, or driven by any other number of factors, it didn't matter to me, and I never weighed into that nor did I ever want to (chuckle), but it was just clear that there was a fractionalization that was going on that kept the food policy council from operating at an optimal level.

The absence of a strategic planning process, the breakdown of communication between the PMFPC and elected officials, and the growing tension between the jurisdictions jointly housing the PMFPC contributed to ongoing confusion about the overall role and function of the council and the roles of individual council members and government staff liaisons. Without supportive structures, formal organizing documents, written agreements, and robust communication pathways, the group was unable to develop and maintain a shared vision and strategic direction.

Training and Capacity-Building

Research suggests that a comprehensive understanding of the policy process is critical to building citizens' capacity to participate in policy creation (Irvin & Stansbury, 2004; Wang, 2001) and that

training and skill-building in this arena is one of the biggest challenges facing FPCs (Scherb et al., 2012). Many of our interviewees agreed that members should at least have rudimentary policy literacy, including knowledge of existing policies related to food systems, an understanding of the process of policy development, and a sense of the role of advocacy in policy creation. However, they expressed different perceptions about how and when this knowledge should be attained and who was responsible for providing the necessary training. Some interviewees identified the need for all members to have strong comprehension of the policy process upon appointment to the PMFPC, while others felt that a few experienced participants could provide the leadership and institutional memory necessary to guide the rest of the group.

One former council member noted that local governance systems are complex and difficult to navigate, and that it is the responsibility of government staff to educate participants on how to influence policy in a "solutions-based way." One former staff liaison we interviewed recalled facilitating orientations at the beginning of each year and bringing in outside policy experts to educate members on "policy 101," but that in the last couple of years of the council's existence, former council chairs "wanted to take over that function." Council documentation dated 2006 lists "work[ing] with staff and FPC members to orient new council members and encourage their participation on committees" as the responsibility of the council chair, although interviewees did not reference this document nor did they point to this as a task assigned to the chair specifically (PMFPC, 2006). One former staff liaison we interviewed indicated that although it was preferable to have members on the council who were up to speed on policy, it was ultimately the responsibility of government staff to help the council navigate the process. One interviewee who as a government employee had supported the formation of the council argued that it was the responsibility of members to educate themselves and "build capacity" to advocate on relevant issues:

> I don't think the city and county has [sic] the responsibility of building capacity…the capacity gets built within the members of the organizations themselves and filling a vacuum where one exists, creating opportunities where they can. All that is driven, not by the county saying, "y'all come, tell us what we should be doing," but by the members saying, "this is what you should be doing on this issue."

While there was disagreement on who was responsible, nearly all interviewees agreed that there was an overall dearth of literacy and navigability of the policy process, which contributed to members feeling powerless, ineffective, and ill equipped to engage meaningfully. Similar to the findings of Scherb et al. who cite "differing abilities to engage in policy" as a challenge to successful food policy creation (2012, p. 10), one former staff liaison stressed the importance of developing a common understanding of the policy process in order to create a "level playing field" so that the advice of council members who were well versed in the policy process was not privileged over that of those who were less experienced. "Staff need to create opportunities to learn from advisory boards, not just target the smartest person in the room and talk to them exclusively about a specific issue," noted the former member, continuing, "if the goal is public policy, then expertise needs to be shared."

"The Cream of the Crop": Defining Expertise and Inclusivity

The first cohort of the PMFPC was considered "the cream of the crop," representing "people with knowledge of some aspect of the food system based on longtime experience," according to a founding member of the council. This included influential restaurant and grocery store owners, university professors, and the executive director of an area food bank. Interviewees noted that while the council may have had wide representation from different sectors of the food system, it was lacking in racial and cultural diversity, which reflects one of the six main challenges facing FPCs as identified by Harper et al. (2009). Some pointed to the fact that regular attendance at monthly council meetings was prohibitive for many members of the community, particularly those who were not able to take time

off from work, had difficulty arranging transportation, and/or had limited English proficiency.

Some interviewees made a distinction between "experts," or those professionally affiliated with a sector of the food system, and those with "life experience," typically defined as someone who faced food insecurity or other food-related issues in their personal lives. Although most interviewees expressed that both perspectives were valuable from the standpoint of food policy, there were differing opinions about how to best incorporate the knowledge of underserved populations into the PMFPC's work. One former member considered it sufficient to have members on the council who worked directly with food-insecure populations and to conduct outreach to communities unable to attend meetings. Another interviewee, who served as a council chair, recounted frustration in trying to persuade government staff that the council needed direct representation from food-insecure populations, and chalked it up to a lack of cultural competency on the part of unconvinced staff. This same interviewee recalled debates about how to achieve more inclusive participation:

> Having equitable representation…takes some real thought and it's probably going to have to be an alternative type of advisory group, meeting at different times, or even talking about meeting in different languages or different places, you know, like the city of Portland go[ing] all the way out to East Portland, and we could not get anybody to agree to meet out there from the staff members because they thought it was too far. And that's really irresponsible, I believe. If you're talking about a community advisory committee and you don't want to meet outside downtown that's not being equitable or inclusive.

A staff liaison we interviewed also expressed concern with regards to inclusivity, noting that in order to "branch out" and bring in new people, the group "need[ed] to be able to function differently so that people [felt] comfortable and welcomed and part of the group." The same interviewee mentioned that council members had expressed commitment to cultivating and mentoring new members, but had failed to follow through. These problems are not unique to the PMFPC. Other FPCs have also experienced difficulty recruiting, engaging, and supporting new members (Fitzgerald & Morgan, 2014), in part because citizens sometimes consider policy to be overly academic, unfamiliar, and inaccessible (Duran et al., 2012; Schiff, 2008).

Our interviewees noted that the composition of the PMFPC changed significantly over time. One former staff liaison mentioned that as the council matured, numerous other food systems–related organizations came on the scene. The presence of these new organizations reflected a growing local food movement, but also diluted the influence and necessity of the council in the policy arena. This made it difficult to continue to recruit seasoned and influential members, such as the executive directors of prominent nonprofits. A former member and chair argued, "the most politically savvy foodies [were] being chewed up and spit out and [were] not willing to return, so the remaining set of available persons were those that didn't have the policy expertise." Indeed, as interest in local food systems grew, the council gained a higher public profile and began to attract community members who were passionate about food issues but were not necessarily policy experts. As fewer "high powered" people participated, the council continued to lose political power. Former council members suggested that these changes to membership composition and the higher degree of mediation on the part of staff liaisons contributed to the decline of outreach to elected officials and ultimately to its dwindling relevancy in their eyes.

Policy Versus Projects Versus Programs

As PMFPC members grasped for opportunities to understand the overall policy process and how they could best address the food system issues affecting the communities they were working with, the lines between projects, policies, and programs became blurred. As one former staff liaison reflected, "I had always understood the reason it was called the food policy council was that it would focus on *policy* not *projects,* and I understood the council to be essentially providing guidance to the city and

county to get our houses aligned with the policy goals." However, when asked to expand on the relationship between policy and projects, the staff member acknowledged that it was not a "black and white situation." Rather, the PMFPC engaged in activities, such as food-focused workshops, listening sessions, and neighborhood-specific meetings, as a way to understand issues at the community level and to help inform needs and opportunities that could lead to policy issues being "flagged" for future redress.

Another former staff liaison expressed frustration with what they perceived as a lack of clarity about what would be the specific policy recommendations that would emerge from project-based work. The same former liaison indicated that the slipperiness between policy, projects, and programs is not unique to the former PMFPC, but is "always a big topic of discussion" at conferences where attendees often ask, "are we doing policy or are we doing programs?" According to Scherb et al. (2012), this confusion is indicative of broad lack of consensus over the term "policy." Hatfield (2012) emphasizes the importance of distinguishing between policy work and project work, defining the former as "identify[ing] and engag[ing] with those areas in which local government touches or shapes the city food system," and the latter as "involv[ing] the development and implementation of specific initiatives" (p. 19). Interestingly, work by Schiff (2008) suggests that interest in policy versus projects versus programs often shifts over time, and groups who may start with a project or program focus sometimes shift to a policy orientation or vice versa.

Indeed, confusion about the role of the PMFPC in regard to its involvement in policy-making, projects, and programs was more than an issue of semantics. According to interviewees, the lack of shared understanding about the distinction between these categories and the type of work that was appropriate for the council to engage in contributed to disagreement about the roles and responsibilities of staff and council members alike. Ultimately, this hindered the council from effectively engaging in meaningful food policy.

Dissolved: The Technical Nail in the PMFPC Coffin

In June 2012, the chair and co-chair of the PMFPC resigned, citing frustration with the pace of change in the "government policy arena" (D. McIntyre, personal communication, June 23, 2012). Government liaisons stressed that the council was becoming increasingly ineffective as an advisory body and was losing relevance to both policy-makers and council members (PMFPC, 2012a). Meeting minutes and interview transcripts reveal a number of reasons for the perceived waning relevancy of the council, which Borron (2003) identifies as one of the most pressing challenges facing FPCs. The city of Portland noted that the council was "operating in a different food environment" than when it had been conceived a decade ago (PMFPC, 2012a, para. 6). Many new food-related organizations had sprung up and some previously existing organizations had shifted or expanded their focus to include food. Elected officials had begun to look beyond the PMFPC to seek niche expertise based on particular policy goals, and the city and the county, in large part due to the advice of the PMFPC, had institutionalized food-related work in the form of full-time staff positions. Council members agreed that the food landscape had changed and that the council should be restructured to reflect these changes (PMFPC, 2012a).

It was also clear that PMFPC members and staff liaisons had different food policy agendas, making collaboration difficult. Government liaisons expressed that the council was working on important issues, but that their work was not directly filling the needs of the city and county (PMFPC, 2012a). They further expressed the desire to "pause" for reflection, to lay out a clear path forward, and to engage in strategic planning before electing new leadership. The council appointed an interim chair and formed a work group charged with revisiting the original city and county founding resolutions, leading a restructuring process, and redefining the council's role and function (PMFPC, 2012a, 2012b).

But the effort came too late. In September County Chair Jeff Cogen reported that the 2007 dissolution of the Sustainable Development Commission, under which the PMFPC was legally housed, had "unintentionally dissolved the FPC"

(PMFPC, 2012a, para. 2). Cogen further communicated that, due to a "basic division of responsibilities between the city and county," both jurisdictions had agreed that they would not continue to be involved in a "joint effort" (PMFPC, 2012a, para. 2). The council and Commissioner Cogen negotiated a three-month period to reflect on the desired roles of each party moving forward. However, the majority of council members considered Cogen's announcement to be a technical dissolution of the council. The PMFPC continued to meet through December to discuss next steps. Discussions revolved around reinventing the council and determining what shape the next iteration should take.

Update on the State of Food Policy in the City of Portland and Multnomah County

Ultimately, the group decided to pursue a new model that would operate independent of local government bodies. In the summer of 2013, a handful of former PMFPC members as well as other interested individuals from the region formed the Portland Area Food Forum (PAFF)—"a citizen led collaborative striving to establish a cohesive network among food justice and food systems work in our region, create space for interaction, and generate effective practices for establishing a just food system" (PAFF, n.d., para. 1). The PAFF convenes quarterly networking socials as well as forums focused on topics such as food access and racial and class equity. PAFF embodies participants' desire to focus on food justice and advocacy, convene a diverse network of individuals and organizations engaged in food systems change, and support more action-oriented projects. The emergence of the PAFF signaled participants' desire to move away from a strict policy orientation to more project-based work, a shift that Schiff (2008) identifies as commonly experienced by FPCs.

In April 2013, Multnomah County developed a new Food Advisory Board (FAB) to "provide specific recommendations to Office of Sustainability staff on ways county services, departments, and offices can leverage the local food system in order to improve the health, safety, equity, and prosperity of the community…[and] the delivery of public services" (Multnomah County, 2014). To the authors' knowledge, the county FAB is no longer meeting regularly. The city of Portland has not articulated intent to form another standing advisory board related to food policy, but instead plans to continue with time- and content-specific ad hoc committees.

Conclusion: Lessons Learned

Through the Lens of the PMFPC: The Challenges of Public Participation

Former members of the PMFPC communicated the potential for the PMFPC to serve as a vehicle of "genuine" engagement, whereby they would be "co-producers" of public policy (Sanoff, 2000; Wang, 2001). However, they described their experience as one more consistent with "pseudo" engagement. They felt that government staff failed to foster two-way communication and ignored recommendations and reports produced by the council. Former members were frustrated by their lack of authority and decision-making power, yet this is the nature of a citizen advisory board as defined by the city of Portland and Multnomah County. A former government employee and self-identified long-time PMFPC advocate argued that elected officials sometimes based their decisions on a different set of factors than the council was using to make its recommendations and that this was "just the nature of the political process."

Former PMFPC members wanted staff liaisons to help navigate the policy process, but instead identified them as "gatekeepers" who prevented the council from accessing elected officials. Former staff liaisons felt that council members were not interested in working on the issues that were of top priority to elected officials and would therefore have the most meaningful impact. Former council members' perception of a growing tension between the city and county made it difficult for the council to negotiate between the two governing bodies' goals and needs. Rather than serving as "co-producers" of policy, sharing power, and achieving a public partnership, former members and staff liaisons were operating with disparate agendas and were ultimately unable to have the type of meaningful policy impact for which they had hoped.

Differing perceptions of the roles and

responsibilities of the council, its individual members, and the government staff assigned to support them was a common theme throughout the interviews. There was no consensus on who was responsible for providing the policy literacy training and capacity-building necessary to effectively identify opportunities for policy intervention and to go about spearheading policy change. As council members found themselves drawn to more action-oriented "projects," staff became frustrated at the lack of attention paid to "policy" outcomes. Overall, there was not a shared understanding about the type of work that was appropriate for the council to engage in, or the roles and responsibilities of both parties in moving the work forward. The absence of a strategic planning process also contributed significantly to the inefficacy of the PMFPC, particularly toward the end of its life. The council's structure, function, and mission were not consistently revisited or revised, leaving governing documentation outdated and, in some cases, irrelevant—the most egregious example being that on paper the council had technically been defunct for five years.

There was also disagreement about how "expertise" should be defined in regard to the recruitment and appointment of council members. A few former members expressed frustration with the lack of racial and cultural diversity on the council. One member recounted being met with resistance when they advocated for granting membership to people who may not have professional ties to food systems, but experienced food insecurity in their personal lives. One former staff liaison expressed that council members had committed to recruiting new and more diverse members, but had failed to follow through. Had there been formal discussion and negotiation about how to define expertise and how to recruit new members, perhaps both parties could have found a middle ground.

Recommendations and Final Thoughts

After a decade of conducting food policy and food systems advocacy work in a region praised for high levels of citizen engagement and dedication to building sustainable food systems, the story of the PMFPC has much to teach us about the challenges of public participation in food policy. We have explored the struggles faced by the PMFPC over the course of its lifetime, and have identified key factors that contributed to the decline of its efficacy and its perceived irrelevance in the eyes of elected officials and council members alike. We offer the following recommendations for fostering more productive relationships and effecting local food policy change.

Planning and evaluation

- Generate a robust strategic plan and planning process. Create a schedule for revisiting and revising the mission, goals, role, function, and governance structure of the council.
- Conduct biannual process evaluations and annual impact evaluations.

Capacity-building

- Develop shared definitions of what constitutes "projects," "programs," and "policies," and maintain a clear understanding of what type of work is appropriate for the council to engage in. With each phase of strategic planning, revisit this understanding to make sure that each proposed work plan or activity is within the scope of the council's role.
- Provide regular policy literacy and capacity-building trainings and agree upon who is responsible for their design and implementation.
- Establish and maintain realistic expectations for council members regarding their level of autonomy and authority in the decision-making process.

Communication

- Foster open two-way communication between council members and government staff and ensure that both parties have a shared understanding of their respective roles and responsibilities.
- Provide regular opportunities for FPCs to present recommendations directly to elected officials and for elected officials to provide feedback on those recommendations. This will help to ensure that the work

of the council remains relevant to decision-makers and that staff liaisons are not controlling the information flow between the council and elected officials.

Membership and representation

- Negotiate a transparent membership recruitment and selection process.
- Clearly define "expertise" and develop a common understanding of the variety of perspectives necessary to create a representative council membership.
- Maintain connection with the communities the council represents, and seek input from the public regularly. Ensure that community engagement meetings are as accessible as possible to achieve a broad range of input from a diverse constituency.

As this list of recommendations reveals, many of the challenges experienced by former PMFPC members and government staff liaisons are not unique to food policy, but speak to the broader arena of public participation in the policy process. Our research suggests that in order to effectively influence local policy change, targeted efforts must be made to resolve the dissonance between local government agendas and practices of citizen engagement. Most importantly, it is critical to negotiate, agree upon, and clearly articulate the roles and responsibilities of council members, government staff liaisons, and elected officials in contributing to a productive public process that empowers citizens, serves government officials, and holds all parties accountable. Although conflict is certain to arise when invested stakeholders come to the table to effect policy change, a sustained effort must be made to foster trust between citizens and local government; to evaluate the usefulness of established roles, structures, and processes; and to make the changes necessary to maintain the relevance of an organization throughout its life.

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The relationship between different approaches to multifunctionality of agriculture and choice of methods: A critical review

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Abstract

The concept of multifunctionality in agriculture is significant to both academia and policy development. Agriculture can serve multiple purposes in addition to the production of food and fiber. It can aid in addressing environmental, economic, and social issues faced by rural communities. The purpose of this study is to explore and describe the relationship between how scholars make use of multifunctionality and what methods they apply to the study of this concept. The article first identifies five types of approaches to multifunctionality: a market and economically focused approach, a rural land-use approach, an ecological approach, a public regulation and policy approach, and an actor-oriented approach. Secondly, applying the method of content analysis, the article examines 50 primary research studies on multifunctionality in the context of agriculture. The hypothesis of this article is that each identified concept of multifunctionality will coincide with a type of method. The article concludes that certain approaches correspond to certain research methods, which can limit the development of multifunctionality as a concept and practice.

Keywords

multifunctionality, political decision-making, research methods, theoretical inquiry, content analysis, policy, agroecology

Introduction

The notion of multifunctionality of agriculture first emerged in the Agenda 21 documents of the Rio Earth Summit in 1992 in the context of sustainable development and food security (Caron et al., 2008; Wilson, 2008). After the 1992 summit, the

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Organization for Economic Co-operation and Development (OECD) further expanded the concept. Scholars and various organizations like the OECD use the term multifunctionality to illustrate that agriculture has one or more functions in addition to its primary role of producing food and fiber (OECD, 2001). This article will illustrate that the term arose from a variety of disciplines and can be used in numerous ways and for various purposes, depending on the geographical scope and political framework.

Multifunctionality was first recognized as an economic activity to help keep producers afloat by providing additional employment as well as alternative and profitable markets (Renting et al., 2008). As such, multifunctionality at this time was being discussed as a positive rather than a normative concept (Caron et al., 2008). The positive approach defines multifunctionality as the jointness of outputs. Jointness examines the relationship between commodities or private goods and noncommodity outputs or public goods. Here, commodity and noncommodity outputs are interdependent throughout the production process. The role of policy development is to interfere when there is a lack of markets for noncommodity outputs (OECD, 2001). The concept of multifunctionality has also evolved as a normative concept with a value in itself, recognizing and encouraging the wide array of services that rural communities and agriculture can provide. This latter approach has been accepted by the European Union (EU) and utilized in its agricultural reforms (Wilson, 2008). In addition to the OECD, the concept of multifunctionality has also been discussed in various political arenas such as the World Trade Organization (WTO), Food and Agriculture Organization (FAO) of the United Nations and the Common Agricultural Policy (CAP) in the EU.

Although the concept of multifunctionality continues to be applied in a variety of ways, scholars and organizations generally use the term to illustrate that rural communities and agriculture serve a wide variety of social, economic, and environmental functions beyond producing food and fiber. Haugan, Nyland, Fjeldavli, Meistad and Braastad (2006) use multifunctionality to examine the ways in which Norwegian agriculture and rurality are suited to providing physical and mental health services, also known as "green care." From an environment perspective, Jordan and Warner (2010) examine the ways in which growing perennials and continuous living cover crops in the upper Midwest region in the United States can regenerate soil health and increase biodiversity that has been negatively affected by corn and soybean farming.

As the concept of multifunctionality is utilized in a wide variety of ways, it is important to explore how scholars define, investigate, and apply the concept. The purpose of this study is twofold: to categorize the ways in which multifunctionality is examined and to describe the relationship between how scholars utilize the concept of multifunctionality and the methods they apply to the study of this concept. The study is an exploratory and qualitative study to introduce the topic and encourage researchers and policy-makers to broaden their approach to studying multifunctionality. The correspondence between concepts and type of method will be examined and tested here using the concept of multifunctionality. Based on the examination of various academic journals and discussion papers, five types of approaches to multifunctionality will be identified: a market and economically focused approach, a rural land-use approach, an ecological approach, a public regulation and policy approach, and an actor-oriented approach. The hypothesis of this article is that each identified concept of multifunctionality coincides with a type of method.

The Various Approaches to Multifunctionality

Although the term multifunctionality generally refers to the notion that rural communities and agriculture can serve functions beyond the production of food and fiber, this concept has been applied by researchers and policy-makers in a variety of ways. Many authors link the wide variety of approaches to specific scientific backgrounds and epistemologies (Caron et al., 2008; Renting et al., 2008; 2009).

Although classifications of concepts can take different forms, be categorized using different criteria, and vary on the level of detail, the work by Renting et al. (2008; 2009) and Caron et al. (2008)

is a good starting point. Renting et al. (2008; 2009) discuss various applications of multifunctionality and propose an integrated model that can be applied to the study of multifunctionality. Caron et al. (2008) develop clusters of the concept and provide a unique outlook by examining the scientific and political motivations that have altered the meaning of the word. Renting et al. (2009) touch on the types of disciplines that are most likely to utilize a specific approach to multifunctionality. However, no scholars to date have examined the types of methods that correspond to the types of approaches. After an extensive review of literature, the author has identified five approaches to utilizing the concept of multifunctionality. The next five subsections describe the approaches to multifunctionality and serve as a guideline to understanding the various studies and literature on this topic. Although these approaches are described separately, this does not suggest that there is no overlap between these concepts, nor that researchers do not combine more than one approach simultaneously.

Market and Economically Focused Approach

Many authors have used multifunctionality focusing solely on the economic aspects of the concept. Multifunctionality here is defined as an economic activity that has multiple outputs, including commodity outputs and noncommodity outputs. Multifunctionality is based on the aspect of jointness between these outputs. Both types of outputs are seen as having a market value, despite the notion that noncommodity values often do not have an established market and have to find other means of evaluation and compensation (Van Huylenbroeck & Durand, 2003). An example of jointness is a farmer who raises cows on a pasture. Here, one economic activity (raising cows) can satisfy society by proving food (meat) and land management of grazing systems and grasslands. These outputs are seen as economic activities of a production process (Abler, 2004; Adamowicz, 2003). Caron et al. (2008) claim this is the most neoliberal approach and represents the positive version of multifunctionality that was presented in the early writings of the OECD. It is important to note that this mostly positive approach does not altogether exclude normative functions of multifunctionality.

Researchers utilizing this approach often ask the question of how to develop markets for noncommodity outputs. Renting et al. (2009) claim that many authors focus on examining how separate markets for noncommodity outputs can be created in a way that do not disturb markets for commodity outputs. Many studies, as illustrated by the sample below, attempt to determine whether, and if so how, farmers should be compensated for their noncommodity outputs, such as landscape management or environmental protection. This approach does not challenge market mechanisms, established agricultural institutions and belief systems, or international trade negotiations. Under this approach, public intervention is only necessary when policy formations are required to develop markets for noncommodity outputs.

Rural Land-use Approach

Whereas the above approach focuses on the economic aspects of multifunctionality, the rural land-use approach directs attention to the territorial aspects of multifunctionality. The concern is with how land is managed and what changes will or will not take place to the physical structure of the land. Often, farmers and farms as a unit are not taken into consideration in this approach. The social processes at the farm and decision-making about managing the land are also not taken into consideration. Decisions about the land are made at an aggregate level. This approach is very normative; the aim is to provide evidence for objectives such as redirecting funds, reinforcing a diverse economy, and promoting alternative functions of agriculture such as landscape management.

Disciplines such as rural planning, landscape architecture, geography, landscape and conservation ecology, and regional economics often utilize this approach by focusing on the location where the land use change will take place. Social aspects, such as regional employment and strength of social networks, or the functions and the activities taking place at this location, are often secondary or neglected altogether (Rossing, Zander, Josien, Groot, Meyer, & Knierim, 2007). Researchers employing this method are concerned with ques-

tions around managing the physical landscape while factoring in the aesthetic and ecological impacts of agriculture (Renting et al., 2009). Where other approaches ignore this, the land-use approach often takes into consideration resilience of crops and ecosystems and the impacts of climate change on the region in question (Atwell, Schulte, & Westphal, 2010; Jordan & Warner, 2010). Biodiversity conservation, watershed management, and forestry and wildlife management are some of the topics covered under this approach. This research contributes to the discussion of sustainable development since rural land use can have immense effects on landscape and the environment.

Ecological Approach

Although the rural land-use approach takes into consideration the ecological aspects of multifunctionality, it is secondary to the concern of land management and physical changes to the land. The main concern of the ecological approach to multifunctionality is the impact of agriculture on the environment; it proposes solutions that challenge the industrial agricultural system. This approach recognizes the contribution of intensive farming to air and water pollution, loss of biodiversity and wildlife habitat, and soil erosion and degradation. It recognizes that the agricultural sector contributes to the catastrophic events of climate change. Fields of environmental studies and geography often use this approach when describing multifunctionality. Specifically, agroecology and landscape ecology promote the principles of this approach. Agroecology utilizes ecological principles to manage ecosystems found on farm land. It was developed, Lovell et al. (2010) claim, to counter industrial agriculture.

Jordan and Warner (2010) propose multifunctionality as a strategy that can meet current human needs while sustaining ecosystems and protecting them for the use of future generations. McGranahan (2014) claims that multifunctionality can help marry the usually competing processes of agricultural production and conservation of biology. He points to the notion that an ecological approach to agriculture does not result in the rejection of industrial agriculture, but can help create a more sustainable system with less use of fossil fuels and greater conservation and protection of ecological systems, while maintaining productivity and profitability.

Recognizing the contribution of the agricultural sector to the degradation of the environment, the ecological approach also views the agricultural sector and farming practices as contributors to the solutions. Under this approach farmers are seen not only as food producers but also as environmental stewards and active participants in formulating and undertaking solutions to bettering the ecological landscape. Several studies in the United States examine how multifunctionality can help restore some of the environmental damage caused by the predominance of industrial agriculture. For example, using participatory methods and interviews, Atwell, Schulte and Westphal (2010) conducted a participatory workshop with agricultural, environmental, and policy leaders in the Corn Belt in Iowa to better understand diminished conservation land and develop practices as a way to achieve ecological as well as economic and social outcomes in the midst of the increasing markets for corn-based ethanol. The participatory workshop not only helped stakeholders recognize the complexity of the Corn Belt, it helped facilitate the formation of partnerships and perennial conservation initiatives that will help increase agricultural production while serving the ecosystem. These studies encourage U.S. farm policy that not only works within the framework of industrial agriculture and increasing yield and profits, but also takes into consideration the environmental benefits agriculture and farmers can produce.

Public Regulation and Policy Approach

This approach focuses on the institutional and policy aspects of multifunctionality. Although this approach is policy-driven, it has the capacity to challenge conventional policy and program management and thus also to challenge conventional approaches to agriculture and rural development. This approach can be classified as normative in the sense that it recognizes the role of political and social institutions in structuring and regulating goods, rather than relying solely on free-market mechanisms. Research under this approach focuses not only on policy formation but also on how these

policies and programs are being implemented and practiced on the ground. As such, impact assessment falls under this approach. Questions of policy formation and operationalizing public institutions in implementing, facilitating, and monitoring multifunctionality are often the focus for researchers employing this approach. Caron et al. (2008) also found that many authors examine the role of policy formation in managing and controlling conflicts between the commodity and noncommodity markets. Disciplines such as political science, policy evaluation studies, sociology, and economics often utilize this approach.

Within this framework, weak and strong multifunctionality is distinguished and placed on a spectrum. Weak multifunctionality is characterized by the lack of challenge and critique for high-intensity production, environmental degradation, and the power structures that influence mainstream agriculture. Conversely, strong multifunctionality pays close attention to the environment and sustainability. Policies developed under the notion of strong multifunctionality attempt to challenge mainstream agriculture and encourage the development of more inclusive, participatory, environmentally friendly, and territory-oriented programs and farming enterprises (Daniel & Perraud, 2009; Renting et al., 2009; Wilson, 2008). Strong multifunctionality is more inclusive, represents nonproductivism, and includes part-time, hobby, and self-sustainable farms as having valid roles in rural and agricultural communities.

Actor-Oriented Approach

The final identified approach is the actor-oriented paradigm. This approach has a wider center of attention and focuses on public goods, such as landscape preservation and biodiversity; goods and services produced for nonfarm markets, including agritourism and energy conservation; and functions of agriculture such as food quality, animal welfare, and quality of life. Like the public regulation and policy approach, this approach has the ability to challenge conventional systems of production and rural policy-making. In addition, this approach has the ability to analyze the food supply chain and the role of multifunctionality in less favored areas, as well as to access various functions within the sustainable development framework. Daniel and Perraud (2009) consider this to be the strongest of the multifunctionality approaches as a result of its greater emphasis on increasing the decision-making power of local communities and allowing the communities' unique development needs and agendas to prevail.

Researchers ask questions about the impact of a function on employment, income, social interactions, and migration patterns; how to promote the various functions in a specific region or community; and why farmers or rural communities choose to partake in various functions of multifunctionality (Caron et al., 2008). This approach attempts to illustrate how these various functions can contribute to the local community, region, and society at large, taking into consideration farmers, the farm, and other local stakeholders as the units of analysis. The social interactions between these units of analysis and various functions of multifunctionality are often examined. In addition, there is a greater focus on sense of place as embodying not just the physical landscape that is the basis of the rural land-use approach, but also the social, environmental, political, and economic aspects. Researchers utilizing this approach assume that territorial-based knowledge can formulate policies and programs that take into consideration the possibilities, knowledge, and capacities of specific regions.

Methods

Content analysis was used to examine and synthesize the sample. Content analysis is a tool to examine human communication, including text, images, and symbolic matter. Researchers applying content analysis place the sample into predefined categories determined by the study's hypothesis (Hale 1995; Lindkvist, 1981). Content analysis operates on the assumption that cultural beliefs systems, viewpoints, and patterns of behavior can be expressed in texts, images, and symbolic matter (Bos & Tarnai, 1999). Content analysis uses several processes to infer social reality. This study utilizes the frequency technique also known as the classification technique. The frequency technique counts the number of occurrences of a certain word, item, or theme. In this case, the peer-reviewed journal articles, discussions, conference papers, and book

chapters that used primary data to examine the concept of multifunctionality were coded. The author used the frequency technique to examine the type of primary research method used in the studies on multifunctionality and the type of multifunctionality discussed.

Three main steps were taken to select the articles for this study. First, we chose articles for the study that examined the concept of multifunctionality. We then determined the type of multifunctionality being discussed. The aforementioned descriptions of multifunctionality were used as predetermined codes for the various ways in which researchers discussed multifunctionality. It is important to mention that not all articles used the term "multifunctionality" to describe the topic of examinations. It was, however, evident by the topic under study that the focal topic can be classified as such. For example, farms dedicated to providing health and social services, referred to as "green care," are widely accepted in literature as part of multifunctional agriculture. Haugan et al. (2006) examine green care in Norway and refer to multifunctionality only once in the concluding remarks. The final main criteria for selecting articles was that the study utilized primary data to examine multifunctionality. The type of multifunctionality was then compared to the type of method used. This would aim to answer the hypothesis of this study, whether identified concepts of multifunctionality coincide with a particular type of method.

We gathered the sample using nonrandom purposive sampling, which involves selecting for the sample whatever the researcher judges to have the characteristics necessary for the study. The intent of this sampling is not to generalize from a large sample but to focus on specific characteristics of interest that will best answer the research question. In this case, the methods used in studies focused on multifunctionality are of interest to the researcher. This sampling technique is suitable for studies such as this one, which seeks to explore whether a phenomenon even exists or whether it is worth investigating further.

In total, there are 50 studies in the sample, with 10 studies per category. This was a conscious and deliberate choice, and believed to be sufficient for the purpose of this study. There are other empirical studies on multifunctionality that could be included in an expanded version of this paper. The years of publication for the sample range from 2003 to 2014. The sample covered articles from 24 journals, two books, and eight conferences or seminars. Qualitative and quantitative methods were used, including case studies, interviews, surveys, contingent valuation method, parametric models and scenario development programs. Appendix A summarizes the sample. Appendix B provides complete bibliographic information for all the samples. The studies from the sample were characterized and classified into the appropriate multifunctionality category. The descriptions of the five multifunctionality approaches above were used to classify the units of analysis. The purpose, unit of analysis, and content of each study determined the approach in which the study was placed. After classifying the studies into the appropriate multifunctionality approach, the methods used in the study were examined.

Results

The results indicate a correlation between the approach to multifunctionality and the choice of research methods used. About half the studies (48%) used qualitative methods; 42%t used quantitative methods; and 10% utilized mixed methods. It is important to mention that some qualitative studies quantified some aspects of their study and used quantitative measures, and vice versa. For example, Haugan et al.'s (2006) study on green care in Norway used a variety of statistical information as a means to describe agriculture in Norway and the green care farmer. In this case, the study was classified as qualitative, as statistical information was used to support the case study. For the purposes of this study, quantifying a qualitative study did not place that research study in the category of "combination of both." To be classified as partaking in both qualitative and quantitative methods, the study had to undertake and follow through with at least one qualitative method and at least one quantitative method and each of these methods had to be taken into consideration in the analysis. A study in the sample on integrated and non-integrated farming systems in Thailand by Tipraqsa, Craswell, Noble, and Schmidt-Vogt

Table 1. Type of Method Used by Approach to Multifunctionality

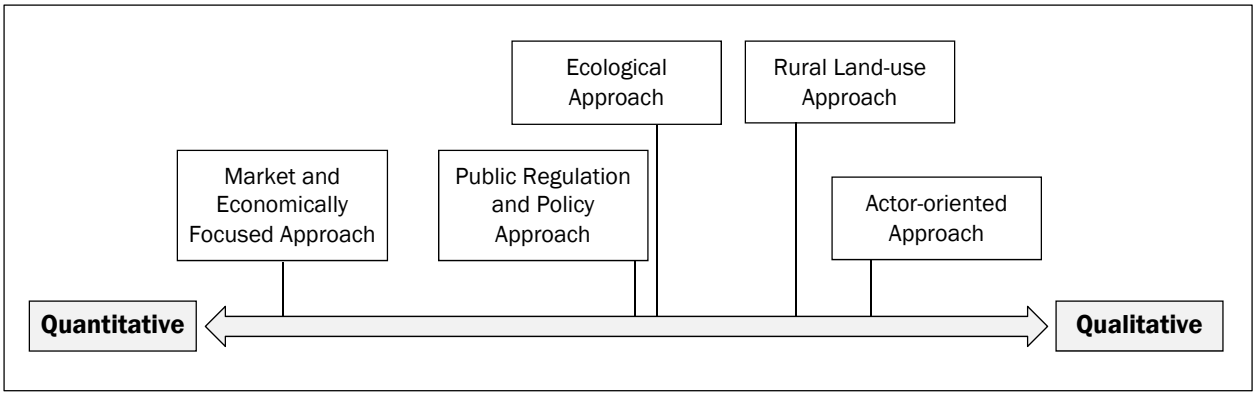
	Approach to Multifunctionality					
Type of Method	Market and Economically Focused Approach	Rural Land-Use Approach	Ecological Approach	Public Regulation and Policy Approach	Actor-Oriented Approach	Total
Qualitative	0	7	4	5	8	24
Quantitative	9	2	4	5	1	21
Combination of both	1	1	2	0	1	5
Total	**10**	**10**	**10**	**10**	**10**	**50**

(2007) is a good example of utilizing both qualitative and quantitative methods. In this study, the authors partook in extensive interviews and observations of the farms (qualitative); the second part of the research involved taking soil samples to obtain information such as stem density and organic matter (quantitative). All the information was integrated to form a comparative study of integrated and non-integrated farms in Thailand.

Table 1 illustrates the type of method (qualitative, quantitative, or both) by the approach to multifunctionality. The market and economically focused approach studies used mostly quantitative methods, with 90% of the methods used in the sample being quantitative. Studies of the rural land-use approach used mostly qualitative methods, with 70% of methods classified as qualitative, 20% as quantitative, and 10% as a combination of both. Forty percent of the studies in the ecological approach used qualitative methods, 40% were classified as quantitative, and 20% used a combination of both. The public regulation and policy approach was an even split between qualitative and quantitative. The actor-oriented approach used qualitative methods in 80% of the sample. Only 10% of the studies used quantitative methods and 10% utilized a combination of both techniques.

Table 1 demonstrates that the market and economically focused approach favors quantitative methods, and the actor-oriented approach favors qualitative methods. The remaining three methods are somewhere in between, with the rural land-use approach slightly more in favor of the qualitative side than the ecological and public regulations and policy approaches, which are more evenly spread across the type of method. Using the data above, we can place the approaches to multifunctionality on a continuum of qualitative methods on one end and quantitative on the other (Figure 1). The continuum does not suggest that the types of methods cannot be used together or that they are mutually exclusive. This review of content analysis illustrates that both types of method embody characteristics of one another and that studies often benefit from using both approaches. The continuum is used as a way of simplifying and

Figure 1. Placement of Approaches to Multifunctionality on the Qualitative-Quantitative Continuum



illustrating the table above.

Table 2 illustrates the mode of the methods used in each approach to multifunctionality. The mode refers to the most frequent value in a distribution. Modes are appropriate measures of central tendency for nominal variables. Nominal measurement organizes that data into categories that are mutually exclusive. In this study, the multifunctionality approaches are designed to be a nominal level of measurement. The mode for market and economically focused approach is the method of contingent valuation model (CVM). The most frequent value for the rural land-use approach is the case study, while the interview was most common for the ecological approach. Under the public regulation and policy approach, the most frequently used method was the comparative case study. Finally, the comparative case study and the case study were used in the same frequency under the actor-oriented approach.

Table 2. Most Frequently Used Method by the Approach to Multifunctionality

Approach to Multifunctionality	Most Frequent Method Used (Mode)
Market and Economically Focused	Contingent Valuation Model (CVM)
Rural Land-use	Case Study
Ecological	Interviews
Public Regulation and Policy	Comparative Case Study
Actor-oriented	Comparative Case Study and Case Study

Discussion

One of the trends found in this study is the low number of studies combining qualitative and quantitative methods. Most studies utilized one or the other. There have been numerous debates about the significance and applicability of qualitative and quantitative methods. Many authors point out that researchers are not limited to one method because both can be utilized in one study without sacrificing the validity or reliability of the other. During data gathering and analysis, the researcher can create a dialogue between both methods to gain a better understanding of concepts and of how to represent them. Babbie and Banaquisto (2002) believe that a complete understanding of a concept requires the application of both techniques.

Although there is no absolute relationship between certain types of questions and explanations and methods and techniques, the results of this study suggest that certain approaches do align with qualitative or quantitative methods. The sample of market and economically oriented studies mostly used quantitative methods. Studies under the market and economically focused approach focus on finding a suitable price for noncommodity outputs. Examples include the amount of compensation farmers should receive for environmentally friendly farming practices and how much the public is willing to pay for a particular noncommodity output, such as wilderness protection. Although these might be very suitable techniques for these questions, it would be worth examining the willingness to pay for services from a qualitative perspective. No study in this sample has addressed this issue on a deeper level with the perspectives of local actors taken into account. The issue of willingness to pay for a service is possible to examine by using in-depth interviews or development of scenarios. This would allow a researcher to examine *why* the public is willing to pay a particular price for that service. Similarly, the actor-oriented approach focused on qualitative techniques. Although some statistical and numerical data was available in the studies, only one study involved conducting a survey. The study on the role of migrant workers in multifunctional agriculture in Greece by Kasimis, Papadopoulos and Pappas (2010) provided a very detailed and clear picture of the trends and roles of migrants in three agricultural regions in Greece. By using a different technique than is commonly applied to the topic, Kasimis et al. (2010) were able to provide an excellent introduction to an issue that has yet to be examined in depth.

Closer examination of the approaches and methods used suggests that certain approaches do correspond to certain methods. The most common method used in the market and economically focused approach is the contingent valuation model (CVM), which is used to estimate a value for environmental issues. This method was not used

under any other approach. In their analysis on the various approaches to multifunctionality, Renting et al. (2008) claim that the market and economically oriented approach focuses too much on public goods and externalities. This limits the ability to understand the wide range of functions agriculture can provide. The notion that CVM was the most frequently used method supports this statement. Attempting to quantify noncommercial goods may be questioned by some scholars and practitioners. There are some functions that are classified as multifunctional that may not be marketable, such as food security and social cohesion.

Although the mode of the remaining approaches was the case study or comparative case study, there is a difference in the techniques they used. For example, the most common technique under the rural land-use approach is the technique of scenario development, where a number of options are posed and one selection is chosen as the one to be implemented. These studies focus on where rural land changes will take place but provide very little information on how large the impacted area will be and the consequences of implementing those changes to that area. This information is relevant for sustainable development; depending on the type and amount of inputs and outputs, changes in land use might have devastating consequences for the environment, limiting the application of this approach to questions of multifunctionality. Also, scenario development often ignores social and ecological aspects of the landscape. Renting et al. (2009) also point out that in studies using scenario models, agriculture is often viewed as one of the land uses and functions, rather than an integrated model of functions at the level of agricultural activity.

The ecological approach was quite evenly split between the use of qualitative and quantitative methods; 20% of the studies utilized both. Although this approach utilized the combination of qualitative and quantitative methods most frequently of all approaches, it does not represent a holistic combination of methods. Similar results can be found in Knickel, Kröger, Bruckmeier, and Engwall's (2009) report on examining evaluation methods of multifunctionality in the EU. Knickel et al. (2009) reported that although a mixture of qualitative and quantitative methods are used, there is very little effort made to integrate the two. Even when both qualitative and quantitative methods are used, they are not used to achieve true triangulation, where a variety of methods and approaches are combined, but are used in separate parts of the research to illustrate separate points. This lack of triangulation can put into question the rigor of the methods and results of the studies in question.

It was within this approach that the only participatory approach was used as a primary research gathering method. To address the environmental challenges associated with the Corn Belt in the U.S., Atwell et al. (2010) invited a variety of agricultural, environmental, and policy leaders to a participatory workshop. The objective of the workshop was to better understand the socio-ecological capacity, resilience, and innovation in the Corn Belt as well as to identify the key obstacles to and opportunities for improving the ecosystem in that region. Participatory research has potential for providing unique perspectives and affecting policy and decision-making. There are also many secondary benefits to participatory research, such as networking and sharing of resources that can help stakeholders.

The public regulation and policy approach used the method of comparative case studies by performing an in-depth examination of various documents. The units of analysis in this approach are mostly complex concepts like multifunctionality, policies, services, and rights. There is an obvious lack of attention given to the local actors and decision-makers. The various policies are examined at an aggregate level. Of all the approaches, the public regulation and policy approach examined the most countries in their comparative studies, comparing on average four countries in a study. When comparative studies were utilized under other approaches, they usually compared two countries, with the exception of Zander et al. (2008), where four countries were compared, classified under the market and economically focused approach. Although these types of studies have contributed greatly to illustrating how different countries use, monitor, and assess the concept of multifunctionality and how multifunctionality fits with wider policy goals of sustain-

ability and rural development, Renting et al. (2009) believe that the organization, implementation, and evaluation of multifunctional policies is still poorly developed.

The actor-oriented approach used both case studies and comparative case studies. Studies under this approach displayed strength in describing and analyzing multifunctional farming systems, including their personal motivations and challenges and their role in a larger framework of sustainability and rural development. They were also successful in illustrating the synergies between various functions (Renting et al., 2008). What appeared to be lacking was the ability to illustrate how multifunctional activities and decision-making at the local level can contribute to the aggregate level of decision-making. Within this framework, interviews with local actors were very common.

Conclusion

The discussion above illustrates that the use of only one type of method poses a variety of limitations. These limitations challenge the development of multifunctionality as a concept and practice. Limiting one's examination of a concept, such as multifunctionality, to the use of one method may also expose the study to a critique of lack of triangulation. As illustrated by Table 2, the most common methods for the entire sample were case studies and comparative case studies. The sample did not include research methods such as process tracing, social mechanisms, and fuzzy set theory. There were only three cases of historical analysis. Only one study utilized participatory methods. The limited use of participatory methods is also represented in Knickel et al.'s (2009) study on evaluation of multifunctional policies and programs. They claim that evaluation of multifunctional policies is directed by experts, while other stakeholders are seen solely as recipients of information. This, Knickel et al. (2009) claim, limits colearning opportunities. The use of diverse methods can provide great value and aid in the development and strengthening of multifunctionality as a concept and a body of research.

This study is meant as an introduction to a topic that has received very little attention. The purpose of this study was to first illustrate the various ways in which multifunctionality is studied. This was done by presenting the five different approaches to multifunctionality. Multifunctionality is present in various disciplines, including social and natural sciences. The multiple uses of multifunctionality have greatly contributed to our understanding of how agriculture can serve several functions in addition to providing food and fiber. By identifying five approaches to multifunctionality, this study supports authors like Knickel et al. (2009), who suggest that we should accept the open and various definitions of multifunctionality. There are numerous social, economical, and ecological benefits. Second, the purpose of this study was to explore and describe the relationship between approaches to multifunctionality and the methods used. The results demonstrate that certain approaches to multifunctionality correspond to certain methods. This may constrain our understanding , as well as constraining the potential of each approach and of multifunctionality as a general concept. Applying different and novel methods and challenging the methods normally used in various disciplines can add to problematizing the concept of multifunctionality.

While recognizing that the size of the sample does not allow for generalization, there is potential to expand this study to make the results statistically significant and to examine other aspects of the relationship between the categories of multifunctionality and the methods used. Further research can also concentrate on comparing the results from the methods used to demonstrate how different methods contribute to the development of a concept and the significance of selecting appropriate methods for specific outcomes. This has helped us better understand the strengths and limitations of multifunctionality as well as the relationship between theory or concept and the method used. The intention here is not to endorse one definition of multifunctionality, but to better understand that multifunctionality can be used in a variety of ways and how those different ways are being studied. The five approaches to multifunctionality allow researchers and decision-makers to better understand how multifunctionality is utilized in various studies. Since multifunctionality of agriculture is not a uniform concept and is examined differently

by various researchers and policy-makers, distinguishing between the five approaches can help identify opportunities and limitations of various studies. This study suggests that further research would benefit from utilizing a combination of new or underused qualitative and quantitative research methods, including participatory methods, to shed a different light on the concept. 

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Appendix A. Summary of Sample by the Approaches to Multifunctionality

#	Author(s)	Origin of Article	Year	Method	Qualitative vs. Quantitative	Region Researched
Market and Economically Focused Approach						
1	Zander et al.	*International Journal of Agricultural Resources, Governance and Ecology*	2008	Comparative archival research	Quantitative	France, Germany, the Netherlands, Portugal
2	Aizaki et al.	*Paddy and Water Environment*	2006	Contingent valuation method (CVM)	Quantitative	Japan
3	Boisvert & Blandford	*Paddy and Water Environment*	2006	Partial equilibrium model	Quantitative	Taiwan
4	Grega	An Enterprise Odyssey: International Conference Proceedings	2004	Case study	Quantitative and quantitative	South and West Moravia
5	Hartell	*Journal of Agricultural and Applied Economics*	2004	Benefit externality valuation /E-V quadratic programming model	Quantitative	NA
6	Lienhoop & MacMillan	*Land Use Policy*	2007	Market Stall approach to contingent valuation method (CVM)	Quantitative	Iceland
7	Ohe	*Journal of Environmental Management*	2011	Fee-determining model	Quantitative	Japan
8	Ollikainen & Lankoski	MTT Discussion Papers 1	2005	Parametric model	Quantitative	Finland
9	Hadiger & Lehmann	Proceedings of the 35th International Conference of Agricultural Economics (IAAE)	2003	Economic static allocation model	Quantitative	NA
10	Hyytia & Kola	99th seminar of the European Association of Agricultural Economics (EAAE)	2005	Survey/ Factor analysis	Quantitative	Finland
Rural Land-use Approach						
11	Turpin et al.	*Land Use Policy*	2009	Scenarios development based on a two scale modelling framework	Qualitative	Eure-et-Loir, France
12	Sutherland at al.	*Landscape and Urban Planning*	2011	Survey and interviews	Qualitative and quantitative	Four geographic regions in Scotland
13	Parra-Lopez et al.	*Land Use Policy*	2009	Case study	Quantitative	The Netherlands
14	Haaland, Fry & Peterson	*Landscape Research*	2011	Case study	Qualitative	Scania, Sweden
15	Holmes	*Geographical Research*	2010	Historical analysis	Qualitative	Tropical savannah

						zone of Northern Australia
16	Aznar et al.	*Multifunctional Land Use* (book)	2007	Case study	Qualitative	France
17	Barbieri & Valdivia	*Journal of Rural Studies*	2010	Multiple linear regressions	Quantitative	Four counties in Missouri, USA
18	Carvalho-Ribeiro, Lovett & O'Riordan	*Land Use Policy*	2010	Case study	Qualitative	Two parishes in northern Portugal
19	Saltzman et al.	*Journal of Rural Studies*	2011	Comparative case study	Qualitative	Sweden and Australia
20	Soliva et al.	*Journal of Rural Studies*	2008	Scenario development and focus groups	Qualitative	Six mountain areas in Europe
Ecological Approach						
21	Atwell et al.	*Land Use Policy*	2010	Participatory workshop and interviews	Qualitative	Iowa, USA
22	Boody et al.	*BioScience*	2005	Scenario development	Qualitative	Two watersheds in Minnesota, USA
23	Hector & Bagchi	*Nature*	2007	Statistical analysis – backward- elimination multiple regression analysis	Quantitative	Eight grassland sites from year 3 of the BIODEPTH project
24	Lovell et al.	*Agricultural Systems*	2010	Case studies including interviews and agroecosystem design assessment tool	Qualitative	Intervale Center and Butterworks Farm in northern Vermont
25	Schindler et al.	*Landscape Ecology*	2014	Interviews	Qualitative and Quantitative	21 experts from 6 European countries. Classification of 38 floodplains.
26	Waldhardt et al.	*Ecology and Society*	2010	Normative multifunctional landscape scenario	Quantitative	Lower Wetter-catchment in Hesse, Germany
27	Crossman & Bryan	*Ecological Economics*	2009	Landscape-scale biophysical and economic data and models.	Quantitative	Lower Murray-Darling Basin in Australia
28	Milne et al.	*The Forestry Chronicle*	2006	Comparative case studies	Qualitative	Three regions in southern Ontario
29	Andersen et al.	*Ecological Indicators*	2013	Surveys and structured interviews	Quantitative	Favrskov and Viborg municipalities in Denmark
30	Lovell et al.	*Agroforestry Systems*	2010	Spatial landscape analysis, interviews and statistical analysis	Qualitative and quantitative	16 farms in Lamoille watershed,

						Vermont, USA
Public Regulation and Policy Approach						
31	Bjorkhaug & Richards	*Journal of Rural Studies*	2008	Comparative case study	Qualitative	Norway and Australia
32	Caron et al.	*International Journal of Agricultural Resources, Governance and Ecology*	2008	Comparative case study.	Qualitative	France, the Netherlands, Poland, Spain, Switzerland
33	Dibden at al.	*Journal of Rural Studies*	2009	Comparative case study	Qualitative	Australia and EU
34	Râmniceanu & Ackrill	*Journal of Rural studies*	2007	Statistical analysis	Quantitative	Eight EU new member states
35	Rossing et al.	*Agriculture, Ecosystems and Environment*	2007	Quantitative system modeling/integrative modelling approaches.	Quantitative	France, Germany, and the Netherlands
36	Sumelius & Bäckman	*International Journal of Agricultural Resources, Governance and Ecology*	2008	Comparative case study	Qualitative	Finland, Germany, Ireland, Latvia, UK
37	Cretegny	International Conference on Policy Modeling	2002	Computable general equilibrium (CGE) model.	Quantitative	Switzerland
38	Donnellan & Hanrahan	ENARPRI Working Paper No. 16	2006	Partial equilibrium commodity model and the satellite GHG and ammonia emissions projection models.	Quantitative	Ireland
39	Lopez-i-Gelats & Tabara	*Journal of Agricultural and Environmental Ethics*	2010	Discourse analysis	Qualitative	Europe
40	Kubíčková	An Enterprise Odyssey: International Conference Proceedings	2004	Case study	Quantitative	White Carpathians, Czech Republic
Actor-oriented Approach						
41	Bowen & De Master	*Journal of Rural Studies*	2011	Comparative case study	Qualitative	France and Poland
42	Morgan et al.	*Journal of Rural Studies*	2010	Comparative case study	Qualitative	Tuscany and Wales
43	Arnalte & Ortiz	Policies, Governance and Innovation for Rural Area International Seminar	2003	Case study	Qualitative	Rural regions in Spain
44	Dufour et al.	*Sociologia Ruralis*	2007	Comparative case study	Qualitative	Three regions in Rhône-Alpes region, France
45	Fleskens et al.	*Journal of Rural Studies*	2009	Case study	Qualitative	Tras-os-Montes region, Portugal
46	Gorman et al.	*Journal of Environmental Policy and Planning*	2001	Case study	Qualitative	Ireland

47	Haugan et al.	*Farming for Health* (book)	2006	Historical analysis	Qualitative	Norway
48	Kasimis et al.	*Sociologia Ruralis*	2010	Case study	Quantitative	Three farming regions in Epirus, Greece
49	O'Connor & Dunne	*Journal of Environmental Policy & Planning*	2009	Historical analysis	Qualitative	Ireland
50	Tipraqsa et al.	*Agricultural Systems*	2007	Comparative case study	Qualitative and quantitative	Northern Thailand

Appendix B. Bibliography for All Sample Papers

Bibliographic Information	Item # in Appendix A
Aizaki, H., Sato, K. & Hiroshi Osari. (2006). Contingent valuation approach in measuring the multifunctionality of agriculture and rural areas in Japan. *Paddy and Water Environment, 4,* 217–222. http://dx.doi.org/10.1007/s10333-006-0052-8	**2**
Andersen, P.S., Vejre, H., Dalgaard, T., & Brandt, J. (2013). An indicator-based method for quantifying farm multifunctionality. *Ecological Indicators, 25,* 166–179. http://dx.doi.org/10.1016/j.ecolind.2012.09.025	**29**
Arnalte, E., & Ortiz, D. (2003). Some trends of Spanish agriculture. Difficulties to implement a Rural Development model based on the multifunctionality of agriculture. Paper presented at the Policies, Governance and Innovation for Rural Area International Seminar.	**43**
Atwell, R. C., Schulte, L. A., & Westphal, L. M. (2010). How to build multifunctional agricultural landscapes in the U.S. Corn Belt: Add perennials and partnerships. *Land Use Policy, 27*(4), 1082–1090. http://dx.doi.org/10.1016/j.landusepol.2010.02.004	**21**
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The future of preserved farmland: Ownership succession in three mid-Atlantic states

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> "Our whole family is involved with our farm, including a son in college who is majoring in agriculture. They [the family heirs] who own it will farm it." (*farm owner and operator in New Jersey)*

> "My biggest worry now is that I don't know what my son will do with the land. He might farm it or might lease it out…" (*Maryland farmer-owner nearing retirement*)

> "My kids are not interested. I'd like to sell the farm to someone local who will appreciate the [renovated farm] buildings for what they are. It will be the highest bidder, unless there is a reason for someone else to have it." (*owner of a preserved Maryland farm*)

Abstract

This paper examines the uses and succession of farmland preserved under state-sponsored pur-

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chase of agricultural conservation easements (PACE) programs in Delaware, Maryland, and New Jersey. Preservation programs in these states have been operating long enough to observe and assess actual transfers of preserved farmland ownership over time. The analysis is based on a survey of 507 owners of preserved agricultural land. Nearly one-third of surveyed preserved-farmland owners had purchased or inherited properties under already existing conservation easements. These individuals ("second-generation" owners) are contrasted from "first-generation" owners, people who sold or donated their land's development rights.

Descriptive and regression analysis is used to compare these two generations of owners on aspects of their preserved land's management that administrators and other stakeholders of farmland preservation programs have regarded as important. Specifically examined is (1) the percentage of the protected land that is actively farmed, rather than being idle or used solely for residential enjoyment; (2) the proportion of owners of preserved land who were "young farmers" when they first acquired preserved farmland; and (3) the percentage of owners who have succession plans to transfer land to a farmer expected to use the preserved land for agricultural production. Results provide optimism that deed-restricted farmland is not being diverted from agricultural use through succession in ownership.

Keywords
preserved farmland, ownership succession, policy evaluation, young farmers

Introduction

The intergenerational transfer of farm assets is an important challenge facing the American farm sector. Farm real estate is the largest asset class, accounting for 84% of all farm assets according to Nickerson, Morehart, Kuethe, Beckman, Ifft, and Williams (2012), and farmer demographics suggest that farmland ownership transitions will accelerate in coming years. The 2012 Census of Agriculture found that roughly 289 million acres (117 million hectares) of agricultural land, 31.6% of all of the nation's land in farms, were owned or rented by operators at least 65 years old (USDA-NASS, 2014). As the current generation of farmers advances toward its retirement years, to whom will their land be transferred? Will it be farmed? Regarding the 2.4 million acres (1.0 million ha) of American farmland that have been protected from development through land conservation easements acquired by state-sponsored farmland preservation programs, these questions have special relevance to the taxpayers who paid for the easements or the owners who donated them. Will land conserved so that it could raise food and other agricultural products cease to be farmed because the new owners prefer to use only its scenic or recreational amenities (Bastian, McLeod, Germino, Reiners, & Blasko, 2002), or because they lack the economic incentives to farm it or rent it out?

For many farm families both questions are met with uncertainty and angst, as reflected in two of the quotations at the opening of this article. Unlike the New Jersey owner who has his family succession plans in place, an elderly farmer of preserved land in Maryland expresses as his "biggest worry" the uncertainty over his son's intentions for the land currently being farmed. Another owner of preserved Maryland farmland laments the lack of a family heir who will continue his farming legacy and capitalize on the investments made to improve the operation. In addition to the cessation of a family legacy on the lands, there is concern that accumulated knowledge of the land and its agricultural capabilities will not be fully understood or appreciated by subsequent owners.

The lack of interest shown by these owners' children is understandable. Farming is a challenging occupation, fraught with economic perils stemming from market dynamics increasingly shaped at a global level, rising production costs, and the inescapable vicissitudes of nature (Dimitri, Effland, & Conklin, 2005). Urban expansion and exurban development patterns bring prospects of significant economic gain to farmland owners considering the sale of their land holdings. Younger individuals in farm households may look over the proverbial fence and wonder whether nonfarm jobs hold promises of a better future.

At the same time, the value Americans place on farming and farmland resources is evident.

Extensive academic research has documented the importance the public places on—and their willingness to fund—the retention of farmland and associated amenities (for a review see Bergstrom & Ready, 2009). Consequently, the U.S. has a large and growing acreage of farm and ranch land that is protected from nonagricultural development by conservation easements sold or donated by landowners to either a conservation organization (e.g., land trust) or government entity.[1] The latter is the focus of this paper. Twenty-eight states have authorized purchase of agricultural conservation easements (PACE) programs to protect farmland resources from nonagricultural development.[2] Enrollment in these state-sponsored programs has risen sharply since early 2000, when the total farmland acreage preserved under state PACE programs was roughly 620,000 acres (251,000 ha) (Bowers, 2000). By early 2005, the total was 1.1 million acres (0.45 million ha) (Bowers, 2005) and by January 2013 it had grown to 2.37 million acres (0.96 million ha), preserved at a public expense of at least US$5.97 billion (American Farmland Trust [AFT], 2013). The most aggressive farmland preservation activity is concentrated in states in the mid-Atlantic and northeast regions.

This paper explores issues of farm succession in three leading agricultural preservation states through a survey of 507 owners of farmland protected by conservation easements held by a state program. Enrollment statistics show that, as of 2012, the states with the highest percentages of total farmland under conservation easements were New Jersey (28%), Delaware (21%), and Maryland (18%) (AFT, 2014; Delaware Agricultural Land Preservation Foundation, 2013; State Agricultural Development Committee, 2013). Collectively, these states have preserved over 672,000 acres (272,000 ha) within a region largely characterized as "urban influenced" (USDA, 2013).

Maryland's primary farmland preservation program acquired its first conservation easement in 1980, while its counterparts in New Jersey and Delaware started preserving land in 1985 and 1996, respectively. The maturity of these programs allows observation and assessment of the transfers in ownership of preserved farmland over time. When our interviews were conducted (July 2011 to January 2012), preservation programs in these states had been operating long enough that nearly one-third (31.4%) of the surveyed owners of preserved farmland had purchased or inherited properties already under conservation easements. In this study, we call them "second-generation owners." These individuals are contrasted with "first-generation" owners, people who sold or donated their land's development rights.

The significant numbers of respondents who are exclusively first-generation or second-generation owners in our sample (346 and 113, respectively)[3] allow us to compare the two generations of owners and test causal hypotheses about how they have managed their protected land. Guiding our choices of hypotheses were statements by leaders and other stakeholders of the preservation programs concerning three desired aspects of the long-term management of protected land: (1) that it continue to be actively farmed, (2) that "young farmers" be able to own preserved farmland, and (3) that current owners plan for the transfer of ownership to another farmer after they retire or die. For these three desired outcomes we use regression analysis to test for differences attributable to owner's generation, occupation, and other surveyed traits.

[1] These lands have been preserved in perpetuity (or, in some cases, a specified term) to ensure their continued availability for farming. The basic mechanism is the severance of development rights through the establishment of a conservation easement, a legally binding agreement between a landowner and a land conservation organization that prohibits nonagricultural development on the property. In exchange, the landowner receives compensation in the form of an easement payment or tax benefit if there has been a donation of land value.

[2] Some farmland preservation programs use the term "purchase of development rights" (PDR) to describe their activities. In this paper, we use the term PACE or, more generally, conservation easements.

[3] The exclusively first-generation owners sold or donated easements, but did not also purchase or inherit land already under easements (hereafter referred to as "first-generation owners" for simplicity). Exclusively second-generation owners bought or inherited eased land, but did not in addition sell or donate easements. The terms "second-generation owner" and "later-generation owner" are used interchangeably to refer to these individuals.

A Brief Background on Farmland Preservation

Farming at the fringe of urban areas is often viewed through a fatalistic lens, framed by expectations of declining agricultural support infrastructure, more numerous conflicts with nonfarmer neighbors, and heightened competition for increasingly scarce, fragmented, and expensive farmland (Berry, 1978; Daniels & Bowers, 1997; Lopez, Adelaja & Andrews, 1988). This cycle of agricultural decline culminates with the conversion of farmland to nonagricultural "highest-and-best" developed uses. The USDA National Resources Inventory found that between 1982 and 2007, 14 million acres (5.7 million ha) of farmland and ranchland were lost to development across the United States (USDA NRCS, 2009). Roughly 38% of the area converted between 1982 and 2007 was classified as prime farmland (AFT, 2014).

State and local governments have responded to farmland loss by developing a number of retention mechanisms, including differential tax assessment policies, right-to-farm laws, and agricultural zoning, that, while effective in supporting agricultural operations, do not afford permanent land protections (Daniels & Bowers, 1997). In contrast, agricultural conservation easement programs retire development rights and usually aim to ensure that enrolled properties will be available for farming in perpetuity. While costly to implement, these programs are also popular because landowner participation is voluntary and compensated (through an easement payment or tax deduction), thus avoiding potential "takings" concerns that may accompany regulatory-based land use controls (Liu & Lynch, 2011a).

Farmland preservation programs have attracted considerable academic attention over the past few decades. The economic rationale and the measurement of public preferences for farmland preservation have been particularly well studied (Bergstrom & Ready, 2009; Bromley & Hodge, 1990; Duke & Ilvento, 2004; Gardner 1977; Hellerstein et al., 2005; Kline & Wichelns, 1996; Nickerson & Hellerstein, 2003). Liu and Lynch (2011b) evaluated whether farmland preservation programs affect the rate of farmland conversion to nonagricultural uses. Several studies have examined the effects of easement restrictions on preserved farmland value, yielding mixed findings as to whether conservation easements reduce farmland values (Anderson & Weinhold, 2008; Lynch, Gray, & Geoghegan, 2007; Nickerson & Lynch, 2001). In similar research, Schilling, Sullivan, and Duke (2013) have examined the impact of residual development opportunities written into New Jersey's deeds of easement on the market value of preserved farmland. Schilling, Attavanich, Sullivan, and Marxen (2014) estimate the extent and distribution of farm profitability impacts of PDR participation.

Postpreservation behaviors of farmland owners who have sold or donated development rights, or acquired deed-restricted farmland through purchase or inheritance, have been less comprehensively examined. A few studies examine how owners of preserved farmland have used the money received from their sales of easements (Duke & Invento, 2004; Lynch 2007; Lynch & Duke, 2007). Two extensive studies of owners of land which was preserved, at least in part, under the federal Farm and Ranch Lands Protection Program were published in 2006 and 2013 (Esseks, Nelson & Stroe, 2006; Esseks & Schilling, 2013). Both examined the attributes of landowners and the uses of protected lands.

Research Methods

The study team developed a computer-assisted telephone interview (CATI) survey instrument, using suggestions from senior staff of the five state-level preservation programs in Delaware, Maryland, and New Jersey, administrators of several prominent county-level programs in the region, and individual owners across the three states who agreed to open-ended interviews. The survey was pretested with owners of preserved farmland in the study area and approved by the institutional review boards at Rutgers University and the University of Nebraska–Lincoln.

The sampling pools for this study consisted of owners of farmland preserved under the Delaware Agricultural Land Preservation Foundation (DALPF), Maryland Agricultural Land Preservation Foundation (MALPF), Maryland Environmental Trust (MET), Maryland Rural Legacy

Program (MRLP), and New Jersey Farmland Preservation Program (NJFPP). We chose these five programs because they operate at the state level, rather than being limited to one county or region of their state, and because they are either the sole statewide program (as in Delaware and New Jersey), or they have made significant contributions to their states' total farmland under conservation easements. It is important to note that MET and MRLP have goals that extend beyond preserving land for agricultural use; i.e., in MET's case, protecting lands with historical, environmental, or scenic importance, and for MRLP, preserving forestland. MET also differs from the other programs because it relies primarily on donations of easements, while the others purchase conservation easements from willing landowners. Stakeholder interviews conducted prior to the initiation of this study and reviews of Maryland's county land preservation programs, however, indicated that the MET and MRLP programs are important parts of the state's approach to farmland preservation.

To develop the sampling frames from which to draw random samples from the Delaware, New Jersey, and MALPF programs, the authors compiled lists of all easements that the programs held as of early 2011. For the two other Maryland programs, MET and MRLP, which protect types of natural resources (e.g., forestland and shorelines) in addition to farmland, we enlisted the help of program staff to identify the protected properties that had at least 10 acres (4 ha) of agricultural land as of the time of the easement's closing. Since our unit of analysis was the owner of preserved land in a program, members of the research team removed duplicate cases from within and across programs. A simple random sample was then drawn for every program, with the size of each sample being proportional to its program's share of the 5,319 total owners across the five sampling frames.

The University of Nebraska–Lincoln's Bureau of Sociological Research conducted the survey's telephone interviews from mid-July 2011 to January 15, 2012. A total of 507 interviews were completed. All 507 interviewed owners answered "yes" to an introductory eligibility question about whether at the end of 2010 they owned "any farmland in [the particular state] for which all or some of its development rights had been sold or donated to a farmland preservation program." The interviews lasted an average of 31.7 minutes.

As shown in Table 1, each program's share of the 507 completed interviews was close—within 0.2 to 2.6 percentage points—to its proportion of the sampling frame. Samplewide statistical analysis used weightings that adjusted for those differences. Applying guidelines developed by the American Association for Public Opinion Research, we calculated the response rate to be 53.8% (AAPOR, 2012). This rate is high compared to many other surveys conducted in the same period (Pew Research Center for the People & the Press, 2012). While point estimates of individual variables may suffer from nonresponse bias if individuals who respond to a survey systematically differ from those who do not, Dey (1997) finds that relationships between variables tend not to be biased. Therefore, in the "Results" section, we emphasize regression findings about relationships such as between an owner's generation and how he or she managed the protected land.

Table 1. Composition of Sampling Frame and Study Sample

	Sampling Frame		Sample	
Easement Program	No. of Landowners	% of Total	No. of Landowners	% of Total
Delaware Agricultural Land Preservation Foundation	627	11.8	59	11.6
Maryland Agricultural Land Preservation Foundation	1,754	33.0	155	30.6
Maryland Environmental Trust	630	11.8	73	14.4
Maryland Rural Legacy Program	374	7.0	29	5.7
New Jersey Farmland Preservation Program	1,934	36.4	191	37.7
Totals	**5,319**	**100.0**	**507**	**100.0**

Overview of Programs in the Study

MALPF, the oldest of the five programs examined, had by June 30, 2013, acquired a cumulative total of 2,102 easements amounting to 285,902 acres (446.7 square miles or 115,700 ha) protected (MALPF, n.d.). MET does not purchase easements, but accepts ones that are donated and holds them in exchange for agreeing to monitor regularly how the land is used in order to ensure compliance with the easements' terms (Maryland Department of Natural Resources [MDNR], n.d.).[4] Although MET focuses on several types of environmentally important land in addition to farmland, protecting the latter has been one of its goals (Maryland Environmental Trust, 2013), and county agricultural land preservation programs in Maryland have regarded it as a significant partner.[5] According to data provided by MET staff, the trust held in early 2011 a total of 630 properties under easements with at least 10 acres (4 ha) of agricultural land as of the time they were enrolled. In our final sample of 73 interviewed MET owners, their average number of easement acres in a farming operation in 2010 was 97.7 (39.5 ha) and the median was 35 acres (14 ha).

The third Maryland program under study, the MRLP, was authorized in 1997 and provides "grants to local governments and land trusts for preservation of forest and farmland across Maryland" (MDNR, 2009, para. 1). Through early 2013, MRLP had agricultural conservation easements on 532 properties totaling 76,146 acres (30,815 ha) of land (AFT, 2013). As with the MET data, we limited our sample to properties with at least 10 acres (4 ha) of agricultural land at the time the conservation easements were conveyed. In our sample of 29 interviewed MRLP owners, their eased acres in a farm operation during 2010 averaged 175.3 acres (70.9 ha) and the median was 80 acres (32 ha).

The New Jersey agricultural conservation easement program was created in 1983 and contracted its first easement in 1985. By July 23, 2013, its easements were protecting a total of 2,183 agricultural properties, covering 204,452 acres (319.5 square miles or 82,739 ha) (SADC, 2013b). Delaware's program was authorized by state legislation in 1991. As of August 13, 2013, it was protecting 711 agricultural properties with a total of 106,473 acres (166.4 square miles or 43,088 ha) (DALPF, 2013).

Results

Results are presented in three sections. First examined is the use of farmland under conservation easements for agricultural production. This is followed by an analysis of access to preserved farmland by young farmers. We conclude with a summary of owners' reported plans for the future ownership and use of their deed-restricted properties.

Is Preserved Farmland Being Used in Active Agriculture?

During the formative stages of this survey project, program administrators and advocates for farmland preservation expressed interest in understanding the uses of farmland under their program easements. The easements do not require that the protected properties be farmed, only that they remain farmable; that is, not converted to buildings, parking lots, other impervious surfaces, or to dumping grounds for materials like trash or gravel.[6] However, some program goal statements explicitly call for active farming of the land. One of the NJFPP's main publicized goals is that protected land

[4] Nearly 29% of MET cases in our sample reported having sold easements. In the 1990s and 2000s, some of the easements currently held by MET were purchased by the Maryland Department of Natural Resources and Maryland Department of Transportation under special programs such as to protect Rural Legacy Areas and Civil War sites (Maryland Environmental Trust, 2013).

[5] See, for examples, the websites of the Baltimore, Calvert, Carroll, Harford, Montgomery, and Washington County governments in Maryland.

[6] A sample deed of easement for the New Jersey Farmland Preservation Program is available online at http://www.nj.gov/agriculture/sadc/farmpreserve/resources/DOEtownship-ownedtosadcwithexception.pdf (retrieved August 21, 2013). See also sample deeds of easement provided by the Maryland Agricultural Land Preservation Foundation: http://www.malpf.info/laws.html (retrieved August 21, 2013), and one for the Delaware Agricultural Land Preservation Foundation: http://www.farmlandinfo.org/documents/30749/DE_sample_easement_app.pdf (retrieved August 21, 2013).

Table 2. Percentage of Preserved Farmland Reported in Agricultural Use, by Generation of Ownership

	Exclusively First-Generation Owners		Exclusively Later-Generation Owners	
Easement Program	N	Mean % of Land in Agricultural Use	N	Mean % of Land in Agricultural Use
New Jersey Farmland Preservation Program	123	82.0%	52	80.5%
Maryland Agricultural Land Protection Foundation	106	76.8	33	64.9
Maryland Environmental Trust	43	49.2	21	46.4
Delaware Agricultural Land Protection Foundation	50	70.1	5	80.4
(All respondents across five programs—*weighted*)	(347)	(74.2%)	(109)	(69.1%)

Notes: Maryland Rural Legacy Program is included in the weighted totals, but is not shown due to low cell frequencies. Percentages reflect the average proportion of owned preserved land that is reported as being used for farming. None of the differences in percentages between the exclusively first-generation and later-generation owners was statistically significant at the .05 level or better in a t-test comparing two independent samples' proportions and assuming equal variances.

"provides us with an abundance of *locally grown farm products* [emphasis added]" (SADC, 2013a, para. 14). Among the goals of Maryland's largest state-operated program (MALPF) is to "preserve productive farmland and woodland for the *continued production of food and fiber* [emphasis added] for all of Maryland's citizens" (Maryland Department of Agriculture, n.d., bullet 1). The legislation establishing Delaware's state-level program (DALPF) included the statement, "Preservation of the State's farmlands and forestlands is considered essential to maintaining agriculture as a *viable industry* [emphasis added] and important contributor to Delaware's economy" (Delaware Agricultural Lands Preservation Act of 1981, para. 1).

Of course, some preserved acres may be too steep, wet, or otherwise unsuitable for farming. Another reason for not farming eased land is when owners prefer to use some or all of it for recreational purposes and/or for an "estate" lifestyle (SADC, n.d.). While program managers might be able to exclude minimally farmed lands from their purchases of easements, they tend not to have formal roles in deciding who receives ownership of land already preserved, such as through a sale, gift, or inheritance.[7]

Our survey data included owners' reports of the total acres of preserved land that in 2010 were in farm operations (the owner's farm, his or her tenant's, or a combination of the two). Dividing those acres into the reported total number of protected acres produces a measure of active agricultural use that we can compare across (exclusively) first- and later-generation owners. Only 23 respondents, 4.5% of the entire sample, report not using any of their preserved farmland for "raising crops, livestock, nursery products, forest products, or other agricultural goods" in 2010.[8]

The New Jersey sample has the highest average percentages of preserved land in farming for both generations: 82.0% (first) and 80.5% (second or later) (Table 2). In the Delaware sample, exclusively first-generation owners report a lower percentage (70.1%) of preserved land in agricultural use than their later-generation counterparts (80.4%), although there were few second-generation owners. The lowest pair of percentages is found in the sample for MET: 49.2% (first-generation) and 46.4% (second-generation). This finding is not surprising since, as noted previously, land is preserved under MET to advance a range of conservation objectives,

[7] Exceptions include where the easements give the program (1) the first right of refusal (Vermont Land Trust, n.d.), and/or (2) the option to purchase the land at agricultural value rather than to permit a sale to someone lacking experience in agriculture or a "farm plan for immediate and future agricultural use of the APR Parcel" (Massachusetts Agricultural Preservation Restriction Program, 2009, § 22.10(1)).

[8] Respondents were asked, "In 2010 was any of your *preserved land* in [state] used for raising crops, livestock, nursery products, forest products, or other agricultural goods?" To prevent potential bias against a "no" response, the question's preface noted that "written agreements for selling or donating development rights are often called *conservation easements*. Those easements usually do not require that the land be farmed, only that it remains *available* for farming."

Table 3. Percentages of Owners Reporting at Least 75% and 100% of Their Preserved Land in Farming Operations, by Generation of Ownership

	At Least 75% of Land is Farmed		100% of Land is Farmed	
Easement Program	Exclusively First Generation	Exclusively Later Generation	Exclusively First Generation	Exclusively Later Generation
New Jersey Farmland Preservation Program	73.2% (*n*=123)	69.2% (*n*=52)	58.5% (*n*=123)	57.7% (*n*=52)
Maryland Agricultural Land Protection Foundation	65.1[a] (*n*=106)	45.5[a] (*n*=33)	49.1 (*n*=106)	33.3 (*n*=33)
Maryland Environmental Trust	37.2 (*n*=43)	33.3 (n=21)	25.6 (*n*=43)	23.8 (*n*=21)
Delaware Agricultural Land Protection Foundation	56.0 (n=50)	60.0 (*n*=5)	50.0 (n=50)	40.0 (*n*=5)
All five programs *(weighted)*	62.9% (*n*=348)	54.5% (*n*=110)	49.9% (*n*=347)	43.1% (*n*=109)

Notes: Maryland Rural Legacy Program is included in the weighted totals, but is not shown due to low cell frequencies.
[a] Difference is statistically significant at the .044 level in a two-sided Pearson Chi-Square test.

only one of which is the retention of land for active agricultural use. In addition, the lower commitment of preserved land to farm use among MET landowners may reflect a selection effect; owners who have greater interest in using their land for agricultural production may favor the MALPF program since its primary focus is on agricultural land retention.[9] Furthermore, MALPF program staff may encourage owners of lands in active agricultural use to convey conservation easements. It is also conceivable that a selection effect may be present, because some owners of Maryland farmland may favor the MALPF or Rural Legacy programs over MET because they provide a capital infusion (an easement payment) that may be used to invest in the farm operation or to satisfy other immediate financial needs. Cases for the Maryland Rural Legacy program are not presented in Table 2 because there is only a single later-generation owner in the sample. The weighted percentages for all 507 respondents are 74.2% (first-generation) and 69.1% (later-generation) of preserved land in farming. While the differences (per program and for all respondents) in the percentages reported by first-generation and later-generation owners range from 10.3 to 11.9 percentage points, none is statistically significant at the .05 level or better. Therefore, Table 2 does not provide definitive evidence that the transfer of ownership to a second or later generation of owners led to less farming of preserved land.

Given the likelihood that some surveyed owners (particularly non-operator owners) did not remember or ever know the exact disposition of preserved acres in the production year (2010) previous to their interviews, we tested the generational-differences hypothesis by using two less-precise measures: the percentages of surveyed owners reporting (1) at least three- quarters of their preserved acres being in either their own farming operations and/or those of their tenants, and (2) 100% of their land devoted to farming. Again, the differences are not statistically significant (Table 3), except in the first of the two comparisons for MALPF owners. A substantially higher proportion of first-generation owners report having at least 75% of their preserved land in agriculture, as compared to later-generation owners (65.1% versus 45.5%). With that 19.6-point exception and a statistically insignificant 15.8-point difference in MALPF's second entry for that table, the percentage differences are relatively small, varying from 3.9 to

[9] The authors thank an anonymous reviewer for this observation.

8.4 points.[10] The proportions of land committed to agricultural use by MET owners are again substantially lower than those reported by owners with easements held by the other land preservation programs, paralleling findings reported in Table 2.

Two types of multivariate analysis were used to test if owner generation has significant effects that are not observable in these cross-tabulations involving just two variables. With both ordinary least squares (OLS) and binary logistic (BL) regressions, we hypothesized that, compared to later-generation owners, first-generation owners were likely to report higher percentages of their preserved land being in farming operations in 2010, controlling for other plausible causal conditions.[11]

In neither the OLS nor the BL regressions was the generation variable (defined as 0 for first generation and 1 for later generation) a statistically significant predictor. Therefore, we tested other variables related to being a first- or later-generation owner. One that proved statistically significant in both types of regressions is whether the owner had only sold an easement; that is, the owner did not also donate an easement or purchase or inherit preserved land (full model results are provided in Appendix Table A1). Nearly all (93.4%) of the 346 exclusively first-generation owners fit that description. According to the BL regression, being that kind of easement seller increases the odds of having at least three-quarters of one's preserved land in a farm operation by a factor of 2.123 (or by 123%), with other predictor variables held constant.[12] The OLS regression has similar findings. Compared to other surveyed owners, those that only sold agricultural conservation easements tend to have higher percentages of their preserved acres in farming operations, by an estimated average of 6.2 percentage points (Table A1).

One plausible explanation for this observation is that the application process for selling easements likely yielded information on the land's current agricultural uses, such as acres of crops planted, pasture area, and land devoted to orchards (see, for example, MALPF, 2012). When the farmland preservation programs we studied were buying easements, perhaps they gave at least some preference to sellers who offered land that was then being entirely or almost completely farmed.

Another statistically significant and substantively important predictor of the percentage of conserved land being farmed is when the respondent operates (i.e., makes day-to-day management decisions) at least some of that land.[13] In both the OLS and BL regressions, the coefficients for the operator variable are larger than those for all other binary variables in the model (Table A1). Individuals for whom farming is a primary occupation (i.e., at least 50% of the respondent's work time is allocated to farming) also commit a larger percentage of their preserved landholdings to farm production. Intuitively, many farm operators would seem to have a business interest in maximizing the agricultural use of their preserved land, and that incentive tends to be stronger among respondents whose primary occupation is farming. Among the 289 surveyed owners who operate at least some of their preserved land, 67.4% report three-quarters or more of their eased acres to be in a farming operation. Among the 156 whose primary occupation is farming, the same measure increases to 78.6%.

Other significant predictors of the amount of preserved land devoted to farming include enroll-

[10] Both here and in the remainder of the paper, we report a percentage-point difference or a regression coefficient to be statistically significant when there was no more than a five in 100 chance that the difference or coefficient value was due to chance factors alone ($p<.05$).

[11] For the OLS analysis, the outcome variable was interval-level, from 0.0 to 100%, while for the binary logistic regressions the outcome variable was "1" = 75% or more of the preserved land in the owner's and/or a tenant's operations, and "0" = less than 75%.

[12] The value, 2.123 is this first predictor's "odds ratio." It represents the change (by multiplication) in the estimated odds of an owner reporting three-quarters or more of his or her preserved acres being in a farming operation that is attributable to a one-unit increase in the predictor (from 0=did not sell an easement to 1=did sell), with all other predictors held constant; see Menard (2002). The odds of such an outcome would be the probability of that outcome divided by 1 minus that probability.

[13] The percentages of owners that are also operators are as follows: NJFPP: 61.8%; MALPF: 61.3%; MET: 32.9%; MRLP: 69%; DALPF: 49.2%. The relatively low percentage of MET owners who report themselves as farm operators may be evidence of the selection effect discussed earlier.

ment in the New Jersey program or MET. The former program is associated with higher percentages of total enrolled land being in farming operations, while the OLS regression estimated that lower percentages of properties preserved under MET would be in farming. The latter difference may be due to MET's preservation program extending to several types of environmentally important land in addition to farmland, and to the previously discussed selection issues arising from landowners having a choice among three Maryland state-sponsored preservation programs. For example, during 2013 MET received a total of 25 easements that "protected 2.8 miles (4.5 km) of Scenic Byway; 921 acres (373 ha) of forest; 892 acres (361 ha) of prime farmland soils; 10.4 miles (16.7 km) of streams and shoreline; and 1,314 acres (532 ha) of Targeted Ecological Area" (MDNR, 2014, para. 1). While all 73 of the MET respondents in our sample own "farmland…whose development rights had been sold or donated to a farmland preservation program," these protected farm parcels may include other natural, historic, or scenic resources. Therefore, an owner may have multiple conservation objectives for a single property. Conserving land for ongoing agricultural production may not be the owner's sole or even primary purpose.[14]

The last two significant predictors are found only in the binary logistic regression. Not surprisingly, having revenue from raising both crops and livestock on eased land increases the odds of at least three-quarters of it being in farm operations. Conversely, receiving income from logging decreases those odds. Although we specifically listed timber production as an appropriate activity on preserved land, respondents may not have included acreage used for that purpose as belonging to their own farms and/or their tenants' farm operations. They may have seen the logging as a completely separate enterprise, especially if they contracted with individuals or companies to do the work.

Access to Preserved Farmland by Young Farmers

In all three states, either the governments or important interest groups have promoted loan programs to help young farmers purchase land for their operations. In February 2013, New Jersey's State Agricultural Convention resolved that the pending federal farm bill "give priority for grants and loans to young farmers determined to sustain agriculture into the next generation" (State of New Jersey, Department of Agriculture, 2013, bullet 11). Earlier the State Agricultural Development Committee circulated a paper on farmland affordability and availability, which observed that "24 percent of New Jersey farmers are at or past retirement age and only 3 percent are under age 35" (SADC, n.d., p. 2). In 2006 the Maryland General Assembly authorized (but did not fund) the Next Generation Farmland Acquisition Program to "help aspiring young or beginning farmers to purchase quality rural working land *and* permanently preserve this land at the same time" (MARBIDCO, 2014, p. 1). Delaware established a similarly purposed program that provided its first loans in 2012. The Farmland Purchase and Preservation Loan Program is targeted to applicants 18 to 40 who apply to DALPF for 30-year, no-interest loans to purchase land that will be preserved; they "must actively use the land for agricultural purposes for the term of the loans" (State of Delaware, 2012, para. 20).

The nationwide Farm Credit System has a loan program to help "young, beginning, and small farmers and ranchers" and defines its clients as being no more than 35 years of age (Farm Credit Council, 2014). Table 4 uses both the Farm Credit standard and the Delaware program's age range of 18 to 40.[15] Although the 35-and-under measure did

[14] Conceivably, some MET owners may have mistakenly inflated the denominator of the ratio from which the percentage was derived by including preserved acres associated with nonagricultural purposes of their easements. However, the questions' wording was designed to avoid that problem. The denominator for the percentage of farmed preserved land was the sum of acres of "agricultural land" that the respondents owned and that became preserved through easements that they had sold or donated, or were already on the land when the respondents bought or inherited it. The numerator for the percentage was derived from three questions about "preserved" acres being farmed by the owner, by a farmer who rented the land, or by a farmer who was paid to do the production work on the preserved land.

[15] Unless otherwise noted, for purposes of analysis and exposition "young farmer" is defined in this paper according to the owner's age when she or he first preserved farmland or

Table 4. Young Farmer Ownership of Preserved Land, by Generation of Ownership

	% of Owner-operators ≤35 Years Old		% of Owner-operators ≤40 Years Old	
Easement Program	First Generation	Later Generation	First Generation	Later Generation
New Jersey Farmland Preservation Program	5.0 (*n*=121)	3.8 (*n*=52)	9.1 (*n*=121)	13.5 (*n*=52)
Maryland Agricultural Land Protection Foundation	6.6 (*n*=106)	14.7 (*n*=34)	10.4[a] (*n*=106)	23.5[a] (*n*=34)
Maryland Environmental Trust	2.3 (*n*=43)	0.0 (*n*=21)	2.3 (*n*=43)	4.8 (*n*=21)
Delaware Agricultural Land Protection Foundation	6.0 (*n*=50)	0.0 (*n*=5)	6.0 (*n*=50)	20.0 (*n*=5)
All five programs (weighted data)	5.4 (*n*=350)	6.3 (*n*=112)	8.0[b] (*n*=350)	15.2[b] (*n*=112)

Notes: "Young farmer" status was determined based on the year in which the surveyed owner first owned preserved land, whether through selling or donating easements or by purchasing or inheriting land already preserved. Maryland Rural Legacy Program is included in weighted totals, but is not shown due to low cell frequencies.
[a] A statistically significant difference at the .051 level in a two-sided Pearson Chi-square test.
[b] A statistically significant difference at the .026 level in a two-sided Pearson Chi-Square test.

not yield any statistically significant differences between the first- and later-generations across the five programs, the no-more-than-40 standard did. In the full sample, 8.0% of the first generation and 15.2% of the later generation were 40 years old or younger when they first owned and operated preserved farmland. This 7.2-point difference is statistically significant.

Among the later-generation young farmers in our sample, most (14 out of 17, or 82.4%) obtained their protected land by purchasing it. In the full group of 59 young (40 or younger) farmers, that percentage was 40.7. Regression analysis confirms the importance of the purchase path for younger farmers.[16] It is statistically and substantively the most important predictor of owning eased land before one is older than 40. None of the other three paths to owning preserved farmland (selling or donating easements, or inheriting preserved land) achieves statistical significance in the analysis.

An anticipated benefit of agricultural conservation easements is that the price of farmland is lower with the development rights removed or reduced. There is a lively academic debate, however, about whether easements actually do lower land prices. Survey-based evidence suggests that it does, while studies of land markets have had more difficulty finding the lower-price effect. A 1996–1997 survey by Paul Feinberg (1997) reached 61 second-generation owners who had purchased protected farmland; 73% of these respondents felt that easements made their properties more affordable to purchase. A 1999 survey of 130 farmer participants in Vermont's farmland preservation program found that it helped younger farmers enter the industry by making land more affordable (Ferguson & Cosgrove, 2000). In our 2011–2012 mid-Atlantic sample, among 106 buyers of protected land, 41.2% consider the sale price "much lower" than the price of similar farmland with development rights intact (Table 5). Another 23.5% regard it as "somewhat lower," the same percentage consider it "about the same," and just 3.9% report that it is either "somewhat higher" or "much higher." Among the 25 respondents who were 40 years old or younger when they purchased protected land, the distribution of answers is quite

acquired preserved farmland. For example, an owner may have been 50 years old at the time of the survey but 32 years old when she or he purchased a preserved farm. For our current purpose, she or he is classified as a young farmer.
[16] Binary logistic regression analysis was used but is not presented herein. For the regression table, please contact the lead author.

similar. A total of 64% find the sale price "much" or "somewhat lower."

Missing from our survey, as well as from the other two studies we cite, are the unobserved opinions of farmers who considered buying protected land but decided against it at least in part because of what they regarded as excessively high prices. Rather than relying on the opinions of actual or potential buyers, the authors of two other studies obtained their samples from the public records on actual sales (both of preserved and nonpreserved land) in selected Maryland counties and used multivariate analysis to determine if preservation status reduced sales prices, accounting for other factors influencing land values (Lynch, Gray, & Geoghegan, 2007; Nickerson & Lynch, 2001). The studies covered two different time periods: 1994 to 1997 and 1997 to 2004, both of which were prior to the downturn in housing prices that began in 2005–2006. Neither study found statistically significant reductions. In later research, Lynch, Gray, and Geoghegan (2010) found that preserved farmland is, on average, less costly than farmland without development restrictions, and were able to attribute some of this price effect to preservation status. Among the owners in our survey who believe that prices of preserved farmland are lower, such perceptions, empirically accurate or not, may have encouraged them to buy protected land.

Table 5. Opinions about the Affordability of Farmland Under Conservation Easements

"Compared to the price of similar farmland with its development rights intact," the price the surveyed owner paid was considered to be [a]:	% Among All Purchasers [b]	% Among Those ≤40 Years of Age at Time of Purchase [b]
Much lower	41.2	44.0
Somewhat lower	23.5	20.0
About the same	23.5	20.0
Somewhat higher	1.0	4.0
Much higher	2.9	4.0
Don't know	5.9	8.0
Missing	2.0	0.0
Total Respondents	102	25

[a] Text of the question: "When you purchased farmland with its development rights already sold or donated, how did you find the price per acre? Was that price: 1. About the same as the price of similar farmland with its development rights still intact? 2. Somewhat lower than …."
[b] These totals included any respondents who were in either the first or later generations of owners of protected land.

Succession Planning

The easements in all five programs are perpetual.[17] This raises the questions as to who will own the land in the future, and will they farm it? The desirability of intergenerational planning for the use of preserved farmland has, in fact, been integrated into federal farmland preservation programming. Authorized in 1996, the USDA Farm and Ranch Lands Protection Program (restructured under the 2014 farm bill into the Agricultural Conservation Easement Program) has been helping state, local government, and private nonprofit organizations to purchase conservation easements for agricultural land. It funds up to 50% of the cost per easement. In recent years the federal PACE program has encouraged its cost-sharing partners to include in their ranking criteria for choosing properties for protection, the "existence of a farm or ranch succession plan established to encourage farm viability for future generations" (AFT, 2012, p. 3).[18]

Farm succession planning may be defined as "the process by which the ownership, income, and management of the family business is transferred to the succeeding operator or the next generation" (Mishra & El-Osta, 2008, p. 288). The arguments for encouraging succession planning by owners of preserved land include:

[17] The Maryland Agricultural Land Preservation Foundation provides for termination of easements, but only those approved for purchase on or before September 30. 2004, and if certain other conditions are met, including that 25 years have passed since approval and that the foundation determines "profitable farming is no longer feasible on the land" (Maryland Department of Agriculture, 2013).

[18] See, for example, the Virginia 2013 Farm & Ranch Lands Protection Program (FRPP) Ranking Worksheet (USDA-NRCS, 2013).

- Using money from the sale of the easement to fund retirement investments for the current owner rather than waiting until he or she retires and is forced to sell all or part of the farm if retirement resources are inadequate (Mishra & El-Osta, 2008; O'Neill, Komar, Brumfield, & Mickel, 2014).
- Identifying heirs who wish to farm the land and channeling easement proceeds to meet the inheritance claims of other heirs (Lynch, 2000).
- Whenever possible, arranging for a family member to be the next operator. Harris, Mishra, and Williams (2012) found that when a family successor is in place, the farm operation tends to realize "higher financial performance, both in terms of higher profits margins and returns to equity" (p. 10).
- Being in rural-urban-interface areas, where farmland—preserved or not—tends to be in short supply, operations may need to adapt to survive, such as by intensifying or diversifying on their existing land base. Some adaptation strategies may only be economically feasible over a longer-term planning horizon, which is made possible when an heir has been identified.
- Sharing with the next owner-operator the current farmer's detailed knowledge of the land, effective production practices, markets, etc. (Miller & Cocciarelli, 2012; USDA-National Research Initiative, 2010).

Our survey instrument contained a series of questions about farm succession. Each owner was asked if he or she had a written plan that "arranges for the transfer of ownership of the land to a relative or other person." If a written succession plan was not in place, the respondent was asked whether there was an oral agreement to transfer ownership in the future. A significantly higher percentage of first-generation owners in the full sample (68.1%) reported having either written plans or oral agreements compared to later-generation owners (54.5%); see Table 6. The same relationship is observed when the assessment is narrowed to having a written succession plan (58.6% versus 41.8%). Within specific programs, statistically significant differences in succession planning are only evident among owners of land preserved under the MALPF program; first-generation owners are more likely to have written plans, as well as oral succession agreements.

Landowners with either type of succession arrangement were asked two follow-up questions about the identity of the anticipated next owner (e.g., one of the respondent's children, another kind of relative, or a nonrelative) and whether the successor would be a "farmer who uses the land for agricultural production." The response options for the second question were: "definitely yes," "probably yes," "probably no," "definitely no," and "don't know." We asked the second question based on the supposition that an owner who also farmed the land will maintain a greater amount of preserved land in active farming, an assumption supported by data shown in Appendix Table A1.

A significantly higher percentage of the full sample's exclusively first generation of owners report that they had either "definitely" or "probably" identified a successor. The difference was 39.3% versus 27.0% (the second part of Table 6). Because the larger percentage for the first generation might have resulted from relatively more owners being older and, thus, more likely to have lined up successors, binary and ordinal logistic regressions tested for the effects of age and other plausible causal variables (see Appendix Table A2). Using both regressions allowed for the possibility that significant effects would be found in one type, but not in the other. For the binary regression, the dependent variable is defined as "1" if the owner responded "definitely yes" when asked whether the next owner would be a farmer using the land for agricultural production, and "0" for all other responses (including instances where the respondent said there was no written or oral agreement about succession). The ordinal logistic regression requires a plausible ordering of the outcome measures (Norusis, 2011), and ranges from having no succession agreement in place to a belief that the next owner would "definitely" farm the preserved land.[19]

[19] The ordering was as follows: "0" stood for the respondent

Table 6. Owner Reports on Succession Planning and Anticipated Successors, by Generation of Ownership: Exclusively First and Exclusively Later

	New Jersey Farmland Preservation Program (NJFPP)		Maryland Agricultural Land Preservation Foundation (MALPF)		Maryland Environmental Trust (MET)		All Five Programs	
Response Categories	Generation of Owner (%)							
Status of Succession Planning	**First**	**Later**	**First**	**Later**	**First**	**Later**	**First**	**Later**
Has written plan	45.5	42.3	65.4[a]	44.1[a]	53.5	38.1	58.6[a]	41.8[a]
Has oral agreement	13.8	5.8	7.5[a]	20.6[a]	7.0	14.3	9.5	12.7
Has either written plan or oral agreement	*59.3*	*48.1*	*72.9*	*64.7*	*60.5*	*52.4*	*68.1*[a]	*54.5*[a]
Total cases	123	52	107	34	43	21	348	110
Likelihood that Successor Will Farm the Land								
Definitely yes	23.6	25.0	27.1	11.8	11.6	4.8	24.7	17.1
Probably yes	14.6[a]	3.8[a]	13.1	17.6	11.6	14.3	14.6	9.9
Definitely or probably yes	*38.2*	*28.8*	*40.2*	*29.4*	*23.3*	*19.0*	*39.3*[a]	*27.0*[a]
Probably no	6.5	5.8	7.5	5.9	14.0	14.3	9.2	8.1
Definitely no	7.3	5.8	6.5	5.9	16.3[a]	0.0[a]	8.0	4.5
Don't know, refused, or not asked because had no written or oral plan	48.0	59.6	45.7	58.8	46.5	66.7	43.4	60.4
Total cases[b]	123	52	107	34	43	21	348	110

Notes: Maryland Rural Legacy Program and Delaware Agricultural Land Preservation Foundation (DALPF) are not presented due to low cell frequencies (i.e., only one and five later-generation owners), but are included in the weighted totals for all programs.
[a] A statistically significant difference at the .05 level or better in a two-sided Pearson Chi-Square test.
[b] This analysis was limited to respondents who were either exclusively first- or later-generation owners.

We began both forms of regression analysis with a single hypothesized causal binary variable, with "0" standing for exclusively first-generation owners and "1" for second- or later-generation owners. In the ordinal regression, "generation" was hypothesized negative (i.e., the later generation were less likely to have lined up a farmer as successor). Although the result was statistically significant, when we added other significant predictors (especially the respondent's age, primary occupation, and a satisfaction measure), the generation variable ceased to have significance at the .05 level. In the binary regression analysis, it never attained significance.

Both the binary and ordinal logistic regressions found that owner's age made a significant difference in the likelihood of having a successor who would "definitely" farm the preserved land (see Appendix Table A2).[20] Other succession

reporting that he or she had no succession agreement (and hence no successor to farm the preserved land); "1" if the respondent reported having a successor but believed he or she would "definitely" *not* farm the land; "2" if the respondent reported having a successor but believed he or she would "probably" *not* farm the land; "3" if the respondent reported having a successor but did not know if he or she would farm the land; "4" if the respondent reported having a successor and believed he or she would "probably" farm the land; "5" if the respondent reported having a successor and believed he or she would "definitely" farm the land.

[20] Our final binary regression model estimated that the odds of such an outcome increase by a factor of 1.033 for every additional year of owner age. The corresponding finding from the ordinal regression is an odds ratio of 1.610, which resulted from converting the interval-level age variable to a binary variable, "Older." That new variable divided the sample into those respondents up to and including 53 years (the 25th percentile value for the whole sample) and those older. Therefore, compared to the younger owners, the odds of those older than 53 having "definitely" lined up a successor who

studies regarding farmland found similar effects for age (Epley, Duffy, & Baker, 2009; Misha, El-Osta, & Shaik, 2010). However, the comparisons to our study are limited by differences in sampling frames. The prior succession research that we cite focuses entirely on owner-operators of farmland, whereas we surveyed a sample of owners, a little more than half of whom (56.4%) are also operators. In our sample, owner-operators are not more likely than nonoperators to have "definitely" lined up a farmer successor, whether or not we take into account their ages (Table A2).

Another of our hypotheses was that the number of years elapsed since the respondent first owned land under a conservation easement would be a significant predictor of having lined up a farmer successor. It seemed plausible that, as more years elapsed, an owner would have more time for the preservation status to affect succession thinking and decisions. Since the land cannot be developed, identifying a farmer successor becomes a practical issue for owning the land, in contrast to a planning strategy where the farm is expected to be sold for development at the time of retirement or death. However, the years-elapsed variable proved statistically insignificant in both the binary and ordinal regressions.

In contrast, the number of preserved acres is a significant predictor in both types of regressions (Table A2). There can be substantial costs involved in succession planning (e.g., for developing a retirement plan or hiring an outside facilitator), and owners of larger farms may be better positioned to bear these costs. Epley and colleagues (2009) found in their Iowa study that size (in acres) made a positive difference in whether plans had been made, but only "once the size of the farm reached 1,000 acres [405 ha]" (p. 5) . In our pool of plausible predictors we could not include farm size in gross sales, as have other studies (see, for example, Epley et al., 2009; Miller & Cocciarelli, 2012), since 44% of our surveyed owners are not operators.

Although being an operator does not increase the likelihood of a farmer successor, having farming as one's primary occupation does. Perhaps such owners are more likely to have found another farmer to succeed them because they have greater financial and/or self-esteem stakes in planning for the operation to continue. Also, a primary occupation of farming might mean they are better networked with other farmers, whom they contact about succession or who approach them.

Are owners who rented out their preserved land any more likely to have farmer successors lined up? Family and nonfamily tenants may be advantaged because they know the land well and may learn when the owners are open to including them in succession plans. Although in the binary regression analysis renting out land does not affect the likelihood of having a farmer successor, in the ordinal regression it was close to being a significant predictor.

There is a similar pattern when we include variables about owners investing in their land's agricultural operations, whether they are owner-operators or not. We hypothesized that having lined up a farmer successor or working toward that goal may provide an incentive for current owners to invest in the land's long-term productivity. Such investment could either help a family successor or make the operation more attractive to a nonfamily purchaser of the farm (Kirkpatrick, 2013; Mishra, El-Osta, & Shaik, 2010). The binary logistic regression analysis finds that the odds of having identified a farmer successor increase for owners in our sample who had "purchased equipment or machinery for use on any of the preserved land" in the time since they first owned such land; however, the coefficient's statistical significance is marginal (p=.067).

In contrast, having a college degree is a significant and substantively important trait in both types of regressions, although in a negative direction. Surveyed owners with college degrees (and higher) are less likely to have identified farmer successors (Table A2). Mishra, El-Osta, and Shaik (2010) report similar findings in their study of farmers based on 2001 national-level Agricultural Resource Management Survey data. They reason that "educated farm operators send their children to schools for higher education, and many of these children may not return to the farm because they secure

would farm the land are estimated to be greater by a factor of 1.610 versus the combined odds of the other four types of responses ("probably" having such a successor, etc.).

higher paying jobs in the nonfarm market" (Mishra et al., 2010, p. 147). Among our 295 first- or second-generation respondents with written or oral succession plans, 234 (or 79.3%) identify a child (or children) as their anticipated successor(s). However, among the 102 of those 234 current owners who had college or graduate degrees, only 25.5% say their successors would "definitely" farm the preserved land. By comparison, among the 132 owners without higher education degrees, 42.4% report farmer successors.

Finally, near the end of the interviews, the owners were asked to look back on their "experiences in owning farmland preserved through conservation easements" and to answer the question, "[H]ow satisfied or dissatisfied are you with being an owner of farmland preserved in that way?" Among the first- and later-generation owners, over half (55.3%) answered "very satisfied." The odds of members of this subgroup having lined up farmer successors is estimated to be more than three times greater than those for other respondents in the binary regression and nearly twice as high in the ordinal model (Table A2). Presumably, high satisfaction with their land having been preserved for agriculture encourages owners to find successors, and persuades them that owning the land would be to the successors' benefit.

Summary

Farmland preservation programs in Maryland, New Jersey, and Delaware have been operating for several decades. The maturity of these programs allows empirical observation of the actual succession of preserved farms, from owners who sold or donated development rights on these properties, to second and even later generations of new owners. In light of the public interests served by farmland preservation—and the significant public expenditures directed to protect these land resources—program administrators and policy-makers are interested in monitoring the uses of deed-restricted farms now and into the future. Some concerns have emerged, for example, regarding the diversion of preserved farmland from active agriculture into less intensive uses. A common example is the acquisition of preserved farmland for residential enjoyment by those interested in rural lifestyles. The encouragement of "rural estate" formation, generally perceived as an undesirable outcome (Daniels, 1986), is attributable to deed of easement language that requires that preserved land be kept *available for* agriculture, as opposed to being kept in *active* farming.

These types of ownership transitions lead periodically to questions about the efficacy of agricultural conservation easement programs as a farm retention tool, but such concerns are often based on anecdotes or a high-profile acquisition of a preserved farm by a wealthy individual who then constructed a large home. In some states this type of succession has raised concern about the accessibility and affordability of deed-restricted farmland to current and future farmers. Policy reactions have included conditioning preservation of a property on the easement holder's right to exercise a right-of-first-refusal purchase agreement at the time the farm is proposed for sale (e.g., in Vermont) as well as the imposition of limits on the sizes of new homes built or established ones expanded on preserved land (e.g., in certain New Jersey counties). Yet at the same time, whether preserved farmland is leaking out of agriculture is not well understood. Little systematic examination of the actual or planned transfer of preserved farmland to second- and later-generation owners has been conducted, making it difficult to generalize about the uses of preserved farmland.

Through a survey of preserved farmland owners, we examined this issue using several comparisons between first- and later-generation owners of farmland protected by conservation easements in our tristate study area. We examined the extent to which preserved farmland is reported to be in active agricultural use, the access to preserved farmland by young farmers, and, finally, the presence and nature of farm succession plans. Statistical analysis yields mixed, but generally positive, results.

First, this research provides some assurance that there is no pervasive disassociation of preserved farmland from active agriculture as properties transition to new owners. Both first- and later-generation owners report devoting relatively high percentages of their preserved acres to farming, although more nuanced analysis suggests that owners who had sold easements tend to devote

more of their landholdings to agriculture than do owners who donated easements or acquired already eased land. Yet the survey finds that some protected acres were not in farm operations (either the owner's or a tenant's)—an estimated 26% on average among the first-generation owners and 31% among the second. Next we examine whether the percentages of the total owners who were young farmers when they first owned land under easements differ across first and later generations of owners. No significant differences were found for persons 35 years and under, a threshold common in certain federal programs and among agricultural lenders. However, using the more liberal young farmer definition found in Delaware's farmland preservation program (40 years and younger), the proportion of later-generation owners who were young farmers when they first owned preserved farmland is nearly double that of the first generation. This suggests that farmland preservation is effectuating access to land among young farmers, presumably because the cost of preserved farmland is perceived by many purchasers of development-restricted farmland to be lower than the cost of comparable land without conservation easements (Table 5). Third, approximately two-thirds (68%) of first-generation owners report having a written or oral agreement for land succession, as compared to a little more than half (55%) of later-generation owners. Relatively low proportions of first- and later-generation owners (39% and 27%, respectively) believe that the subsequent owners of their preserved land will likely farm it. While there is disparity between the two generations of owners examined, this generational effect disappears when other factors positively correlated with having a succession plan (e.g., owner age, farm size, primary occupation, and overall satisfaction with owning preserved farmland) are considered simultaneously. In contrast, owners with college educations are less likely to have a successor interested in farming the preserved land.

Policy Implications and Further Research

We conclude with a discussion of the implications of our findings, highlighting potential extensions of this research as well as policy recommendations. On the whole, our study suggests that acquisitions of agricultural conservation easements in the three study states are advancing stated farmland retention goals. The extent to which plans are in place for the succession of preserved farms to future farmers, however, warrants additional attention. Challenges intrinsic to the succession process are neither unique to preserved farms nor to the three states under examination.[21] Despite the hard work and uncertainty inherent in farming, the transfer of a family farm to the next generation of family members is a commonly held desire among farm families (Gasson & Errington, 1993). For example, Laband and Lentz (1983) found that the likelihood of sons entering their fathers' occupations is considerably higher in the farm sector, relative to other professions (presumably a reflection of the transfer of high human capital across generations of farm families). Yet the process of farm succession is wrought with difficulties, including procrastination, the need of the current generation owner to maintain an adequate livelihood or retirement resources, intrafamily equity, and other family dynamics. The process can be made more challenging if it occurs during a time of high emotion (e.g., a sudden illness or death of a key farm family member).

The successful transition of farm management responsibility, physical assets, and less tangible assets (e.g., knowledge of farming and the land) from an aging farm owner to a next- generation owner is critical to farm survival. More broadly, matters of farm succession have important ramifications for the structure, performance, and adaptability of the farm sector (Gasson &

[21] Our findings on farm succession planning are comparable to those from several other studies. In a recent national-level survey, 30% of operator-owners of preserved farmland report having a farmer successor (Esseks & Schilling, 2013). A 2001 national study by the USDA Economic Research Service finds that 23 percent of surveyed farm operators had "identified a successor" (Mishra, Johnson, & Morehart, 2003). A 2000 survey by Iowa State University finds that 29% of farmer respondents had "a potential successor to their operations" (Duffy, Baker & Lamberti, n.d.). A similar 2006 Iowa survey finds 27% of farmers have an identified successor (Iowa State University, n.d.). A 2011 Michigan State University survey finds 45% of farmers had "identified one or more successors who will eventually take over management of your farm" (Miller & Cocciarelli, 2012).

Errington, 1993; Inwood & Sharp, 2012; Mishra & El Osta, 2008). Identifying and engaging next-generation farmers may result in greater investments in modernization, expansion of innovative marketing or production practices, and improved economic vitality (Mishra et al., 2010; Potter & Lobley, 1992). In contrast, a farmer without a known successor may lack incentive to make longer-term farm investments, particularly if the owner is approaching an age where an exit from farming is contemplated. In the case of farmland preserved under state conservation easement programs, farm succession is also of interest to program managers, policy-makers, and the voting public, which hold expectations that such lands are forever kept in (or at minimum available for) farming.

Our analysis finds that, in most cases, the preserved farmland that has been transferred to new owners is being used mostly for farm production. Prospectively, however, there are fewer than four out of 10 first-generation owners, and only a little more than one-quarter of later- generation owners, with plans in place to transfer their preserved land to family members or others with an intention to farm the land. An important caveat to these stated plans for succession is warranted. The timing of, and the extent to which, managerial control over the farm will be transferred to a named successor remains an open area for further inquiry. The idea that a successor may be named but allowed little managerial authority has been identified as a possible impediment to intergenerational transfers of farms (Gasson & Errington, 1993; Lobley, Baker & Whitehead, 2010). Gasson and Errington (1993) dub this a "farmer's boy" situation, whereby the successor provides little more than hired labor to the operation, does not gain management experience, and essentially accepts the situation in anticipation of future farm ownership. On a related topic, we do not delve into the important distinction between a transition in farm management responsibility and the actual transfer of farm asset ownership (Errington, 1998; Keating, 1996). Both this issue and that of heirs without significant management experience deserve more academic inquiry within the farmland preservation literature.

The following recommendations are offered to facilitate planning for the succession of preserved farmland and its continued use in agricultural production.

- Easement holders can identify and evaluate administrative or regulatory provisions of their programs, including deed of easement terms, which may constrain agricultural use of preserved lands or farm adaptation. Program staff visits to preserved farms (e.g., when required for monitoring easement compliance) may be used to advance this purpose. The link identified in our study between owner satisfaction with his or her preservation experience and succession planning suggests the importance of understanding the types of incongruities that may exist between the views of owners and easement holders as to what uses are appropriate on preserved farmland. For example, agritourism and direct marketing are growing in importance, particularly in urbanizing areas (see Schilling, Sullivan & Komar, 2012). This growth is fueled in part by an expanding local food movement and by the economic necessities of a changing agricultural business climate. Farmers seeking to capitalize on these opportunities may "push the envelope" in terms of what is conventionally interpreted as an accepted agricultural use by farmland preservation programs (e.g., hosting weddings at wineries on preserved farms is a current example receiving considerable policy and legislative scrutiny in New Jersey).

- Farm Link and similar programs (see, for example, Vermont's Land for Good program) aim to link farmland owners with those seeking to purchase or lease farmland for production. It will be useful to evaluate farmland linking programs systematically to assess their efficacy in aiding farm succession planning and, specifically, matching new and beginning farmers with available farmland. Benchmarking effective programs, or elements thereof, can provide useful information to other programs.

- Some private land conservation organizations are working with beginning farmers to create access to affordable agricultural land (see Beckett & Galt, 2014). These types of initiatives can be assessed for replication or expansion by state-sponsored conservation easement programs. One innovative state program example can be found in Delaware. In 2012, the Young Farmers Program helped 10 young farmers purchase 900 acres (364 ha) of unpreserved farmland by providing interest-free loans, provided that the land is farmed. An outgoing owner agrees to a perpetual conservation easement and is compensated for it at the time of transfer, thereby preserving the land. Another opportunity may be to set aside a portion of lands preserved through fee simple acquisitions for beginning farmer access, perhaps in tandem with some form of beginning farmer incubator program.

- Efforts to support the challenging process of farm succession planning should be continued. Mishra, El-Osta, and Shaik (2010) suggest that Cooperative Extension professionals and other agricultural support providers can play an important role in advising farm owners about the importance and process of succession planning. These professionals need the support and training required to provide this assistance effectively, including information and strategies to address common barriers, such as cultural issues (Inwood, 2013), and examples or case studies of successful farm succession that may be used during client advisement. 

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Appendix

Table A1. Results of Ordinary Least Squares and Binary Logistic Regressions: Predictors of Percentage of Preserved Land Being in Owners' and/or Their Tenants' Farming Operations

	Ordinary Least Squares Regression for Predicting Percent of Total Preserved Land in Farm Operations		Binary Logistic Regression for Predicting Whether at Least 75% of Acres Were Farmed		
Predictor Variables	Regression Coefficient [a]	Level of Statistical Significance	Regression Coefficient	Level of Statistical Significance	Odds Ratio [b]
Sold easements only	6.191	.040	.753	.002	2.123
Operator of his or her eased land	26.928	.000	1.385	.000	3.996
Primary occupation was farming [c]	8.758	.008	.827	.004	2.287
Eased land under the NJ program	9.746	.001	.860	.000	2.362
Eased land under MET	–12.367	.006	–.274	.447	.761
Eased land produced income from both crops and livestock	6.006	.128	.945	.019	2.573
Eased land produced income from logging	–5.132	.307	–.795	.052	.452
Total acres of preserved land	.001	.734	.000	.635	1.000
Current age (in years)	.088	.432	–.001	.902	.999
Male gender	4.240	.128	.405	.073	1.499
Constant	40.093	.000	–1.479	.021	.228
	Total Cases: *n*=500 [d]				
Goodness of Fit measure	Adjusted R Square=0.302		Nagelkerke R Square=0.345		

[a] The predicted change in the percentage of preserved land in a farming operation associated with a one-unit increase in the predictor variable, with other predictor variables in the equation held constant.
[b] The odds ratios result from exponentiating the logistic regression coefficient for each variable. For further information about "odds ratios," see footnote 12.
[c] And the respondent also farmed at least some of his or her preserved land.
[d] Missing are four respondents who did not report their numbers of protected acres and three who did not report their ages.

Table A2. Results of Logistic Regression Analysis: Predictors of a Respondent Having a Successor Who Will Use Preserved Land for Agricultural Production

	Binary Logistic Regression			Ordinal Logistic Regression		
Predictor Variables	Regression Coefficient	Level of Statistical Significance	Odds Ratio [a]	Regression Coefficient	Level of Statistical Significance	Odds Ratio [a]
Generation	.144	.663	1.555	–.234	.275	0.791
Age of owner	.032 [b]	.007	1.033	.476 [b]	.026	1.610
Median years owned land that was preserved (≥10 years versus fewer)	–.414	.129	.661	–.027	.885	0.973
Median acres preserved (≥115 acres versus fewer)	.961	.000	2.614	.723	.000	2.061
Operated at least some of his or her preserved land	–.394	.268	.674	.083	.726	1.087
Primary occupation is farming	1.226	.000	3.406	.605	.008	1.831
Rents out preserved land	.302	.350	1.352	.412	.055	1.510
Invested in farm equipment or machinery	.569	.067	1.767	.324	.121	1.383
College graduate	–.676	.011	.509	–.518	.004	0.596
Male gender	–.310	.242	.733	–.209	.260	0.811
Very satisfied owning preserved land	1.147	.000	3.150	.600	.001	1.822
Constant	–4.547	.000	.011	—	—	—
Total Cases		*n*=454			*n*=454 [c]	
Goodness-of-fit Measure		Nagelkerke R Square=0.223			Nagelkerke R Square=0.146	

[a] The odds ratios in these columns result from exponentiating the logistic regression coefficient for each variable. The ordinal logistic regression model passed the "Test of Parallel Lines" (Norusis, 2011).
[b] While the binary regression's measurement of age was interval level (reported years of age), the ordinal regression used a two-value variable, with 0=that the respondent was in the first quartile of age (up to and including 53 years of age) and 1=that the respondent was older than 53.
[c] The analysis was limited to respondents who were either exclusively first- or later-generation owners.

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Creating space: Sack gardening as a livelihood strategy in the Kibera slums of Nairobi, Kenya

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Abstract

As many countries in sub-Saharan Africa undergo rapid urbanization, a growing number of people are joining the ranks of the urban poor. Urban agriculture is a livelihood strategy used by the poor to improve their well-being, but it has remained largely inaccessible to inhabitants of slums, who generally lack access to land to farm. However, in the Kibera slums of Nairobi, Kenya, a relatively new form of urban agriculture has emerged, called

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sack gardening, in which farmers plant crops into the sides and tops of large sacks of soil. Our research asked how participation in sack gardening served to improve the livelihoods of farmers in the Kibera slums of Nairobi. We demonstrate that urban agriculture can be a viable and important livelihood strategy for households, even in densely populated slum environments. Low-space urban agricultural activities like sack gardening should receive greater consideration as part of urban development initiatives.

Keywords
Africa, Kenya, Kibera, livelihoods, sack gardening, urban agriculture

Introduction

In 2007, the world population hit a landmark with more than 50% of people now residing in urban areas. While sub-Saharan Africa remains predominantly rural, most countries are projected to be more than 50% urban by the year 2030 (UN-Habitat, 2004). Because most cities are unable to keep up with the need for infrastructure and formal employment, urbanization often leads to the growth of informal settlements, the informal jobs sector, and a growing number of urban poor. Current estimates suggest that nearly 1 billion people worldwide reside in informal settlements or slums, without adequate access to food, shelter, water and sanitation (UN-Habitat, 2010).

Cities are centers of political, social, and economic opportunity in most countries, but they are also home to growing numbers of poor people.[1] If countries are to address rapid urbanization and the growth of urban poverty, they need to support and empower livelihood strategies that the urban poor have developed to survive. Urban agriculture is one livelihood strategy used by the urban poor to improve their well-being, in combination with other livelihood strategies. Numerous studies of urban and peri-urban agriculture worldwide have demonstrated that it is effective at improving household food security (Binns & Lynch, 1998; Crush, Hovorka, & Tevera, 2011; Egziabher, Lee-Smith, Maxwell, Memon, Mougeot, & Sawio, 1994; Maxwell, 1995; Mwangi, 1995) and as an income-generating activity (Baumgartner & Belevi, 2001; Drakakis-Smith, Bowyer-Bower, & Tevera, 1995; Mlozi, 1996). In sub-Saharan Africa, studies of urban agriculture have been limited, but those that have been done generally suggest that approximately one-third of households are engaged in some form of urban agriculture, and that two-thirds of the farmers are women (Prain, Karanja, & Lee-Smith, 2010). While urban agriculture is a fairly common urban livelihood strategy, it has remained largely inaccessible to inhabitants of slums who generally lack access to any open space to farm.

Sack Gardening in Kibera

In the Kibera slums of Nairobi, Kenya, a relatively new form of agriculture has emerged, called sack gardening. Farmers plant crops into the sides and tops of large sacks of soil, allowing them to grow 20 to 40 plants in the space previously occupied by just a few plants by making use of the vertical space created by the sack. While sack gardening (sometimes called sack farming or vertical gardening) is not new to Kibera, it has become more popular since 2008. Following postelection violence in early 2008 that strongly affected residents of Kibera, a French nongovernmental organization (NGO) called Solidarités began providing free seedlings and technical advice to new farmers as part of an effort to improve household food security. Solidarités' sack gardening program officially ended in 2012, but the practice had been widely adopted and sack gardens can still be seen throughout Kibera today. At the time of our research study, several thousand households in Kibera practiced some form of sack gardening (Karanja & Njenga, 2011). This form of urban agriculture is practiced on a smaller scale than urban agriculture is typically practiced in other urban and peri-urban parts of Nairobi due to the unavailability of land in the slum. Although sack gardening specifically in the Kibera slums has received a great deal of media attention (e.g., Chesterton, 2011; Doiron, 2011; Karanja and Njenga, 2011), this type of urban agriculture can also be found in most cities in Kenya and other countries around the world (e.g. Hossain, 2013).

[1] "Urban poor" refers to the proportion of the urban population living below the poverty line (Wratten, 1995).

Our research specifically asked how participation in sack gardening has been integrated into the livelihood strategies of farmers in the Kibera slums of Nairobi. We demonstrate that urban agriculture can be a viable and important livelihood strategy for households, even in slum environments. In particular, sack gardens are important to women in Kibera as they fit well with their current livelihood strategies and allow them to provide for their households while building a greater sense of community among the farmers. Through this case study of sack gardening in the Kibera slums, we hope to demonstrate the importance of this form of small-scale urban agriculture, which provides another viable livelihood strategy to the urban poor in in other regions of the world, and even in highly space-constrained urban environments.

Sustainable Livelihoods Approach

To evaluate the impact of sack gardening on household livelihood strategies, we adapted the sustainable livelihoods approach to examine the ways in which farmers drew on different capitals to support their well-being and ability to farm in the slums. The term "livelihoods" refers to the capabilities, assets, and activities required for a means of living (Chambers & Conway, 1992). A sustainable livelihoods approach considers different assets used by urban farmers to modify their livelihood strategies and to help them overcome food insecurity. Carney (1998) suggests that a sustainable livelihoods framework is a tool that can help identify the main factors affecting livelihoods and the relationships between them. This framework places poor households at the center of the development process and starts with their capabilities and assets, rather than just their problems (Scoones, 1998). While the urban poor may not have cash savings, they often have access to other assets, such as their labor, health, knowledge, skills, friends, and family, and the natural resources around them, which combined constitute a stock of capitals (Narayan & Pritchett, 1999). People's livelihoods are dependent on their access to different types of capital, including financial, natural, human, physical, and social. The combination of these capitals or assets constitutes a livelihood strategy, and households strive to use their assets in combination to cope with economic, environmental, health, and political changes (Scoones, 1998).

Residents of Kibera face a range of challenges, including high levels of food insecurity and poverty, frequent threats of violence, and inadequate access to basic goods and services, including sanitation services, health care, and education. Households must creatively use their assets in order to pursue different livelihood strategies in this context. Sack gardening provides a new way for households to draw on their portfolio of capital assets and modify their livelihood strategies as a means of improving their food security or generating income.

Natural capital consists of the natural resources useful to livelihoods, including land, soil, water, and other environmental resources. This form of capital is generally considered to be less significant in cities, but in the context of urban agriculture, natural capital is critical as land is at a premium (Rakodi, 2002). The livelihoods of those practicing urban agriculture are particularly dependent on their access to land, soil, and water.

Physical capital is the basic infrastructure for transportation, shelter, water, energy, and communications, as well as the equipment that enables people to pursue their livelihoods (Rakodi, 2002). The ability of residents to obtain the physical capital required for sack gardening, such as sacks, seeds, and fertilizer, may influence their participation. Additionally, lack of physical infrastructure in Kibera, such as piped water, impedes residents' ability to participate in gardening, as they must use the informal sector to obtain water from streams or wells, or have enough financial capital to purchase water from the water vendors who possess the physical capital to transport it (Villavicencio, 2009).

Human capital refers to the quantity and quality of labor resources, education, skills, and health status of household members (Rakodi, 2002). The ability of households to engage in economic activities is often constrained by the educational levels or health status of household members. Lack of education or skills forces household members to rely on informal labor markets or to participate in activities such as urban agriculture to supplement their incomes (Foeken, 2006). Although sack

gardening does not require formal education, it does require a particular set of knowledge and skills. Households with recent ties to rural agricultural areas may have more human capital in this area than households whose members have lived for multiple generations in the slums (Linares, 1996; WinklerPrins & de Souza, 2005).

Financial capital is defined as the financial resources available to people, including savings, credit, pensions, and remittances, which provide them with different livelihood options. In the context of urban agriculture, financial capital refers to the financial resources available to begin sack gardening, such as money needed to purchases water, sacks, and potentially seeds and soil (Rakodi, 2002). Financial capital is strongly dependent on relationships of trust, and is closely related to the next type of capital, social capital (Prain et al., 2010).

Social capital encompasses the social resources, including networks, membership in formal groups, relationships of trust and reciprocity, and access to wider institutions of society, on which people rely when pursuing their livelihoods (Rakodi, 2002). Sack gardening takes place in a densely populated, urban environment. Residents may draw on their social networks for help in building sacks, maintaining the gardens, sharing harvested goods, and protecting sacks against theft, among other activities.

Households practicing urban agriculture make use of these different forms of capital assets in the broader context of policies, institutions, and processes that are applied to and exist in the Kibera slums and the city of Nairobi. They also draw on their assets in response to vulnerability that results from engaging with urban ecosystems (Prain et al., 2010). Our research looked at the ways in which farmers in the Kibera slums made use of these different capital assets to examine how sack gardening has been integrated into household livelihood strategies, and the extent to which this has proven beneficial for the households involved in this type of farming.

Study Area

The Kibera slum was selected as our research site because it is the largest informal settlement in Nairobi, and it represents some of the most challenging issues faced by residents in informal settlements in Kenya today. Residents of Kibera have participated in sack gardening for several years, with many beginning to garden after the post-election violence of early 2008. At the time of our study, sack gardening was practiced by upwards of 5,000 households (Karanja & Njenga, 2011). The great diversity of the Kibera slum allows comparisons to be made concerning the impact of sack gardening on livelihood strategies among a wide variety of household structures, income levels, and ethnic backgrounds.

Kibera is located about 7 km (4 miles) southwest of downtown Nairobi, within the legal city limits (Figure 1). It is East Africa's largest slum, with approximately half a million residents occupying about 2.5 square kilometers (1 square mile), making it one of the most densely populated urban settlements in the world. It consists of 10 villages or neighborhoods, defined loosely along ethnic lines. The villages included in our study were Makina, Mashimoni, Laini Saba, Kianda, Kisumu Ndogo, Soweto East, Soweto West, Gatwekera, and Silanga. The population of Kibera is composed of residents with many different ethnic groups and social backgrounds. Over half of the households live below the poverty line (Sampson, Raudenbush, & Earls, 1997), but in reality the number of households experiencing poverty is much higher. The income level on which poverty lines are set in Kenya often ignores the cost of nonfood essentials in urban areas, such as the cost of water, health care, and education (Putnam, 2001).

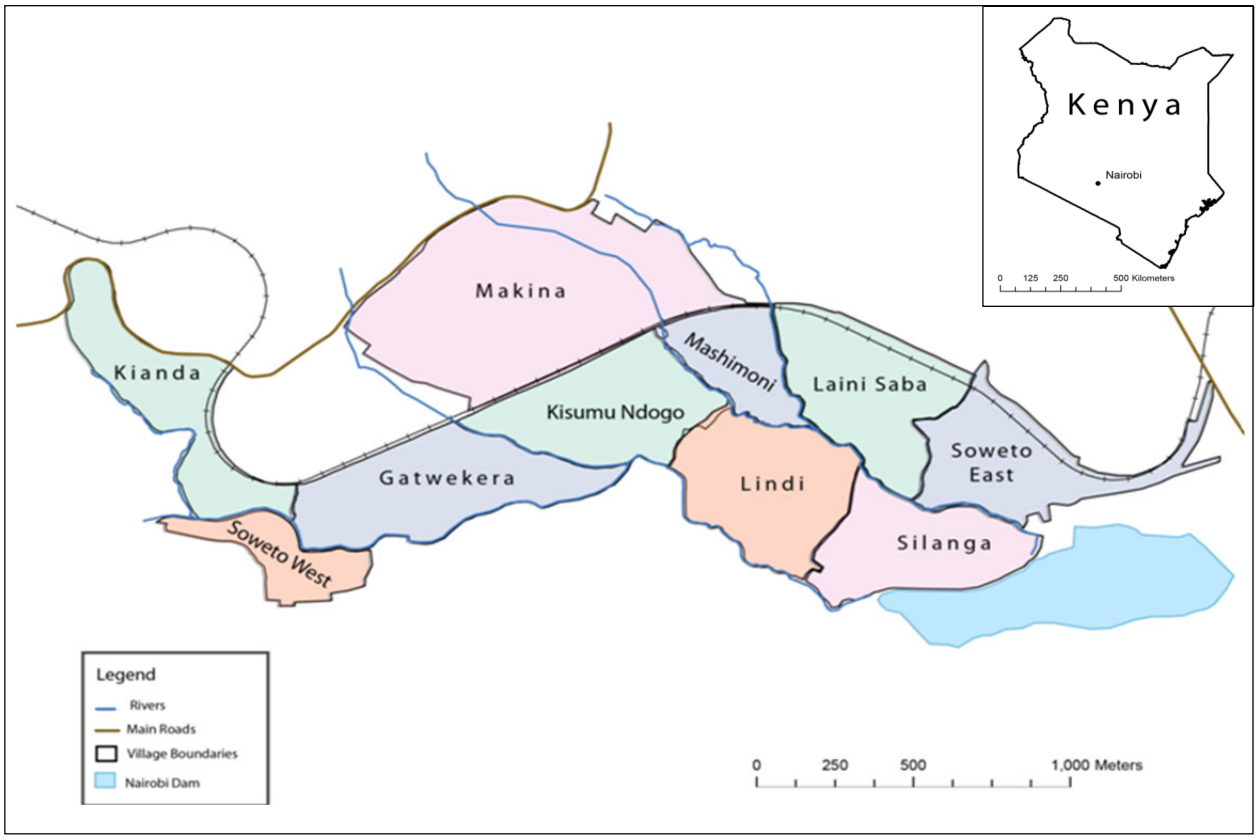
Data Collection

We conducted our research on the impacts of sack gardening on livelihood strategies over a period of seven months in late 2010 and early 2011 in collaboration with researchers from the University of Nairobi. We used a two-part mixed-methods approach to collect data on the impact of sack gardening on residents' livelihoods, combining qualitative, semistructured interviews with farmers[2]

[2] For this study, farmers were defined as those households practicing sack gardening, and nonfarmers were households who did not practice any form of agriculture. The terminology "farmers" and "nonfarmers" is a direct translation from

Figure 1. Map of the Kibera Slums in Nairobi, Kenya

Approximately 500,000 people reside in this slum, where thousands of households are now involved in sack gardening. The Kibera slum is divided into its own neighborhoods. Our research was carried out in the villages of Makina, Mashimoni, Laini Saba, Kianda, Kisumu Ndogo, Soweto East, Soweto West, Gatwekera, and Silanga.



Map created by the first author.

and a quantitative household survey of farmers and nonfarmers. We first conducted qualitative, semi-structured interviews with 31 farmers from Makina and Mashimoni villages. Farmers were chosen for the qualitative interviews using purposeful sampling in order to capture a wide variety of factors, including the number of sacks farmed, as well as the age, gender, educational attainment, and length of time farming households were involved in sack gardening. Interviews took place at the farmers' houses and were conducted in Kiswahili by the first author and a research assistant. Farmers were informed about the purpose of the research project and permission was obtained to conduct and make an audio recording of the interview.[3] During the interview, farmers were asked a range of questions about their experiences with sack gardening in order to understand how they had begun sack gardening, the types of crops they grew, the benefits and challenges of gardening, and any concerns they had about environmental risk.

In the second phase of the study, we used information from initial interviews to craft and then conduct a survey of 306 households in nine villages in Kibera (n=153 farmers and n=153

Kiswahili of how practitioners of sack gardening in Kibera refer to themselves. While they would be considered gardeners by most Western definitions, the use of the term farmer best represents the voice of the people of Kibera.

[3] Human subject clearance for this research was obtained from Michigan State University's IRB, protocol number 10-568; r036781.

nonfarmers). Surveys were pretested on 10 households by field assistants and the first author prior to implementing the full survey. The survey questionnaire asked more specific and quantifiable questions about the how sack gardening was being used as a livelihood strategy, including questions related to the various capital assets, including human, financial, natural, physical, and social capital. See Table 1 for demographic of the survey respondents; there were significant differences between the farmers and nonfarmer respondents in age, time in Kibera, and family size. Households were chosen to be asked to complete the survey using a stratified random sample of farming and nonfarming households in nine neighborhoods in Kibera. Sampling frames[4] of nonfarmers and farmers in each of nine villages in Kibera were created with the help of a local field assistant from each village. The assistants compiled lists of 35 farmers and 35 nonfarmers in each village, and we randomly selected 17 people to interview from each list. The selected interviewees were contacted to confirm that they would be participating in the survey and to inform them of the time and date of the survey interview. Surveys were administered in Kiswahili with the help of four enumerators, all of whom were local university students.

Data Analysis

Semistructured, qualitative interviews were recorded, transcribed, translated from Kiswahili, and analyzed using thematic analysis (Waitt, 2005) using the software NVivo in order to determine the major themes that participants identified related to sack gardening as a livelihood strategy. Data from the household survey were analyzed using the statistical software package SPSS (Version 15). We used a series of independent t-tests and Pearson's correlations to test the significance of mean values between farmers and nonfarmers at a 95% confidence level ($p<0.05$) for differences in the ways in which they engaged with natural, physical, financial, social, and human capital to use sack gardening as a livelihood strategy.

[4] *Sampling frame* is a statistical term referring to a list of all individuals in a population that can be sampled.

Table 1. Demographic Overview of the Household Survey Participants

	Farmers	Nonfarmers
Sample Size	153	153
Age (years)	34.4*	29.5*
Time in Kibera (years)	14.8*	11.6*
Family Size	5.2*	4.2*
Level of Education	Upper Primary	Upper Primary

* Indicates a statistically significant difference between farmers and nonfarmers ($p<0.05$).

Sack Gardening as a Sustainable Livelihood Strategy

Sack gardening is a livelihood strategy now pursued by thousands of households in the Kibera slums of Nairobi (Karanja & Njenga, 2011). As discussed earlier, it is advantageous because it allows households to plant a large number of crops in a relatively small space by taking advantage of the vertical growth of plants. The majority of farmers we surveyed grew a combination of four crops in their sack gardens: kale (*Brassica oleracea*); Swiss chard (*Beta vulgaris*), known locally as "spinach"; green onions (*Allium wakige)*; and coriander (*Coriandrum sativum*). A small number of farmers also reported planting varieties of squashes or pumpkins, harvested for the leaves, (*Cucurbita* spp.), tomatoes (*Solanum lycopersicum*), "managu" *(Solanum scabrum),* "nderema" (*Basella alba*), and *"*murenda*"* (*Corchorus* spp.). The last three are African indigenous vegetables. Farmers who grew kale, Swiss chard, green onions, or coriander all consumed the crops they grew. A smaller number also sold or shared the crops (primarily kale and Swiss chard). Of the farmers who sold their crops, about 80% sold the crops informally to friends and family, with the remainder selling to vegetable vendors or at their own vegetable stalls.

Sack farmers in Kibera had an average of five sack gardens, although this varied by village within Kibera. Because open land is extremely scarce in Kibera, farmers with larger numbers of sacks tended to situate them on public or unclaimed land, rather than land owned by members of the household or the landlord. Many of these sack

gardens were located in close proximity to a pit latrine, an open sewage drain, under a clothesline, or next to a road. Farmers frequently fenced off their sack gardens using plastic sacks, strings, or wires in order to protect them from theft by passers by, from livestock such as chickens, and from trash that is swept into the garden area. Based on our household survey, farmers in Kibera had been planting sacks for an average of 1.6 years (19 months), ranging from 2.1 years in Silanga village, where it was first introduced, to 1 year in Makina and Kianda.

Farmers' livelihoods are dependent on their access to different types of capital, including financial, natural, human, physical, and social, thus examining the ways in which farmers' draw on these capitals or assets illustrates how sack gardening has been adopted as a livelihood strategy in Kibera.

Natural Capital

Access to natural capital, including soil, water, and access to land, was very challenging for many farmers in Kibera. While it did not deter them from planting sack gardens, they were often forced to plant fewer sacks than desired or to forgo caring for their sack gardens because they could not get enough water to irrigate them.

Soil: Farmers obtained their soil from a variety of sources, including open fields near their house, old construction sites, the railroad that passes through the slums, old dumpsites, the riverbank, and various other locations. The village where the farmers lived was roughly correlated with the source of their soil, with farmers from Mashimoni, Kisumu Ndogo, and Soweto West being more likely to take soil from the nearby railroad or dumpsites, while farmers from Soweto East, Gatwekera, Laini Saba, Makina, and Silanga tended to dig soil from open fields near their house. Only farmers from Gatwekera collected soil from the riverbank, as this village is located closest to the Nairobi River, which passes along the southern boundary of the Kibera slums. Our broader study found that farmers who collected soil from dumpsites were more likely to have high levels of heavy metal contamination (As, Cd, and Pb) in the soils and in their crops (Gallaher, Mwaniki, Njenga, Karanja, & WinklerPrins, 2013).

Nearly all the farmers collected their soil for free, but about 5% of farmers paid to have someone to transport it to their houses. These farmers paid an average of 50 shillings (US$0.63) for labor to fill a sack with soil, with the cost ranging from 25 to 200 shillings per sack (US$0.32 to US$2.52). Only about a third of farmers reported asking permission to collect soil from a location; the others did not ask.

Collecting soil was a challenge for many farmers because soil is heavy, there are limited collection sites given the high density of the housing in the slums, and it is difficult to obtain permission to collect the soil from public land. During the qualitative interviews many farmers expressed concerns about being caught while collecting soil from the railroad, as this is an illegal activity. One farmer explained,

> We usually get the soil from near the railroad. It's not easy to go and dig the soil because it's an offense if you are caught. We go to the railroad in the evenings, as if we are stealing, because if you go during the day and you are caught, you will be sent to jail.

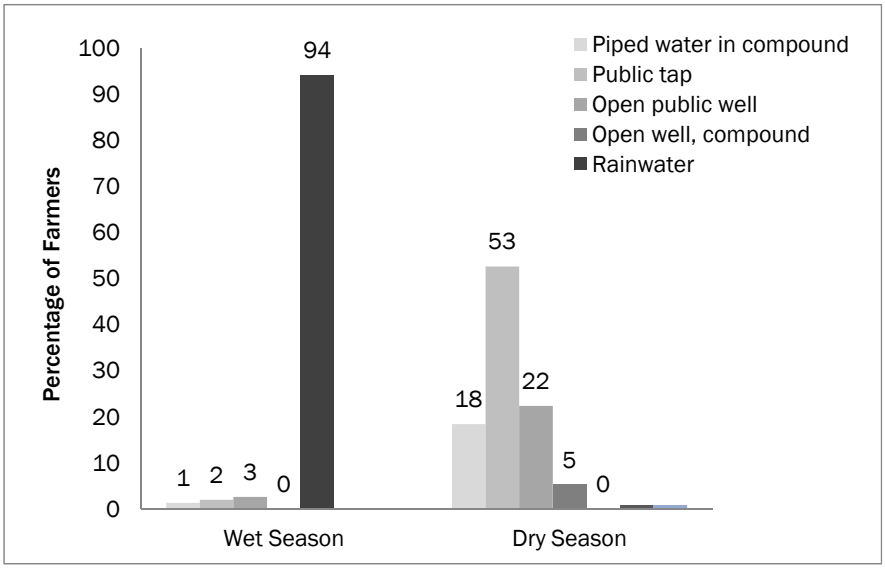
Not surprisingly, most of the farmers we surveyed who collected soil from the railroad reported that they did not ask permission. A few people responded that they had gotten permission from a local official, but it is possible that these farmers reported getting permission because they felt uncomfortable admitting to an illegal activity.

Water: Obtaining water to irrigate their sacks was another major challenge faced by farmers in Kibera. The slum lacks major water distribution outlets, resulting in frequent and acute water shortages throughout the slums. This has led to an informal water system whereby people access water though small, individually owned pipes that are illegally connected to small water mains that serve nearby residential areas. These pipes crisscross Kibera, passing through sewage-filled drainage ditches or through people's homes. Water vendors who have pipes with large water storage tanks con-

nected to these informal systems supply more than 85% of residents (Schippers, 2000). Findings from our interviews indicate that during water shortages, the amount of time it takes to collect water also increases as many pipes run dry, and women often must spend several hours collecting water during these times. As a result of the increased cost and effort required to obtain water during frequent water shortages, farmers often refrain from irrigating their sack gardens in order to prioritize domestic water needs. Overall, the cost of water was the most substantial expense associated with sack gardening, and a small number of farmers said that they chose not to maintain their sack gardens during the dry season due to the high cost of water.

Figure 2. Sources of Irrigation Water for Sack Gardens in Kibera During the Wet and Dry Seasons

During the dry season, households used water from a variety of sources to irrigate their sack gardens. In most cases, this water must be purchased (*n*=152).



Irrigation water for sacks was obtained from a variety of sources, depending on the season (Figure 2). During the wet season, most farmers (94%) relied exclusively on rainwater to irrigate their sacks, while during the dry season farmers were more dependent on water from other sources. More than half of farmers (53%) we interviewed purchased water from a public tap within Kibera, with the next most common sources of irrigation water being open public wells (22%) or taps within a housing compound (18%).

Few farmers reported using grey water from their homes in order to water their sacks due to concerns about contaminating the food in their gardens with soap residue from washing clothes or doing dishes. Although grey water, particularly water from rinsing clothes or dishes, is likely safe to use, their concerns stemmed from the training they received from the NGO Solidarités, which instructed them that soap residues would kill the plants in their sack gardens.

Access to land: During the qualitative interviews, nearly half the farmers we interviewed said that finding adequate space for their sacks was a major challenge (Figure 3). Several farmers said that they would have planted a greater diversity of plants, particularly indigenous vegetables, if they had more room to build more sacks. In addition, a few women said they had taught their friends how to construct a sack garden, but lack of space prevented their friends from actually building them.

The lack of space in Kibera also meant that farmers often were forced to place their sacks in potentially unsanitary locations, including under a clothesline or next to a latrine (30%), next to a drainage ditch with raw sewage (23%), or next to a road (25%) (Figure 4). Lack of space also led to conflicts between farmers and their neighbors. As one farmer explained,

> Our plots here in Kibera are very squeezed so sometimes you place your sacks on your neighbor's doorstep. They may not be interested in building their own sacks, but they will pick your vegetables when you are not there. But I don't quarrel with my neighbors because Kibera is very sensitive. Just one little thing can build and explode.

Figure 3. Finding Adequate Space to Place the Sack Gardens is One of the Major Challenges Faced by Farmers in Kibera

This row of sacks is shared by four different households and occupies the front yard (alley) shared by these houses.

Photo by C. Gallaher, 2010.

Physical Capital

In contrast to the difficulties reported in obtaining natural capital, farmers generally had an easy time acquiring the physical capital needed to participate in sack gardening in Kibera.

Sacks: Sacks were generally made of a nylon mesh material and were originally used for transporting grains such as rice and maize to shopkeepers. Farmers obtained sacks from multiple sources. About 80% percent of farmers purchased at least some of their sacks (at an average cost of 20 shillings (US$0.25) per sack), with the others previously owning or being given their sacks. Sack farmers had an average of 5 sacks in their gardens, although this varied somewhat by village. Farmers in Gatwekera, Laini Saba, Kianda, and Soweto West had an average of 6 or 7 sacks per household, while in the other villages within Kibera farmers had only 3 to 5 sacks per household.

Figure 4. Because Sacks Were Frequently Placed Near Open Sewage Ditches or Latrines, Flies Were a Common Problem

Farmers had to carefully wash their crops to remove the fly excrement before eating the vegetables.

Photo by C. Gallaher, 2010.

Seeds: Nearly all farmers reported obtaining seeds and seedlings for their crops from the local NGO Solidarités that has been active in promoting sack gardening within the Kibera slums. This NGO offered free kale and Swiss chard seedlings and green onion and coriander seed packets to all farmers who registered with their organization. As such, many farmers who were trained by family members later registered with Solidarités in order to obtain the planting material. When Solidarités ran out of seedlings or seed packets, farmers then resorted to purchasing seeds and/or seedlings from local markets. Anecdotal accounts also suggest that farmers have begun to plant suckers (offshoots)

from other farmers' existing kale plants rather than obtaining new seedlings from the Solidarités nursery. According to the farmers, these suckers are considered to be a healthier variety of kale plants than those available from the nursery, and to be less prone to diseases or insect damage.

Fertilizers: Farmers applied a variety of fertilizers to their sack gardens, including chemical fertilizers, compost, dumpsite waste, plant residue, and manure from cows, goats, chickens, and rabbits (Figure 5). Manure was mixed into the soil at planting, while other forms of fertilizer were applied postplanting. Over one-third of farmers applied manure to their sacks, while only 10% used chemical fertilizers, and less than 10% used compost, plant residue, or waste from dumpsites. Manure was typically obtained from friends and family or from Solidarités, or purchased as a group of farmers in order to share the cost. Farmers reported using compost or dumpsite waste when manure was hard to obtain. Chemical fertilizers were purchased by the farmers or given to them by Solidarités. Farmers typically avoided using night soil (human waste) since Solidarités had warned them that this could spread disease.

Pesticides: About 80% of farmers applied some form of pesticide to their crops, sometimes applying combinations of different types of pesticides. The most commonly applied pesticides include chemical pesticides and ash. Ash was collected from charcoal stoves and sprinkled on leaves as a traditional form of pest control. About 20% of farmers interviewed had applied a different type of traditional pesticide, which involved mixing hot pepper, soap, and garlic in a water solution and spraying it on the crops. Chemical pesticides were generally given to farmers by Solidarités or purchased as part of a group, where each farmer contributed 20 to 100 shillings (US$0.25 to US$1.26) for a tin of pesticides.

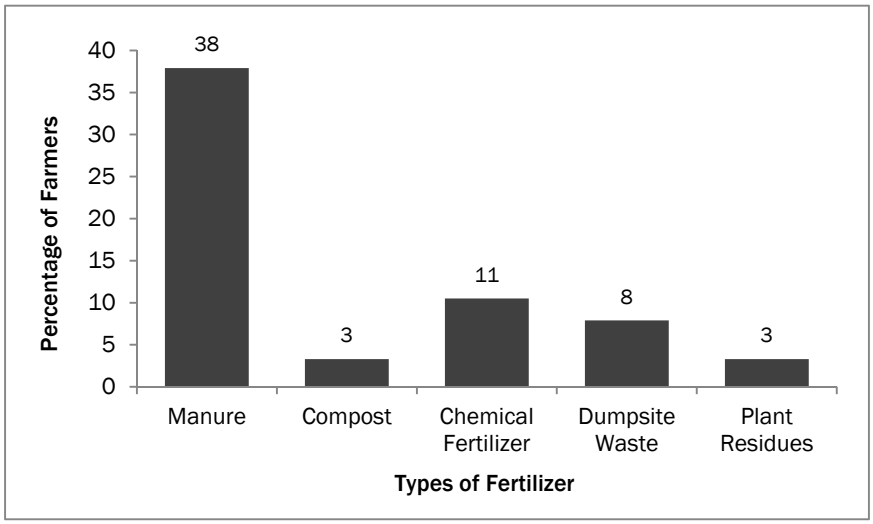
Human Capital

While sack gardening does not require any formal education, it does require knowledge related to farming and caring for plants. Thus, we hypothesized that households with stronger ties to rural agricultural areas or previous experience with farming would be more likely to be involved in sack gardening.

Previous Experience with Agriculture: The majority of farmers and nonfarmers (85% and 75%, respectively) have had previous experience with mixed farming in rural areas, mostly before they migrated to Kibera. A smaller number of households (13% and 7%, respectively) were previously involved in some form of vegetable farming in urban areas. Overall, respondents with previous agricultural experience were more likely to currently practice sack gardening than those without. We would have expected respondents who had more recently moved to Kibera to have stronger ties to rural, agricultural areas. However, we found no significant correlation between their length of residence and previous experience farming, whether urban or rural. Nor were gender or household wealth signifi-

Figure 5. Fertilizer Use Among Farmers

Many farmers in Kibera use fertilizer in their sack gardens, with animal manure being most commonly used (*n*=153).



cantly correlated with their length of residence in Kibera. However, older respondents were more likely to have had previous urban farming experience than were younger respondents. In terms of labor for sack gardening, women carried out the majority of farming tasks. Of the men farmers surveyed, nearly all received help from their spouse or children with some farming-related tasks, including building the sacks, planting, weeding, watering, applying fertilizers and pesticides, or harvesting the crops. This is consistent with previous studies that demonstrated that women typically provide the labor for small-scale urban agriculture (Hovorka, 2006a).

Education: There was no significant difference in the average level of formal education between household members of farming and nonfarming households. Beyond formal education, trainings about how to build and farm with sack gardening were important sources of information. Farmers received training about sack gardening from a variety of sources, including Solidarités (86%), family and friends (33%), and other NGOs or church groups (<5%), with many farmers trained by more than one source. Nonfarmers had also received training from Solidarités (12%) or family and friends in Kibera (8%), but had chosen not to adopt sack gardening for various reasons, such as lack of interest, time, and/or resources. About 87% of farmers reported teaching someone else about some aspect of sack gardening. The importance of these types of farmer training in urban agriculture has been documented among urban farmers in other parts of Kenya (Lee-Smith, 2010).

Building Human Capital: An interesting issue that was raised repeatedly during the qualitative interviews was the extent to which sack gardening had contributed to the creation of human capital among farmers. Farmers we interviewed reported sharing knowledge about sack gardening with their friends and family in Kibera or other parts of Kenya, or even teaching children and relatives how to plant and maintain sack gardens. One farmer we spoke with explained that she had been frustrated when she saw her neighbor's young children picking leaves from her kale plants. But then she realized the children had been collecting small piles of soil and were pretending to plant her kale leaves into their "garden." Through their play, these children were showing an interest in farming, so she was no longer upset they were harvesting her kale.

With their newfound knowledge about sack gardening, farmers reported feeling proud or more confident as a result. They felt healthier, happier, and more confident because they were better able to provide for their families or share their vegetables with their friends. They also felt that sack gardening had given women more confidence because of the challenges they undergo as part of farming. A similar sense of empowerment through urban gardening has been documented among women farmers in South Africa (Slater, 2001) and Botswana (Hovorka, 2006b).

Financial Capital

In the context of urban agriculture, financial capital refers to the financial resources available to start gardening, such as money to purchase soil, seeds, water, and tools (Rakodi, 2002). Asking households directly about their income and expenditures is a sensitive subject, and people often have a poor understanding of their household's income and expenditures. Few urban poor have salaried employment, so household incomes fluctuate according to business revenues or the availability of casual labor. Likewise, prices for goods in the slums also fluctuate frequently. Thus, overall measures of household wealth are often approximated based on proxy assets, such as ownership of various household items, land, or housing tenure, as well as expenditures on basic needs like food (Montgomery, Gragnolati, Burke, & Paredes, 2000). Our survey compared financial capital available to farming and nonfarming households to see what financial assets are available to these households and to see if sack farming had any effect on a variety of measures of household wealth. An internal study completed by Solidarités in 2010 suggested that households needed to have at least three sack gardens in order to have extra produce from their gardens to sell for cash (M. Ng'ang'a, personal communication, September 4, 2010). Qualitative interviews with farmers revealed

that many people were conscious of their monetary savings from sack gardening, and they used money they would have spent on vegetables to purchase other goods. By comparing various measures of financial capital between farming and nonfarming households, we go beyond the cost-benefit analysis completed by Solidarités to examine the impact sack farming has on creation of household wealth.

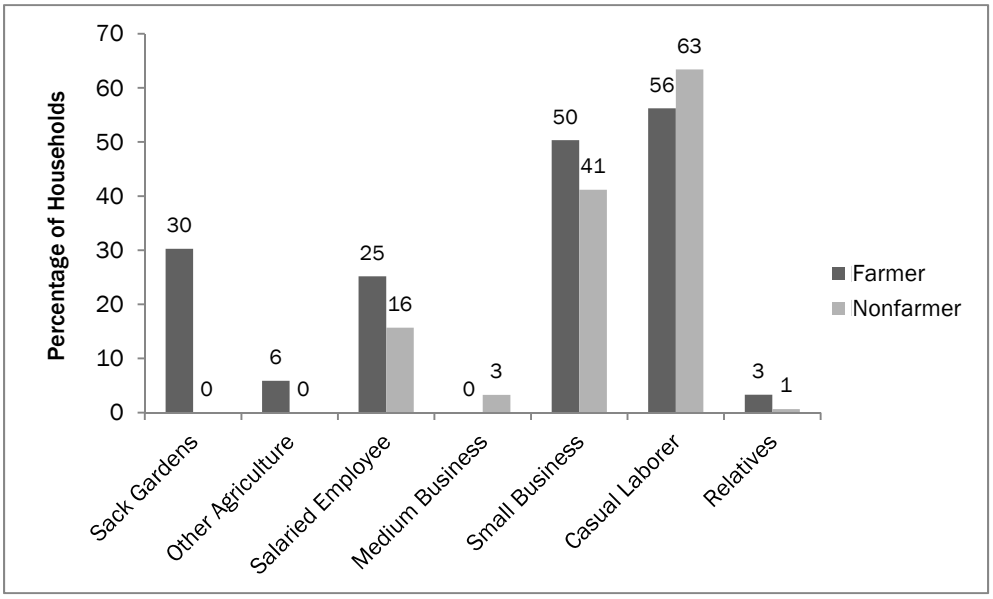
Housing Tenure: Previous studies have demonstrated a positive relationship between housing tenure and household wealth (e.g., Filmer and Pritchett, 2001), so our study investigated housing tenure as a proxy for household wealth. We found no significant difference between farmers and nonfarmers in terms of housing tenure. The longer a respondent had lived in Kibera, the more likely they were to own their own home ($p \leq 0.00$). This is because the housing market in Kibera is extremely tight, and most homes are owned by a small number of landlords. Only the families who have lived in Kibera for a long time were able to own homes there because they had original land tenure rights. However, families who rented their homes may have acquired some degree of wealth despite not owning their house or plot of land. The majority of households (93%) interviewed during the survey rented their houses.

Household Income: Household income is another measure of household wealth. Most households reported that they earned 4,000–8,000 shillings (US$50–100) per month, consistent with other studies of household income in Kibera (DesGroppes & Taupin, 2011). Reported household incomes ranged from less than 1,500 shillings (US$18) to more than 20,000 shillings (US$250) per month. While we saw no significant difference in total household income between farmer and nonfarmer households, the sources of this household income differed (Figure 6). The majority of households interviewed earned income from a small business or as casual laborers, and about 30% of farming households reported receiving some income from sack gardening. Farmers were significantly more likely than nonfarmers to have a salaried employee contributing income to the household (df=302, p=0.04).

Proxy Assets of Household Wealth

Household income is often a poor indicator of the long-term financial well-being of a household, especially since income can vary widely among households who depend on casual labor and small business (Filmer & Pritchett, 2001). Instead, researchers often measure long-term household wealth by looking at proxy assets, such as whether or not a household owns a television, mobile phone, or radio, to assess the long-term financial capital of a household. We asked about ownership of a set of items that have previously been identified as good indicators of household wealth in Kibera (Ngongo et al., 2007). These assets were assigned a weight based on the inverse proportion

Figure 6. Sources of Household Income for Farmers and Nonfarmers in Kibera (n=305)



of the number of households that owned the item: items that were more commonly owned were assigned lower weights than those that were owned by a smaller number of households. A household wealth index was then created by totaling the weighted assets owned by each household.

We found no significant difference in household wealth between farmer and nonfarmer households in Kibera. These findings were not surprising given that sack gardening contributes relatively little income to farming households. Additionally, interviews with farmers revealed that they were most likely to spend money earned from selling their vegetables on household expenditures, such as food or cooking charcoal, rather than on durable goods that were counted as part of a household's total assets. While sack gardening may be important financially to a household in terms of supplementing its food supply or providing extra spending money for things like school supplies for children, we were not able to demonstrate any impact on a household's long-term wealth, as measured by its physical assets. It does have significant nonmonetary benefits, including improving household food security and building social capital among community members (Gallaher, Kerr et al., 2013).

Income Spent on Food: The proportion of total income that a household spends on food is another important indicator of a household's financial capital. During our qualitative interviews, many farmers explained they had benefited from sack gardening by being able to obtain food from their gardens, or by selling vegetables from their gardens in order to purchase flour or cooking fat. Our survey found that food is a major expense for most households in Kibera, with farmers and nonfarmers spending 50–75% of their total income on food. On days that farmers harvested food from their sack gardens, they spent significantly (df=149, p<0.00) less of their total monthly household income on food compared to days they did not harvest, indicating that farming does provide some financial savings to farming households. Participating in urban agriculture as a means of subsidizing household income is common and widely documented in East Africa (e.g. Foeken 2006), although it had not been documented previously for small-scale agriculture like sack gardening.

Savings: A final important aspect of financial capital is savings. Many of the farmers we talked to viewed sack gardening as a means of saving money in their household budgets. Based on our qualitative interviews, farmers chose to save their money in different ways. Some women set aside the money for an unspecified goal. Others saved the money to buy household items, such as clothing, shoes, or pens for their children, or to pay their rent each month. Several farmers contributed their savings to microfinance organizations, called merry-go-rounds, and borrowed money from the same saving and credit system to invest in household goods. One farmer, Beatrice,[5] began sack gardening in 2008 and had seven sacks at the time of our interview. In addition to using the vegetables for home consumption, she was able to sell some once a week at the local market. She used the money she saved from not purchasing vegetables, and the extra money she earns from selling them, to buy household items like soap, cooking fat, and flour. Beatrice felt she had benefited from sack gardening so much that she formed a women's group where women shared space for their sack gardens and helped each other with labor such as watering and weeding the gardens. Another farmer we interviewed reinvested the money saved from her sack gardens into her business. By investing her savings of 200 shillings (US$2.50) in her dried fish business, she was able to generate over 1,000 shillings (US$12.50) in profit by the end of the month. Participation in informal savings and credit systems is an important form of wealth creation in Kenya, especially for slum dwellers who lack access to traditional financial institutions. Sack gardening has positively affected farmers in Kibera by generating income that has allowed them to participate in savings and credit systems.

Social Capital

In the densely populated slum environment of Kibera, residents must navigate a complex landscape where people from different regions of

[5] The names of all study participants have been changed to protect their identity.

Table 2. Correlation Coefficients for Significant *p*-values Reported in the Text Related to Social Capital
For all tests, *n*=306 (153 farmers, 153 nonfarmers).

Correlated Variables		Correlation coefficient	Significance (*p*-value)
Sharing seedlings	Age of farmer	–0.164	0.04
Sharing seedlings	Place of birth (proxy for ethnic group)	0.192	0.02
Own land they farm	Willingness to share farming spaces		
Number of social groups farmers participate in	Help others with gardening activities	0.391	≤0.00
Trained by Solidarités	Consult with other farmers about farming issues	0.179	0.04

Kenya, of different ethnicities, and speaking different languages, must co-exist. People's lives are often governed by informal rules and regulations that dictate interactions between different groups of people. Social capital refers to norms and networks that enable people to act collectively, and these norms and networks draw upon notions of trust and reciprocity between individuals or groups of people (Rakodi, 2002). Our research investigated how people used social capital to facilitate sack gardening, as well as whether sack gardening helped to strengthen farmers' social capital.

Group Membership: One measure of social capital is membership or involvement in different types of social groups (Putnam, 2001). Farmers were significantly more likely to participate in a social group, agricultural or not, than were nonfarmers (*df*=304, $p \leq 0.00$). As part of groups of sack gardeners, farmers frequently discussed farming issues, shared the cost of farm inputs, received training together, and planted or harvested together. For example, in Mashimoni village, some of the women farmers we interviewed had formed a gardening group called the Big Five[6] women's group. This group is composed of several neighbors who share space for their sack gardens and who help with agricultural labor, including carrying the soil for the sacks together, as well as planting, watering, and weeding. They also collaboratively purchase fertilizer and pesticides for their sacks, with the chairperson of the group purchasing and applying the pesticides to each member's sacks. Other social groups frequently centered around religious activities, contributions to a merry-go-round, or other activities such as business training, with the most common group activity being a merry-go-round. Although types of groups that people are involved in globally varies by region, participation in all these types of groups allows members to form new social networks and build the overall social capital of the community. Greater community social capital has been linked to reductions in crime (Akçomak & ter Weel, 2012), improved health outcomes (Elgar, Davis, Wohl, Trites, Zelenski, & Martin, 2011), and agricultural innovation (Heemskerk & Wennink, 2004).

Shared Farming Activities: During our qualitative interviews, farmers reported that they shared their vegetables with their friends and cooperated with other farmers by helping to carry soil for their sacks or sharing seedlings. They also bought water from each other and consulted about different farming issues. Outside of participating in a social group, these activities were important in terms of helping to build friendships or cooperation.

Findings from the larger household survey confirmed many of the observations from the semistructured, qualitative interviews about the ways in which farming activities were shared. Sharing seeds or seedlings with each other was negatively correlated with age, meaning that younger farmers tended to share with each other more than older farmers (p=0.04) (Table 2), and they also tended to share seeds with people of the

[6] The name of the women's group is a reference to the Big Five wild animals of East Africa, which are the lion, elephant, Cape buffalo, rhinoceros, and leopard. These animals are known for being the fiercest and rarest of the wild animals in East Africa, and the name of the women's group was likely chosen to reflect this resilience.

same ethnic group (p=0.02). Sharing labor for constructing sacks was marginally negatively correlated (p=0.06) with household income, suggesting that poorer households tend to help each other to construct their sacks while wealthier households may be able to afford to pay someone to help them. Whether farmers owned the land their sacks were placed on strongly predicted whether they shared the space where they placed their sacks (p<0.00). Shared garden spaces were more likely to be on public land, or land owned by another landlord, rather than on land owned by the farmer.

Importantly, farmers with greater social capital, as measured by participation in social groups, were also more likely to help with informal shared farming activities, including sharing seedlings, helping to carry soil, constructing sacks, and sharing space for planting (p≤0.00). This likely reflects their greater connectedness with other members of the community. Finally, farmers were more likely to consult with other farmers about farming-related issues if they first learned about sack gardening from Solidarités (p=0.04). This is likely because this NGO requires farmers to participate in training sessions together to learn how to construct and care for their sack gardens, which seems to facilitate forming social ties between the farmers.

Relationship with their Neighbors: During qualitative interviews with farmers, many reported that sack gardening had strengthened friendships or cooperation between themselves and their neighbors as a result of sharing their vegetables with their friends, sharing extra seedlings, helping each other to carry soil or build their sacks, or pooling money to buy fertilizer and pesticides. Sack gardening has helped to create a sense of community because it has given people reasons to talk to their neighbors. They buy water from each other, consult with each other about problems, and create employment for each other. This study found that sack farming has been a way to bring the women of certain neighborhoods together, and according to one farmer, has decreased tensions between different ethnicities in Kibera. Following the post-election violence of 2008 that took place between different ethnic groups in Kibera and throughout Kenya, it is significant that sack gardening has brought women of different ethnic groups together.

Respondents who were part of the household survey were asked to rate their relationships with their neighbors, from very good (speak every day) to poor (do not get along). Farmers reported having significantly (df=304, p≤0.00) better relationships with their neighbors than nonfarmers. In addition, almost one-third of farmers (32%) reported that they now interact with their neighbors more frequently than they did before they began sack gardening. In Kibera, where it is normal for multiple households to share a single housing block, having a good relationship with one's neighbors is important for a household's safety and survival, and is thus and a good measure of a person's social capital.

Exchanges of Goods: Exchanges of goods and services between friends and neighbors in urban areas are another important measure of that household's social capital. Because our research demonstrated that sack gardening had strengthened friendships and improved many farmers' relationships with their neighbors, we expected that farming households might give and receive goods more frequently than nonfarming households. Farmers were significantly more likely than nonfarmers to receive harvested goods (vegetables), labor for agriculture, and information from their neighbors. Those farmers who reported that their relationships with their neighbors had improved since beginning sack gardening were significantly more likely to receive information, labor for agriculture, and cash loans from their neighbors. The greater availability of cash loans was particularly important because this demonstrates that farmers had improved their social safety net as a result of beginning farming.

All the above measures of social capital among farmers and nonfarmers are particularly important because our broader research found that higher social capital was strongly correlated with household food security (Gallaher, Kerr, Njenga, Karanja, & WinklerPrins, 2013).

Summary and Conclusions

This research on sack gardening in the Kibera slums of Nairobi demonstrates that sack gardening

is a viable livelihood strategy that residents of the slum have successfully integrated with other existing urban livelihood strategies. Households drew on their capital assets in a variety of ways as they practiced urban agriculture. Farmers drew on both physical and natural capital to enable them to set up and maintain their sack gardens. Physical capital, such as sacks and seeds, was relatively easy for farmers to obtain. However, insecure access to natural capital, including land, soil, and water, was one of the major limiting factors in determining how many sacks a farmer had, or whether they were able to begin farming. Farming households with greater human capital, mainly those with previous agricultural experience, were more likely to participate in sack gardening. Sack gardening also helped to build human capital by teaching farmers a new skill that they were able to share with others. Sack gardening contributed to financial capital through income generated from sales of vegetables and savings by producing vegetables for the household's own use. This income was saved through local savings and credit systems and also used to meet other household needs, such as paying for health services, rent, and food. Finally, sack gardening positively contributed to farmers' social capital by creating stronger social networks between those involved in gardening groups, creating a greater sense of community, and strengthening friendships between farmers and also between farmers and their nonfarming neighbors. These findings have broader implications for urban agriculture in cities worldwide because they demonstrate that slum dwellers are able to successfully integrate small-scale urban agriculture activities into their urban livelihood strategies. However, farming in informal settlements does have particular challenges. Access to natural capital including soil, irrigation water, and land must be addressed for these small-scale urban agricultural methods to succeed.

In the context of increasing urbanization, development programs need to support a variety of livelihood strategies that are accessible to the urban poor. While urban agriculture is often inaccessible to slum dwellers because they lack access to land, our case study has demonstrated that low-space agriculture is a viable livelihood strategy and therefore deserves greater attention as part of global urban development initiatives. Sack gardening has spread in popularity and is now being promoted by many community development organizations throughout the world as a way of improving household food security and diversifying local livelihood strategies. Our broader research on sack gardening in Kibera found that it positively influenced household food security (Gallaher, Kerr, et al., 2013) but that there are legitimate concerns about contamination of food grown in sack gardens as a result of the highly contaminated soil in many slum environments (Gallaher, Mwaniki, et al., 2013). Further research is needed in other urban environments to see if sack gardening can be scaled up to promote diversified livelihoods and household food security without compromising the long-term health of the inhabitants.

Additionally, for sack gardening and more generally urban agriculture to be viewed as a permanent and viable, long-term option for urban development and promotion of urban food security, more needs to be done to formally recognize urban agriculture as a legal activity. In many countries in sub-Saharan Africa, urban agriculture is still illegal or lacks official government support. Thus despite the great potential of urban agriculture to contribute to livelihoods of the urban poor, it does not receive the attention it deserves in the context of urban planning, agricultural extension, and overall development initiatives. Formally recognizing urban agriculture as a viable urban livelihood strategy would provide much needed institutional support to urban farmers.

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Products from urban collective gardens: Food for thought or for consumption? Insights from Paris and Montreal

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Abstract

Among the various forms of urban agriculture that have emerged and been developed over the past 15 years in countries of the global North, collective gardens (CGs) are one of the most significant. In Montreal and Paris, their numbers have increased rapidly in the past 20 years. Previous research has shown that food production is an important motivation for urban dwellers to engage in gardening activities, but the food function of CGs, that we define as the quantitative and qualitative food supply they are likely to provide to gardeners, is poorly known. This paper investigates this food function in Paris and Montreal. We carried out comprehensive interviews with gardeners, quantified production, and did plot monitoring to provide insights on the quantities of fruits and vegetables produced in CGs, the destination of garden produce, the use of space in plots, and the types of crops grown in CGs and their yields. The results show a wide diversity of practices regarding CGs' food function that has to be considered in relation to the multifunctionality of these gardens. The paper concludes with a discussion on the results and the implications of this research for garden planning and management.

Keywords

collective gardening, multifunctionality, urban agriculture, urban gardening, urban food production, Paris, Montreal

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Introduction and Literature Review

In industrialized cities, growing concerns regarding food quality and the environmental and social conditions of food production are currently leading to renewed interest in urban agriculture (Evers & Hodgson, 2011; Pothukuchi & Kaufman, 1999). Two different perspectives can be found in the recent academic literature on urban agriculture: on the one hand, a range of studies describe urban agriculture by focusing on its outputs, production processes, and geographical location[1] (Algert, Baameur, & Renvall, 2014; Smith & Harrington, 2014); on the other hand, several North American authors describe the social and environmental movement driving urban agriculture (Cohen, Reynolds, & Sanghvi, 2012; Duchemin, 2013; McClintock, 2010).

Among the various forms of urban agriculture that have emerged and developed over the past 15 years in countries of the global north, collective gardens (CGs) are one of the most significant. CGs include cultivated spaces managed collectively by groups of gardeners, most often for food-production purposes and for the gardeners' own consumption, located at a place distant from the gardener's home (INRA, 2013). They include both historical forms of gardens, whose origins go back in the late 19th century (such as family gardens in France, allotment plots in the UK, or community gardens in Quebec), and more recent forms of gardening, such as shared gardens in France. As we realized that the same expression can refer to a diversity of designs, settings and statuses[2] from one country to another and even within a same country, we use the term "CGs" to avoid ambiguity that may arise from using a word already used in a specific context.

Since the early 2000s, the number of CGs and the number of urban dwellers involved in a form of collective gardening have increased rapidly in many industrialized countries. This is reflected in the academic literature, where various case studies describe the extent of CGs in the cities of the Global North. While illustrating the environmental, social, and/or economic functions that CGs have for these cities, these case studies exemplify the multifunctionality of CGs and the various benefits and motivations associated with collective gardening (Draper & Freedman, 2010; Duchemin, Wegmuller, & Legault, 2008; Evers & Hodgson, 2011; Gittleman, Jordan, & Brelsford, 2012; Pourias, Daniel, & Aubry, 2012).

During the last decade, driven by the increasing popularity of CGs, several studies assessed the potential of CGs to contribute to the urban food supply (Darrot & Boudes, 2011; Grewal & Grewal, 2012; MacRae, Gallant, Patel, Michalak, Bunch & Schaffner, 2010; McClintock, Cooper, & Khandeshi, 2013). These studies concluded that a substantial part of urban food demand could be produced within the cities' own boundaries by putting vacant land into production.

At the same time, a set of studies aimed at documenting qualitative changes in gardeners' diets; in North America, recent studies on nutrition and public health have demonstrated that people involved in community gardening have a healthier diet than nongardeners regarding their average consumption of fruit and vegetables (Alaimo, Packnett, Miles, & Kruger, 2008; Litt, Soobader, Turbin, Hale, Buchenau & Marshall, 2011). Gerster-Bentaya (2013) has argued that CGs, as a form of "nutrition-sensitive urban agriculture" have the potential to contribute to diversify diets of urban dwellers and should therefore be given more attention in public policies, especially regarding their connections with local food systems.

Regarding the individual motivations of gardeners, food production appears to be one of the most important motives mentioned by gardeners. For example, a 2000 study on 20 community gardens in upstate New York showed that the most commonly expressed reasons for participating in gardens were to access fresh foods, enjoy nature, and receive health benefits (Armstrong, 2000). In

[1] Urban agriculture was defined by Moustier and Fall in 2004 as the agriculture located in or around a city, whose products cater for the city; urban agriculture is characterized by the conflicts or complementarity that might exist between agricultural and urban non-agricultural use of its resources (Moustier & Fall, 2004)

[2] For example, in France, "shared gardens" can refer to gardens that provide communal or individual plots, while "family gardens" are most often divided into individual lots, but are also evolving toward new layouts that include communal plots.

Montreal, producing fresh and locally grown food is a very important motivation for 60% of gardeners, while saving money is a very important reason for only 18% of the community gardeners (Duchemin, 2013). Duchemin reports that, in Europe, the reasons for engaging in a form of gardening are similar to those in Montreal, despite a slightly greater interest in the social function of the gardens and a slightly lower interest in food production (Duchemin, 2013).

Therefore, according to the existing literature, it turns out that food production in CGs, especially the growing of fruits and vegetables[3], is both an important motivation for participants and a promising way to enhance nutrition and availability of fresh food in cities.

However, the production levels of CGs have received little attention from researchers and very few quantified studies exist to document CGs' outputs (Algert et al., 2014; Evers & Hodgson, 2011; Gittleman et al., 2012). This knowledge gap significantly reduces the impact of recent studies that address the question of food production and consumption in CGs. For example, the positive impacts of gardening on nutrition, observed in several studies, is due to an increased consumption of fruit and vegetables among gardeners; however, it is unclear whether this increased consumption is due to a greater awareness of nutrition issues among gardeners (vs. nongardeners) or due to the quantitative contribution of the gardens themselves that led to a change in diet. This question cannot be answered without knowing the gardens products and how they fit into and their use eventually modifies gardeners' diets.

Similarly, studies investigating the potential contribution of gardens to urban food supply are based either on production data obtained in different soil and climate contexts than their field of study, or on theoretical yields calculated from yields obtained in conventional agriculture (Darrot & Boudes, 2011; Grewal & Grewal, 2012; MacRae et al., 2010; McClintock et al., 2013). Yet it appears that the cropping practices of urban gardeners and the yields achieved in CGs differ significantly from what is observed in conventional agriculture (Algert et al., 2014).

An emerging body of literature has focused on the possibility of quantifying production rates of CGs. These studies have proposed methodologies, including participative methods, to record the amount of fruit and vegetables produced (Duchemin & Enciso, 2012; Gittleman et al., 2012; Smith & Harrington, 2014; Vitiello & Nairn, 2009). These studies highlight two important points: (a) the relatively high yields per unit area observed in CGs, which are close to the yields achieved in bio-intensive agriculture (Algert et al., 2014; McClintock et al., 2013) and (b) the very high variability of yields and quantities produced from one plot to another (Gittleman et al., 2012; Vitiello & Nairn, 2009). These recent studies have drawn attention to the need for better estimating and understanding the quantities of fruit and vegetables produced in urban gardens.

Regarding the contribution of CGs outputs to gardeners' food supply, a recent French study proposed a methodology based on surveys to assess levels of self-procurement achieved in one French family garden for each crop grown in garden plots; this study showed that gardeners achieved very high rates of self-procurement for fruits and vegetables (Mienne, Mandereau-Bruno, Isnard, & Legout, 2014).

Regarding the types of crops grown in CGs, several studies conducted in the U.S. provide lists of the most commonly grown crops in U.S. community gardens.[4] Methodologies differ from

[3] The products of CGs are diverse, and recent studies have shown evidence in urban contexts of the development of livestock and beekeeping (McClintock, Pallana, & Wooten, 2014). However, fruits and vegetables are the most common food products in CGs and we will focus on that type of production in this paper.

[4] In available studies, we find the following crops (among others), in different orders depending on the indicator used (area, weight, preference census, etc.): tomatoes, beans, sweet peppers, hot peppers, lettuce and leafy vegetables, cucumbers, zucchinis, onions, peas, sweet corn, and radishes. It is striking that among the most popular crops in New York City community gardens, one finds "exotic" vegetables (e.g., calaloo, okra) that do not appear in the National Gardening Association survey (2009) at national level, which shows a range of crops closer to the traditional Western diet. The same range is found in French family gardens, with the notable

one study to another. For instance, in New York, Gittleman et al. (2012) based their calculation on the number of plants recorded in a sample of garden plots. In a survey on a representative sample of the U.S population, the National Gardening Association (NGA) drew up an inventory of gardeners' favorite crops (Butterfield, 2009). In France, data are available only for family gardens, and most of these data are old or poorly detailed regarding the methodology used (FranceAgriMer & Fédération des Jardins Familiaux et Collectifs [FNJFC], n.d.; Union des Entreprises pour la Protection des Jardins et des Espaces Publics [UPJ]–CSA, 2007), except for a recent survey among gardeners of one family garden in the region of Paris (Mienne et al., 2014). There is a clear need to update data on the types of crops grown in CGs and to provide standardized methods in order to allow for comparisons.

Little is known, furthermore, on the use and destination of garden produce. A few French and American studies suggest the importance to gardeners of sharing their harvests; giving away a part of the garden produce is identified as a goal in itself in production strategies (National Gardening Association, 2009; Weber, 1998). Storing garden produce also seems to be a common practice (Gojard & Weber, 1995; Mienne et al., 2014). In 1995, Gojard & Weber identified three models of consumption among French gardeners: annual consumption (small livestock and easily stored products); seasonal and diversified consumption (exclusively oriented toward spring or summer produce); and occasional consumption (fresh herbs and fresh produce in small amounts) (Gojard & Weber, 1995). These findings need to be updated and examined in greater depth today to reflect a gardening landscape that has changed, particularly since new types of CGs have emerged over the last few decades.

Following this literature review, we identify several knowledge gaps on the food function of CGs, which we define for the purpose of this study as the quantitative and qualitative measures of food supply that CGs are likely to provide to gardeners, measured by the type of products grown in CGs, the contribution of these products to gardeners' diets, the quantities produced, the yields, and, finally, the use and destination of the garden products. This paper aims to contribute to filling these gaps while also providing insights on the food production processes in CGs. .

In the first part of this paper we provide insights on the harvest of CGs: (a) the quantities of fruits and vegetables harvested; (b) their contribution to gardeners' food supply; and (c) the use and destination of garden produce. In the second part of the paper, we apply land-use assessment methods taken from the agronomy of farming systems that were previously adapted to the context of diversified market-gardening (Mawois, Aubry, & Le Bail, 2011; Navarrete & Le Bail, 2007). These methods allow us to analyze (a) the intensity of use of surface areas in CGs; (b) the most common crops in CGs in terms of surface area; (c) the crop diversity in CGs and (d) the yields of CGs.

Methodology

The methodological framework involved two study sites (Paris and Montreal) and an original combination of quantitative and qualitative data.

Study Sites

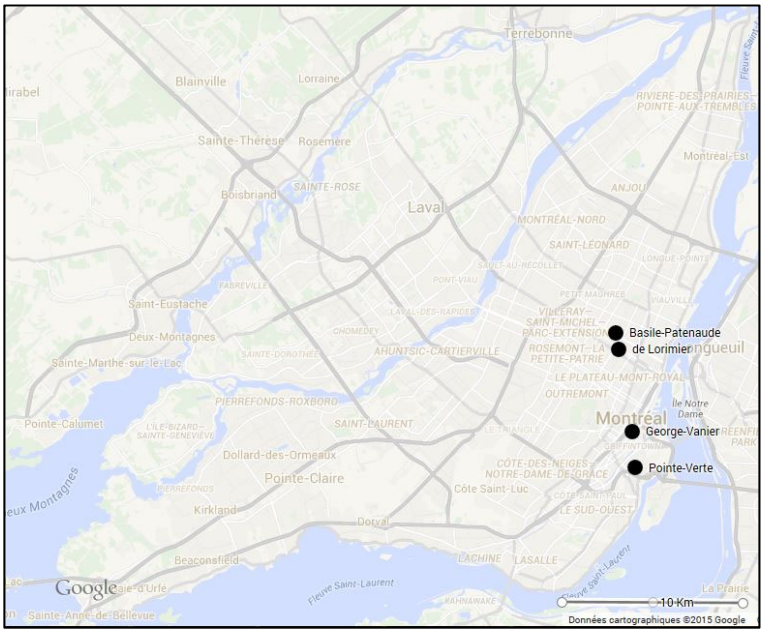
The study was conducted in Paris and its close suburbs, and in Montreal. The choice of these two cities was based on a set of common elements and interesting differences that enabled us to perform a comparative analysis. Paris and Montreal are two global cities, i.e., cities that are strongly connected to international economic and social networks and have strategic functions on a global scale (Hales, Peterson, Mondoza Peña, & Gott, 2014; Ghorra-Gobin, 2009). Paris and Montreal have 2.2 and 1.6 million inhabitants, respectively (6.7 million in Paris including its close suburbs, namely the three neighboring districts commonly called *la petite couronne,* literally the "small crown"), for respective

difference of corn, which is not found in France, and potato, which is predominant in France but is found less often in North American gardens. This suggests that very cosmopolitan intra-urban gardens might serve a different population than home gardens or CGs in rural areas across the United States. It calls for an updated study in France on this topic in intra-urban shared gardens, whose history differs significantly from that of family gardens.

densities of 21,300 and 4,500 inhabitants per km² (55,400 and 11,700 inhabitants per mile²). Municipal programs dedicated to promoting urban gardening exist in both these cities, although the municipalities' involvement and regulatory frameworks differ. Consequently the requirements differ as well, in terms of prohibited crops and recommended cropping practices (minimum proportion of the plot devoted to food crops, whether utility buildings are allowed, whether consumption of garden produce is encouraged or discouraged, etc.).

Figure 1. Map of Gardens Selected in Paris

Figure 2. Map of Gardens Selected in Montreal



Source for both maps: Google Maps. (2015). Jardins [Custom maps]. Retrieved from https://www.google.com/maps/d/edit?mid=zLe0X46YqMWI.k0H0MfHM7rp8

The study was conducted in 11 CGs (Table 6, Appendix): seven were located in Paris and its close suburbs, and four in Montreal. In Paris and Montreal the study sites were selected to represent the greatest possible diversity, based on the following criteria: type of garden, geographical location, garden age, size, and number of plots, internal organization (communal plots vs. individual plots), member or not of a municipal program and/or federation. In both cities, gardens exclusively dedicated to flower production, which are unusual but do exist, were excluded.

In Paris, our sample of gardens consisted of three family gardens and four shared gardens (Figure 1). The AJOAC garden, the Pointe de l'Ile garden, and the Bd de l'Hôpital garden are family gardens, created in 1942, 1954, and 2002, respectively. They are all divided into individual plots; however, the size of the plots varies significantly from one garden to another. The AJOAC garden and the Pointe de l'Ile garden are both old gardens that are organized according to the "traditional" design patterns of French family gardens, and they offer plots between 200 and 300m² (2,153 and 3,229 ft²). The Bd de l'Hôpital garden is a more recent family garden, located in a very dense neighborhood of Paris. It offers plots from 20 to 30m² (215 and 323 ft²). Among the four shared gardens of our sample, three offer individual plots that are on average 4m² (43 ft²) for the Ecobox garden, 22m² (237 ft²) for the Jardin aux Habitants, and 150m² (1,615 ft²) for the Jardin des Bordes. The latter

is located in a periurban park, on former agricultural land, while Ecobox and the Jardin aux Habitants are located on a parking lot and along a street, respectively, within Paris. The last shared garden, the Sens de l'Humus garden, consists of one single communal plot of 500m² (5,382 ft²).

In Montreal, our study sample consisted of four community gardens (Figure 2). All were located in the city of Montreal and offered individual plots of 15 to 18m² (161 to 194 ft²). The Basile-Patenaude garden was probably created in the 1980s and is located in the district Rosemont-Petite Patrie. The George-Vanier garden and the Pointe-Verte garden were created in 1985 and 1984, respectively. The garden de Lorimier is one of the largest community gardens in Montreal, as it offers 120 plots; it's located in the district Plateau-Mont Royal, the densest district in Montreal.

Within each garden, we selected a sample of gardeners using the method as follows. In Montreal, we took advantage of the occasion of garden general assemblies, which take place in every garden at the beginning of the growing season, to present the ongoing study and ask gardeners to leave their contact details if they were willing to enroll in the study. If we had more than four gardeners on the contact list for one garden, we randomly selected four gardeners for the interview; if we had fewer than four gardeners, we contacted all the gardeners who left their contact details. In Paris, as there were no general assemblies, we first contacted gardeners on the recommendation of a reference person in the garden (for example, the president of the garden association) and then proceeded step by step to meet other gardeners, with the aim of interviewing four gardeners per garden if at all possible.

Data Collection from the Garden Survey

The set of data we worked with includes quantitative data of harvests in the gardens as well as qualitative data from questionnaires and interviews with gardeners and from our observations of the plots.

Interviews

In the end, 23 gardeners in Paris and 14 gardeners in Montreal were interviewed from 2012 to 2013. Each gardener was interviewed twice during the growing season.

At the beginning of the growing season, a semistructured individual interview was held regarding (a) the gardener's visits to the garden (time spent in the garden, frequency of visits, distance from his or her home, etc.) and the functions he or she attributed to the garden; and (b) his or her point of view on the importance of the food function of his or her plot (importance of the garden in the gardener's overall food supply, use and destination of the produce, etc.).

At the end of the growing season, a second, shorter interview was held to assess what had actually happened during the past season. The gardener was asked to give an opinion on his or her actual presence at the garden, the expected and actual yields, problems encountered during the season, and changes to be made for the following year. He or she was also asked to select from a series of situations the one that best characterized the plot's contribution to his or her food supply. This gradient of situations (Figure 3) was built on the basis of preliminary interviews conducted in 2011 in Paris,

Figure 3. Gradient of Collective Garden's Contribution to the Gardener's Food Supply

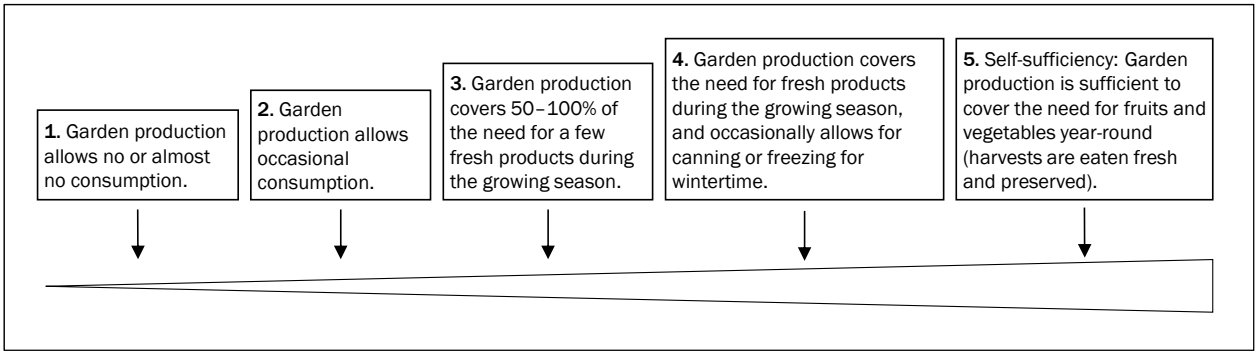
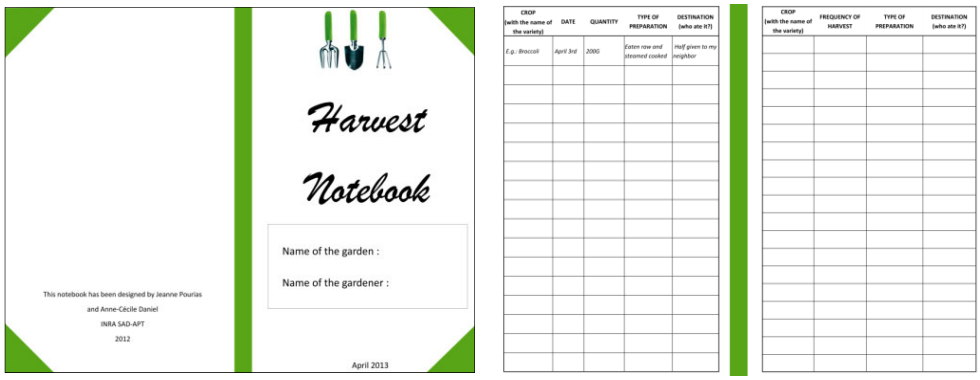


Figure 4. Harvest Booklet: Front and Back Covers and Inside Pages



before the beginning of the study, with experts from local organizations and municipal authorities. It was tested on seven urban gardeners (not included in the sample above). This gradient defines five situations that cover the various ways the garden can contribute to the gardener's diet by providing fresh fruit and vegetables, from no or almost no food production to complete self-sufficiency.

Quantification of Productions (Harvest Booklet)

At the end of the first interview, if the gardener was willing to continue the study we gave him or her a kitchen scale and a harvest booklet (Figure 4). The booklet included tables with the following headings: (a) type of crop; (b) date of harvest; (c) quantity harvested (in grams or units); (d) use of the crop (eaten raw or cooked, preserved or immediate consumption); and (e) destination of the crop (gifts outside the close family).

In Paris, 14 gardeners out of the 23 interviewed (approximately 60%) agreed to fill out the booklet during the 2012 season, nine of whom (approximately 40%) continued until October 2013. In Montreal, 14 gardeners (100%) agreed to complete the booklet throughout the 2013 season.

Plot Monitoring

The plots of gardeners who had been interviewed and who gave their agreement to open their plots to our visits were monitored monthly during the growing season of Paris (March to October) and Montreal (June to October). This monitoring was done in order to analyze the choice and organization of crops by gardeners in space and time. In Paris, the monitoring was conducted on 19 plots in 2012; in 2013, five gardeners decided to stop the study and four new gardeners were enrolled, so the monitoring was conducted on 18 plots in 2013. In Montreal, the monitoring was conducted over one growing season (2013). At each visit, a plan of the plot was drawn up with the help of the gardener, on which the following items were recorded: (a) newly planted crops and the corresponding surface areas; (b) growing plants; and (c) harvest in progress. Gardeners were asked to describe what they had recently planted and to explain the choice of crops. This monthly monitoring was also an opportunity to verify that the gardeners had no problems when weighing their crops and filling out their harvest booklet.

Data Analysis

We used agronomical concepts such as cultivated area and developed area to analyze and interpret field observation data, and statistical tools to process quantitative data.

Surface Areas

Three levels of garden surface areas are used to describe the land use: S_t, S_c and S_d (Figure 5). The plot size (total surface S_t) was recorded at the beginning of the season. S_t is likely to vary from one year to another for gardens in containers and/or when the gardener is given an additional whole plot or section of a plot.[5]

The cultivated area (S_c) was also recorded at the beginning of the season. S_c is the area allocated to food crops, i.e., S_t once the area used by fixed

[5] For example, in case of a gardener who leaves or drops out during the season, the plot is temporarily assigned to other gardeners.

elements is subtracted. These fixed elements may include garden furniture, storage sheds, cabins, pathways, permanent flowerbeds, lawns, or area dedicated to other uses (e.g., a rest area, bowling pitch, or other recreational uses).

The developed area (S_d) takes into account the cropping cycles. As a single bed is likely to be cultivated several times during the season, S_d is the "cumulative area of all the areas cultivated during the various cycles" (Mawois et al., 2011); consequently, a row or a bed seeded twice during the season is counted twice (Figure 5).

The plans drawn up with the help of gardeners were entered in a Microsoft Excel file to automatically calculate newly planted areas. This Excel file was designed to visualize the land occupation throughout the season (surface areas under each crop) and the cumulative area for each crop at the end of the season so as to calculate S_d.

Quantities Harvested

Harvest booklets were collected at the end of the growing season and the data entered into an Excel file. Where gardeners had reported quantities in units (counts), a chart of correspondence between the units and the mean weight of each vegetable was used to convert these units into grams. The chart used was built on the basis of data collected on the Internet, and was calibrated with the help of several gardeners who volunteered to indicate in their booklet both the number of units and the weight in grams of their harvests. This allowed us to obtain average data on the weight of produce harvested in the gardens; however, it remains imprecise in the case of produce with highly variable harvest weight, such as zucchini. The amounts reported in the booklets were compared with the gardeners' assessment during the second interview.

Yields

The global yield (Y_g) is defined as the sum of the amounts of fruit and vegetables produced on the plot during a growing season, divided by S_c.

The yield per crop is defined as the sum of the quantities produced in crop *i,* divided by the sum of developed areas (S_d) planted during the growing season for crop *i.*

Statistical Tools

We used the software R to perform basic statistical analysis on our data, in particular to test the significance of differences between average number of cultivated species, quantities harvested and yields on the plots surveyed.

Results

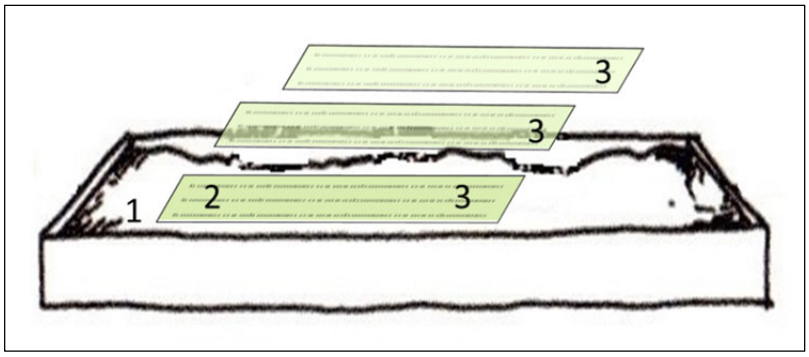
The results section has been divided into three parts: (a) results of harvests (quantities, contribution to gardeners' food supply, destination and use of garden produce); (b) results of the use of plots (production area and intensity of plot use, type of crops, and crop diversity); and (c) the yields achieved in CGs, which brings together the results on harvest and the results on land use.

Harvests

We first present the quantitative data on harvests obtained through the harvest booklets, then the results on how garden produce contribute to gardener's food supply, both in quantity and in quality (destination and use of the produce).

Figure 5. Different Levels of Surface Area Analysis

1. Total plot surface area (S_t); 2. Cultivated area (S_c); 3. Developed area (S_d). In this example, three crops are planted successively during the growing season.



Wide variability in the quantities harvested

The total amounts of fruits and vegetables produced in the gardens vary considerably from one plot to another. Among the plots surveyed, the quantities produced during one season ranged from 8.3 kg on a plot of 18 m² (18.3 lb. on 194 ft²) to 392.7 kg on a plot of 200 m² (865.7 lb. on 2,15 ft²) (Table 1). The highest amount of food are produced in the biggest plots; however, some big plots (>100m² or >1,076 ft²) produce less than small plots (<20m² or <215 ft²).

Contribution to gardener's food supply

In Montreal, three gardeners out of 14 (20%) said they were in situation 2 (see Figure 3), i.e., the harvest allowed for occasional consumption, and 11 gardeners (80%) said they were in situation 3, i.e., the garden produce covered 50% to 100% of their needs for a few fresh products during the growing season. In Paris, one gardener out of 14 said he or she was in situation 1, i.e., his or her garden produce no or almost no food; two gardeners were in situation 2; six were in situation 3; four were in

Table 1. Quantities of Fruits and Vegetables Harvested in Sampled Gardens

City	Type of garden	Plot	S_t (m²)	Mean S_c (m²) (Paris 2012 & 2013; Montreal 2013)	Quantities 2012 (kg)	Quantities 2013 (kg)	Mean quantities (kg)
Montreal	Community gardens	Plot 13	15	14	–	9.2	9.2
		Plot 14	18	16	–	10.5	10.5
		Plot 5	18	16	–	17.7	17.7
		Plot 8	18	15	–	22.4	22.4
		Plot 3	15	12	–	23.7	23.7
		Plot 7	15	14	–	23.7	23.7
		Plot 12	18	16	–	25.0	25.0
		Plot 6	11	10	–	25.7	25.7
		Plot 2	18	14	–	28.0	28.0
		Plot 9	18	17	–	30.5	30.5
		Plot 4	18	17	–	39.4	39.4
		Plot 10	18	18	–	42.0	42.0
		Plot 1	18	17	–	51.3	51.3
		Plot 11	15	13	–	56.2	56.2
Paris	Family gardens	Plot 10	28	18	8.3	–	8.3
		Plot 2	391	226	29.3	–	29.3
		Plot 13	300	141	37.9	26.9	32.4
		Plot 12	200	137	132.1	75.0	103.6
		Plot 8	200	144	155.3	159.8	157.6
		Plot 4	178	105	223.1	245.4	234.2
		Plot 9	200	116	392.7	257.7	325.2
	Shared gardens	Plot 10	500	200	12.1	–	12.1
		Plot 1	75	40	12.3	–	12.3
		Plot 6	6	5	13.8	–	13.8
		Plot 7	15	8	18.8	23.3	21.0
		Plot 4	22	16	24.8	33.1	28.9
		Plot 3	129	109	38.2	53.1	45.7
		Plot 2	129	111	105.6	155.0	130.3

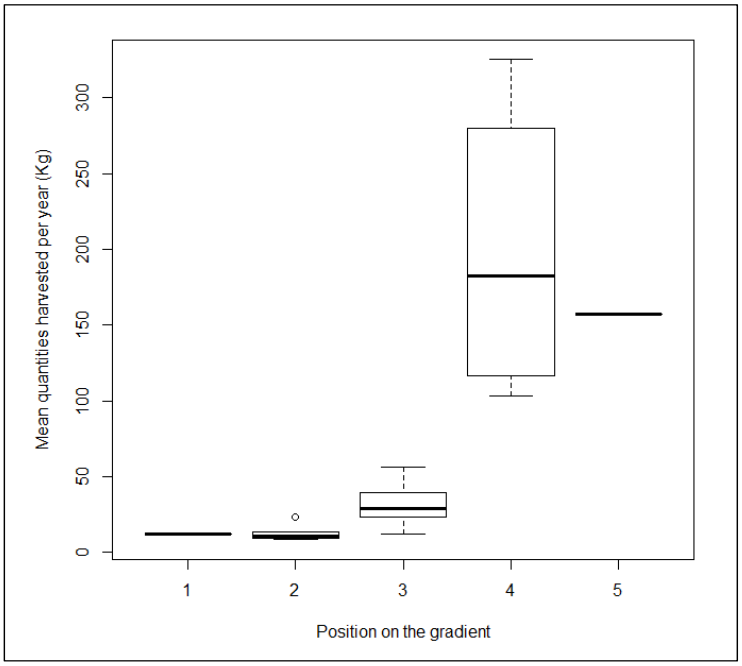
Note: 1m²=11 ft²; 1 kg=2.2 lb; 1kg/m²=0.2 lb/ft²

Table 2. Four Models Regarding the Use of Garden Produce

Models	Length of harvest	% of crop preserved	Example of produce
1. Seasonal production of fresh vegetables	4 to 5 months in Montreal; 4 to 7 months in Paris	0–30%	Plots strongly oriented toward the production of leafy vegetables, often with a diversity of species and some uncommon vegetables seldom found in shops or expensive (dandelion, cichoria catalonia, radicchio, watercress, etc.) and aromatic herbs.
2. Seasonal self-production with preservation of part of the harvest	4 to 5 months in Montreal; 4 to 7 months in Paris	30–80%	(A) Production of summer vegetables to make pesto, ketchup, and tomato sauce (tomatoes, basil, garlic, celery); (B) Production of fruit for jam; (C) Very specialized production of one or two types of vegetable that are seldom found in shops and/or expensive and that can be preserved for a year-round supply (e.g., African spinach).
3. Self-production year-round with most vegetables consumed immediately (little preservation)	Was not observed in Montreal; 8 to 12 months in Paris	0–30%	Production of seasonal products eaten rapidly after harvest (radishes and lettuce in spring; tomatoes, zucchinis, pepper, eggplants, beans in summer; celery, carrots, turnips, squashes in fall; leeks, cabbage, and leafy vegetables under cover in winter).
4. Traditional model: self-production year-round with storage and preservation of a large part of the harvest	Was not observed in Montreal; 8 to 12 months in Paris	30–80%	Production of seasonal products eaten fresh, plus vegetables that are easy to store to be eaten throughout winter (potatoes, carrots), and fruit for canning (jam and sauce).

situation 4, i.e., the garden produce covered their fresh produce needs during the growing season; and one was in situation 5, i.e., self-sufficiency. Self-assessment of the contribution of their plot to their food supply was consistent with the quantities harvested, as the average quantities harvested by gardeners who said they were in situation 3 (31±12 kg; n=17) were significantly larger[6] than the quantities harvested by the gardeners in situations 1 (12.1 kg; n=1) and 2 (13±6 kg; n=5), and the quantities harvested by gardeners in situation 4 (198±100 kg) or 5 (157 kg) were significantly[7] larger than the quantities harvested by gardeners in situation 3 (Figure 6).

Figure 6. Comparison of Gardeners' Self-assessment of the Importance of the Garden in their Food Supply and the Quantities Harvested, Indicating Position on the Gradient (see Figure 3)



Note: 1 kg=2.2 lb

Destination and use of garden produce

Considering the variability of our sample,

[6] Kruskal-Wallis chi squared=9.933, df = 2, p=0.006968<0.05

[7] Kruskal-Wallis chi squared=11.087, df = 2, p=0.003913 <<0.05

we propose four models for the use of garden produce, based on two criteria: the length of the growing season and the percentage of the harvest preserved (Table 2). These two indicators give information on the types of crop grown and how long the garden is likely to provide a food supply. The length of the growing season varies from one garden to another. Between Paris and Montreal, differences in the length of the growing season are due to differences in climatic conditions. In Paris, harvests can range from February to December, with a peak from July to September. In Montreal, harvests can range from May to October, with a peak in August and September. Most of the gardeners in our study sample correspond to models 1 and 2. In Montreal, six gardeners out of 14 were in model 1 while eight were in model 2. Models 3 and 4 were not observed in Montreal, as winter cropping is not possible in Montreal community gardens. In Paris, nine gardeners out of 14 were in model 1, one was in model 2, one in model 3, and three in model 4. Gardeners who followed models 3 and 4 were gardeners who had relatively big plots (120 to 200m^2, or 1,292 ft^2 to 2,153 ft^2).

Sharing the harvest with people outside the immediate family (those living in the same household), such as extended family, friends or colleagues, is a major destination for crops. The percentage of produce given away is not related to levels of production; gardeners who produce the largest quantities are not necessarily those who give the most, and vice versa (Figure 7).

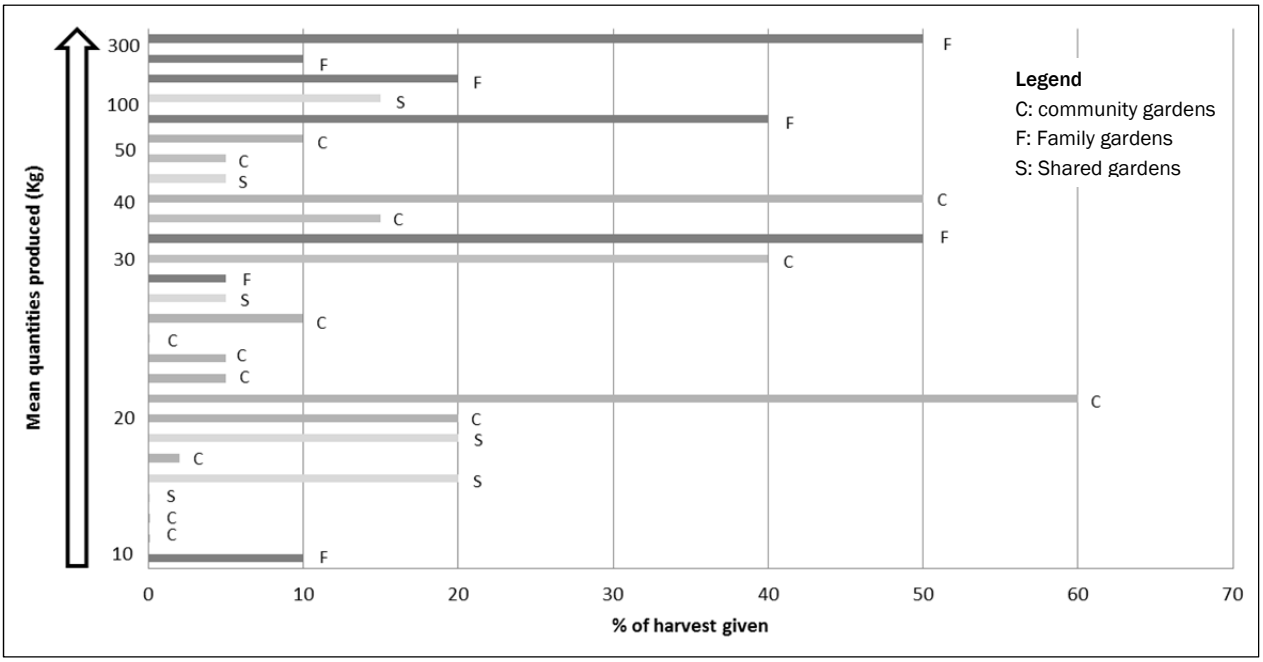
Use of Plots

Cultivated areas

When the plots were monitored over two years (Paris, n=14) we found that, for the same plot, the area dedicated to food production that we refer to as the cultivated area (S_c) varied little from one year to the next.

The share of the plot dedicated to food production (S_c/S_t) varies a great deal among gardeners; in our sample, depending on the plot, 40% to 100% of the total surface area of the plot is used for food production (76 ±16% on average on all 37 plots surveyed). In Figure 8, S_c/S_t is given for each plot of study and represented by the grey line.

Figure 7. Quantities of Fruit and Vegetables Produced According to Percentage of Harvest Given Away Outside the Immediate Family



Note: 1 kg=2.2 lb

According to our observations, two factors can contribute to explaining this variability: the size of the plot and the type of garden.

Gardeners of small plots (<20m² or <215 ft²) allocate on average a larger part of their plot to food production (88 ±11% of the plot dedicated to food crops, on average) than gardeners of medium-sized plots (20 to 100m² or 215 to 1,076 ft²; 66 ±9% of the plot dedicated to food crops, on average) or large ones (100 to 500m² or 1,076 to 5,380 ft²; 64 ±14% dedicated to food crops, on average).

The space dedicated to fixed elements and recreational uses is on average more prominent in Parisian gardens. Gardeners of family and shared gardens in Paris allocate on average respectively 64 ±9% and 73 ±18% of their plot to food production, while gardeners in Montreal community gardens allocate on average 89 ±7% of their plot to food production.

Within the same class of plot size or within the same type of garden, we still observe variability from one gardener to another. As one might expect, individual choices of gardeners regarding the motivations and functions assigned to the garden also strongly influence the share of the plot dedicated to food crops.

Figure 8. Share of Plot Dedicated to Food Production

Plot size (class)	Plot size (m²)	Actual production area (S_c/S_t; in %)
Small plots (<20m²)	4	89
	4	108
	6	79
	11	90
	15	57
	15	77
	15	84
	15	88
	15	92
	18	76
	18	81
	18	88
	18	92
	18	92
	18	96
	18	97
	18	98
	18	94
Medium plots (20-100m²)	22	73
	25	74
	25	80
	28	68
	30	55
	30	67
	70	63
	75	53
	91	58
Big plots (>100m²)	101	68
	129	84
	129	86
	178	59
	200	58
	200	69
	200	72
	300	47
	391	58
	500	40

Note: 1m²=11 ft²

Developed areas

S_d reflects the number of crop cycles on a given plot and the length of the growing season. As S_d is the cumulative area of all the areas cultivated during the various cycles of the growing season, the S_d/S_c ratio is frequently above 100%.

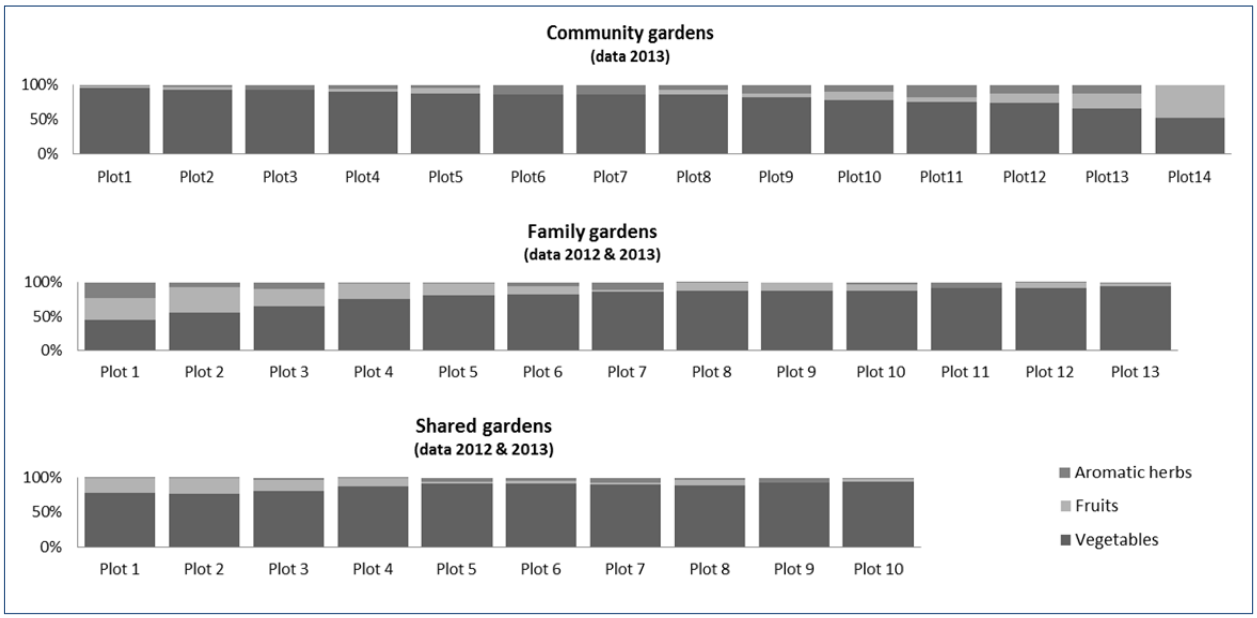
Again, this ratio varies highly from one gardener to another; in our sample of Parisian garden plots, it ranged from 18% to 176% in 2012 (average of 109% on all 19 plots) and from 36% to 130% in 2013 (average of 92% on all 18 plots). In our sample of Montreal garden plots, it ranged from 44% to 107% in 2013 (average of 83% on all 14 plots).

The size of the plot does not seem to influence this ratio. The major factor that explains the variation, aside gardeners' individual choices, is the length of the growing season. The S_d/S_c ratio is on average lower for Montreal gardens than for Parisian gardens, as the season is shorter in Montreal, where gardens are open from May 15 to October 30, whereas they are open year-round in

Table 4. Main Crops in Montreal and Paris Gardens (mean % of total S_d)

Montreal, 2013 (*n*=14 plots)			Paris, 2012 (*n*=19 plots)			Paris, 2013 (*n*=18 plots)		
Crops	Mean % of total S_d	Standard deviation	Crops	Mean % of total S_d	Standard deviation	Crops	Mean % of total S_d	Standard deviation
Tomato	18.4	14.1	Lettuce	14.6	8.7	Lettuce	13.5	11.4
Bean	9.4	7.2	Tomato	8.6	11.4	Tomato	10.0	14.0
Lettuce	6.2	7.6	Beans	6.6	5.0	Beans	7.6	8.7
Garlic	4.6	6.0	Cabbage	5.9	6.3	Strawberry	7.1	5.7
Pepper	4.4	5.7	Potato	4.8	5.4	Potato	5.8	6.0
All vegetables	82.7	2.1	All vegetables	82.2	2	All vegetables	81.4	2.3
All fruits	8.2	0.9	All fruits	14.4	1.1	All fruits	16.6	1.1
All aromatics	9.1	1.2	All aromatics	3.3	0.6	All aromatics	2.0	0.6

Figure 9. Importance of Each Type of Crop (Vegetables, Fruits, and Aromatic Herbs) in Collective Garden Plots (% of total S_d)



France. From 2012 to 2013, S_d decreased slightly in most Parisian gardens plots. This can be explained by the different climatic conditions from one year to the next; the growing season started much later in 2013 than in 2012 due to an unusually cold spring. Therefore, *within a given year and for the same climate zone,* S_d/S_c reflects the relative intensity with which the gardener uses the cultivated area (S_c).

Main crops cultivated in plots of study

At our study sites, the three most important crops in terms of surface area are tomatoes, lettuce, and beans (green and dry beans), followed by cabbage, potatoes, and strawberries in Paris, and by garlic and peppers in Montreal (Table 4).

For the 39 plots in the study, most of the total developed area is cultivated with vegetables (86% on average in Paris shared gardens, 79% in Paris family gardens, and 82% in Montreal community gardens). The rest of the developed area is occupied by fruits and herbs, with a variable share between the two depending on the plot (Figure 9).

Crop diversity

On the plots investigated, six to 36 species were counted for S_c of 4m² (43 ft²) and 137m² (1,475 ft²),

Figures 10a and 10b. Food Crop Diversity in Study Plots According to Size of Cultivated Area (S_c)

Figure 10a. Crop Diversity by Cultivated Surface, for Paris and Montreal

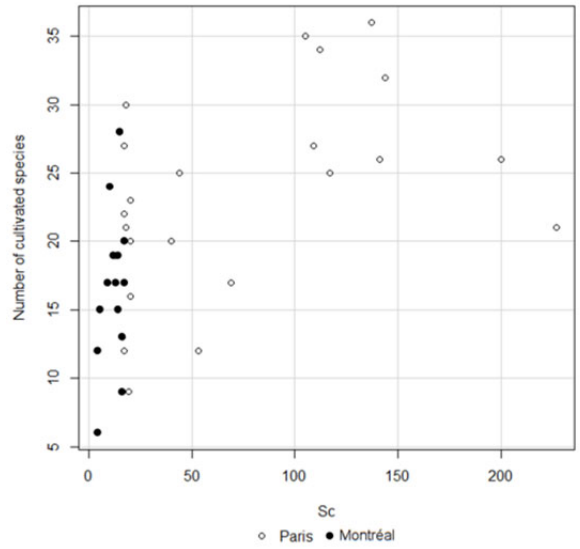
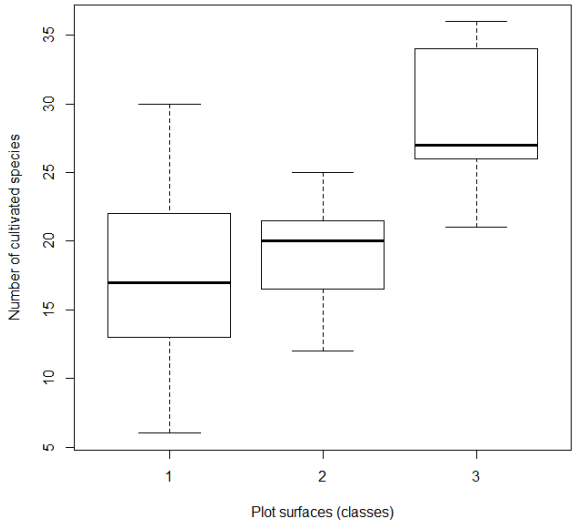


Figure 10b. Crop Diversity by Class of Cultivated Surface
Plot surface classes: 1: S_c<20m² (*n*=21), 2: 20<S_c<100m² (*n*=7), 3: S_c>100m² (*n*=9)



Note: 1m²=11 ft²

respectively (Figure 10a). The size of the cultivated area appears to be poorly correlated with the number of cultivated species.[8] However, a bigger cultivated area seems to allow a slightly higher number of cultivated species, especially when S_c>100m² (1,076 ft²) (Figure 10b).

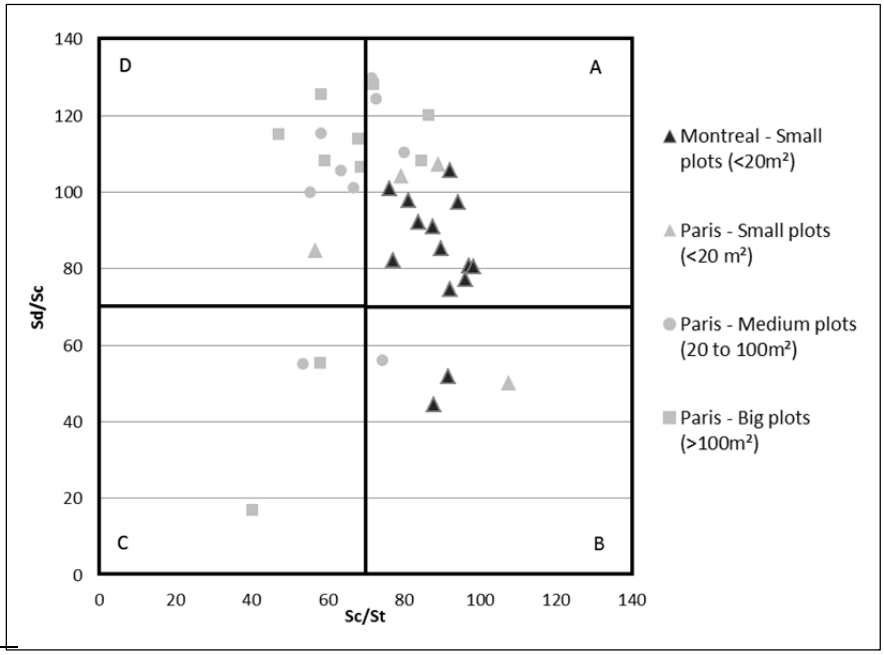
Land use intensity

Following our previous findings on the S_c/S_t and S_d/S_c ratios, we identify four classes of gardeners according to their use of space (Figure 11).

Class A refers to gardeners who use their plots very intensively for food crops (S_c/S_t and S_d/S_c are high); class B refers to

Figure 11. Four Classes of Gardeners According to Their Use of Land for Food Production (Paris, *n*=23, average for 2012–2013; Montreal, *n*=14, 2013)

Legend: A. Highly intensive use of the plot for food crops; B. Plot mainly dedicated to food crops but low intensity in the use of space; C. Non-intensive use of the plot, with priority to uses other than food production; D. Highly intensive use of the cultivated area for food crops but other uses of the garden as well.



Note: 1m²=11 ft²

[8] Adjusted R-squared=0.24

gardeners whose plots are mainly dedicated to food crops but who do not use this space intensively (S_c/S_t is high, S_d/S_c is low); class C refers to gardeners who have a non-intensive use of their plot, as they give priority to uses other than food production in the garden (S_c/S_t is low, S_d/S_c is low); and class D refers to gardeners whose plot is dedicated in part to uses other than food production but who still use the cultivated area intensively. Table 5 indicates how many plots fall into each category for each study location.

These classes of land use intensity are consistent with the data collected during interviews on the uses and functions assigned to the gardens by gardeners.

Table 5. Classification of Plots According to Land-Use Intensity

Class	Number of plots	
	Montreal	Paris
A	12	8
B	2	2
C	0	3
D	0	10

Yields

Y_g is the total quantity harvested on a plot during one growing season, divided by the cultivated area (S_c). Y_g vary considerably from one gardener to another. In our sample data, we observe no significant difference between the average yields obtained in 2013 in Montreal community gardens (1.9 ±1kg/m²; 0.4 lb/ft²), those obtained in 2012 and 2013 in Parisian family gardens (1.2 ±1kg/m²; 0.2 lb/ft²), and those obtained in Parisian shared gardens (1.4 ±1kg/m²; 0.3 lb/ft²).[9] There were no significant differences in global yields in Paris between 2012 and 2013.[10] However, we observe significant differences between classes of land-use intensity[11]. Gardeners in classes A (n=22), B (n=2), C (n=3) and D (n=10) in terms of land-use intensity have respective global yields of 1.7 ±0.9kg/m², 1.1 ±0.6kg/m², 0.2 ±0.1kg/m², and 1.8 ±1.1kg/m² (or 0.3 lb/ft², 0.2 lb/ft², .0.04 lb/ft², and 0.4 lb/ft²). We can conclude from the observation of means and analysis of variances that gardeners in class C have lower yields than gardeners in other classes of land use intensity (Figure 12).

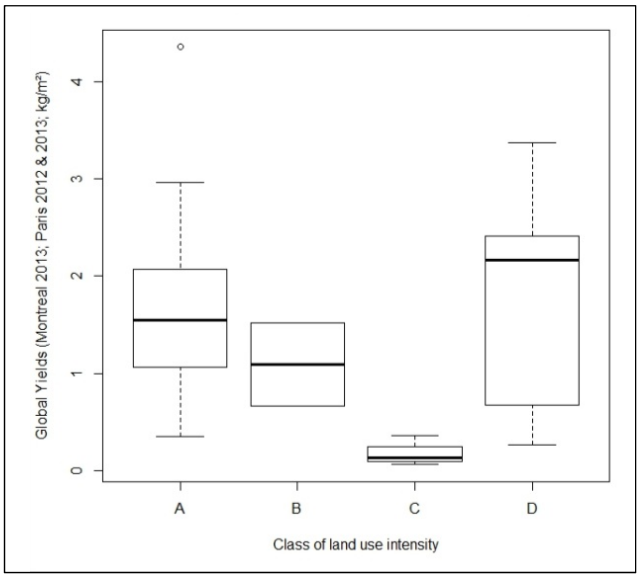
Figures 13a and 13b present the yields for two of the largest crops in terms of surface area, beans and tomatoes. The yield was calculated as the total quantity of beans and tomatoes harvested during the growing season, divided by the developed surface area for these crops.

Yields per crop vary widely from one gardener to another. In 2012, yields for tomatoes ranged from 0 to 4.1kg/m² (0 to .8 lb/ft²) in Paris. The particularly bad weather conditions in 2012 led to widespread mildew in the Paris area, which caused the loss of a substantial part of the tomato crop in gardens as well as in professional market gardening. In 2013, yields for tomatoes ranged from 0kg/m² to 10kg/m² (2 lb/ft²) in Montreal and from 0kg/m² to 5.9kg/m² (1.2 lb/ft²) in Paris.

Discussion

In this study, we observed an extreme variability from one study plot to another, in terms of both

Figure 12. Average Yields per Class of Land-Use Intensity



Note: 1 kg=2.2 lb; 1kg/m²= 0.2 lb/ft²

[9] Kruskal-Wallis chi-squared=3.5045, df=2, p =0.1734>0.05
[10] Paired t-test t=0.7114, df=8, p=0.497>0.05
[11] Kruskal-Wallis chi-squared=9.2133, df=3, p=0.04167<0.05

Figures 13a and 13b. Yields for Tomatoes and Beans (total weight of crop harvested per plot/S_d for this crop)

Figure 13a. Yield for Tomatoes in 25 Collective Garden Plots (in kg/m²)

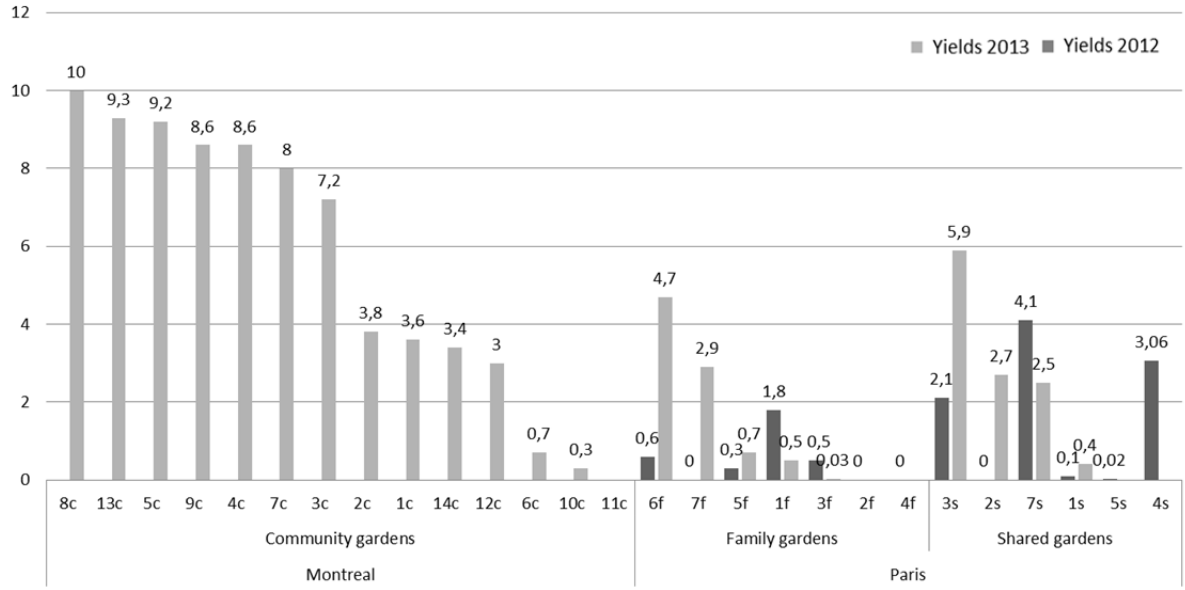
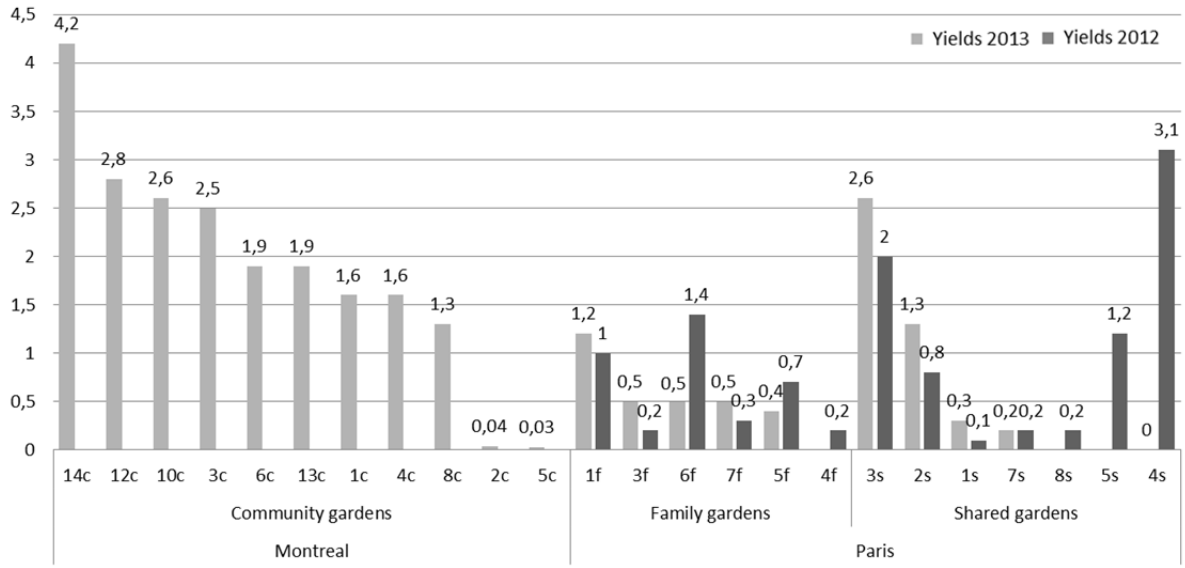


Figure 13b. Yield for Beans in 21 Collective Garden Plots (in kg/m²)



Note: 1kg/m²=0.2 lb/ft²

the use of space and the quantities harvested. This variability is in part linked with the diversity of the study sample, and allows us to highlight the determinants of food production in collective gardens.

From our findings we can distinguish individual determinants, at the scale of one plot managed by a gardener, and determinants at the scale of the garden, which have to do with the layout of the garden and the rules and regulation that apply. We will first discuss the findings of this study and link

them both with individual decisions by gardeners and with the general context of the garden.

We will then present the implications of these findings for planners interested in setting up urban collective gardens.

Discussion of Results

In accordance with previous studies, we found that quantities produced in collective gardens vary considerably from one plot and gardener to another.

The harvest booklet appears to be a reliable tool to evaluate the levels of production in gardens. However, the measurement of quantities produced per year is a tricky task that requires heavy involvement of the gardener throughout the season; weighing and writing down every item in the harvest is a tedious task.

Despite this precise measurement of the quantities harvested in the study plots, we found no direct correspondence between the quantities harvested and the quantities actually eaten by the gardeners and their immediate families; firstly, because collective gardens are often located in a densely urbanized environment, surrounded with pathways and sometimes completely open onto the street nearby, theft is frequent and is difficult to quantify. Secondly, the amounts of produce given away are irregular and variable, but represent an important destination of garden produce.

Just as consumption units and production units are not superimposed in certain types of subsistence farming (Gastellu, 1978), so too is the proportion of garden production in gardeners' diet difficult to ascertain. The sharing and/or preservation of garden produce occur even when the quantities produced are low. We found that the amounts of produce given away outside the gardener's immediate family are quite variable, and do not depend on the level of production. The fact of giving away and sharing food from the garden was previously described by Dubost (1997) as an important social practice among gardeners. In many cases, part of these donations goes to other gardeners in the same garden. In this case, at the scale of the growing season, we can consider these gifts as exchanges: gardeners frequently say that they receive produce from other gardeners in case of surplus or if they do not grow a crop themselves, and in return they give of their own produce for the same reasons. Weber (1998) has argued that giving away a part of the harvest is an alternative to preservation in the case of seasonal production models. We do not agree with this explanation, first because having a seasonal garden does not mean the absence of preservation, and second because we observed gardeners in a year-round production model who gave a large proportion of their harvest away.

Gojard and Weber (1995) distinguished between two self-production models: a model oriented toward self-sufficiency through year-round consumption, with a significant share of the harvest preserved or stored; and a model of seasonal consumption, where most of the harvest occurs during the spring and summer months. We suggest distinguishing four different strategies for use of garden produce, depending on the length of the harvest and the percentage of crops meant to be preserved and/or stored.

Self-assessment of the garden's contribution to the gardener's fresh produce supply is consistent with the quantities harvested over the season. Additionally, these estimates are consistent with national estimates of fruit and vegetable consumption. For example, in 2013 in Paris, gardeners whose production covered a substantial part of their consumption (situations 4 and 5 on the food function gradient, Figure 3) produced on average 182 kg (401 lb). The average annual quantity of fruit and vegetables (excluding potatoes) bought by a family in France was around 167.9 kg (370 lb) in 2012 (Serrurier & Drouard, 2013).

It is worth noting that only gardeners cultivating plots larger than 100m² (1,076 ft²) reported to have significant levels of self-procurement for fruits and vegetables (situations 4 and 5 on the food function gradient), which is consistent with previous studies that showed high levels of self-procurement in garden plots of 200m² to 300m² (2,152 to 3,229 ft²) (Mienne et al., 2014). This brings us to the question of the size of the plots. It suggests that there might be a threshold in plot size regarding the possibility for gardeners to obtain a substantial part of their fresh food supply from garden production.

However, our results show that the size of the

plot in itself is not a reliable indicator of how much a plot may produce. In order to give a more detailed view of the use of space by gardeners and to ascertain how this use of space contributes to the amount of food produced in the study plots, we used three variables to describe the use of space at the scale of the plot: S_t, S_c, and S_d. All three give us different points of view on how the plot is used by the gardener, for what purpose, and how it contributes eventually to food production.

S_t is a fixed value at the scale of a gardener, except for gardens that allow gardeners to expand the surface area of their plot, which was only observed in our sample in the case of a garden in containers but may also exist in gardens without a structured organization (for example in squatted gardens, as the literature (Pasquier & Petiteau, 2001) has reported). However, at the scale of the garden, the group of gardeners and/or the managing institution can potentially extend or decrease the size of the plots. This is a common issue when a new garden is being established and is also an issue for existing gardens. In Paris many family gardens that used to offer large plots of 200 to 500m² (2,152 to 5,382 ft²) are now dividing these plots into smaller ones, with the main objective of attracting young people or families who have relatively little time to maintain large plots.

The share of the plot dedicated to food production (S_c/S_t) was very variable from one gardener to another. This variability can be interpreted in relation to the multifunctionality of the garden, as mentioned above (Duchemin et al., 2008), and to "structural data" that influence the use of land in collective gardens. For example, it is difficult to build fixed elements (pathways, storage sheds, or cabins) on small plots, while these elements are commonly found on medium-sized and large plots, which explains why the S_c/S_t ratio is higher for small plots. On large plots of more than 100m², which are found mostly in family gardens based on a model inherited from the 19th century *jardins ouvriers* (workers' gardens), individual cabins that serve as both storage space for equipment and as living space are often prominent features, as are leisure furniture such as tables, chairs, barbecue grills, etc. The S_c/S_t ratio therefore reflects concretely the multifunctionality of these gardens, with a high ratio revealing an important food function attributed by the gardener to his or her plot, and a low ratio indicating that the gardener also conceives of uses other than crop production on his or her plot. The workload that a large plot requires may also lead gardeners who have a large plot to reduce the area cultivated with vegetable crops, and to increase the area dedicated to other plants that are easier to maintain, for food (berry bushes, for example) or not (lawn), or else to devote the land to other purposes (picnic tables, for example). The various regulations applicable to the gardens can interfere with the individual determinants mentioned above. In Montreal, the city's Community Garden Program stipulates that the surface area dedicated to food crops must not occupy less than 75% of the total plot area (Ville-Marie Montréal, n.d.). The same rule applies to most Parisian family gardens.

The developed surface, S_d, concretely reflects the intensity of the use of the area dedicated to food crops during the cropping season. As an indicator of the cropping systems, it is mostly explained by a gardener's cropping practices and production strategy.

S_d, as a variable that integrates time, is meant to describe cropping systems, whereas S_c is a variable that allows us to map the plot at time *t* but does not reflect the complexity of gardening practices.

In order to link together our findings on S_c and S_d, we identified four classes of "land-use intensity," which appear to be a relevant tool to situate a particular gardener's practices in terms of land use in relation to the others. These classes of land-use intensity are consistent with the yields measured in the study plots. In Montreal, gardeners were all in classes A ("Highly intensive use of the plot for food crops") and B ("Plot mainly dedicated to food crops but low intensity in the use of space"). This can be explained by the existing regulation in Montreal, which stipulates that flowers, herbs, and fruits all together must not occupy more than 25% of the plots, and by the relatively small size of the plots in community gardens. In larger plots like those in Parisian family gardens, the same rule exists but is very rarely followed.

Interestingly, this rule is generally complied with if we refer to the composition of the devel-

oped surface (S_d): the ratio

$$\frac{S_d\ vegetables}{S_d\ total}$$

is usually higher than 75%. We highlight an ambiguity in the existing regulations: they do not specify whether the rules apply at time *t* or across the entire growing season, which significantly changes the calculation.

Crop diversity is usually relatively high in the plots investigated. We observed a higher average number of cultivated species in our sample than in the study of Mienne et al. (2014). This can be explained by the difference in the methodology used, as the Mienne et al. study used a one-shot survey with a preset list of crops, while we used a field survey throughout the season to establish the list of crops grown.

Regarding the list of crops grown in the garden plots, most of the crops grown and harvested in the gardens are vegetables. Tomatoes, lettuce, and beans are the three most common crops in terms of surface area both in the Paris and Montreal gardens. However, among the other crops grown in the gardens, we observed significant differences between the two cities. In addition to the cultural aspects that underpin the choice of crops, rules and regulations also affect gardeners' choices: for example, potato is prohibited in community gardens in Montreal. Furthermore, interviews with gardeners revealed that many gardeners who own a small plot avoid planting crops that tend to develop widely, when the expected yields for the crop are relatively low, and/or when prices for the crop in shops are low (e.g., zucchinis and other squashes). Thus these crops are not cultivated in Montreal community gardens, nor are fruit trees (which are also prohibited in Montreal gardens as well as in some garden in Paris).

As a result of this ban in planting trees, fruits are exclusively red berries in Montreal community gardens. In the Paris area, fruits are mainly red berries in gardens within Paris , where planting trees is also prohibited, while nuts and stone fruits play a significant role in many suburban gardens.

In several cases, we observed that aromatic herbs were absent from the garden plots. This is mostly the case on plots remote from the homes of the gardeners, who thus prefer to grow herbs in their home garden (private garden or balcony boxes) for daily home use, reserving their garden plot for crops that require less regular harvesting. This is particularly the case of family gardens in the Paris area, as they are usually further from gardeners' homes than are shared gardens (Daniel, 2012) or Montreal community gardens, which are frequented mostly by people living in the neighborhood around the garden (E. Duchemin, personal communication, January 5, 2013).

Regulations that apply to Montreal community gardens specify that at least five species must be grown on the plot. Once again, this regulation does not specify whether this value applies at time *t* or across the season. If we refer to the whole season, this requirement is met in all gardens, as most gardeners wish to have a diversity of crops. However, some gardeners prefer to specialize in a few "flagship" crops, which decreases the number of cultivated species. In Montreal and in Paris, this was observed in the case of gardeners who grew one or two crops that were too rare or expensive in shops, and who preserved the harvest to have it year round (Model of use of garden produce 2 in Table 2).

Regarding the yields, our finding of wide variability from one gardener to another is consistent with previous studies (Gittleman et al., 2012; Vitiello & Nairn, 2009). Various determinants can explain this variability, among which are soil and climatic conditions, cropping systems (which in our study sample included containers), and gardeners' cropping practices (fertilizer and water supply, pest control strategies, etc.). We have not detailed these determinants in this article, but they could be investigated further in future research.

The yields per crop that we obtained may allow for future comparisons with other crop production systems, including professional market-gardening systems. For example, in outdoor conventional market gardening, the yields for tomato production are reported to range between 1.9 and 3.3 kg/m² (0.4 and 0.7 lb/ft²) (Weill & Duval, 2009) in climatic conditions close to those in Montreal. In the collective gardens that we investigated in Montreal in 2013, the yields range between 0 and 10 kg (22 lb), with an average of 5.4 kg/m² (1.1 lb/ft²) (all

plots together). In France in 2012, for tomatoes the national mean yield of open-air tomatoes was approximately 5.2 kg/m² (1.1 lb/ft²) (Arnoux, 2013) while in the collective gardens we investigated the yields ranged between 0 and 3.5 kg/m² (0.7 lb/ft²) in 2012, and 0 to 5.9 kg/m² (1.2 lb/ft²) in 2013 (averaged over all the plots). However, the observed variability in yields and quantities produced challenges for the possibility of using average quantities in global estimations.

Implications for Garden Planning and Management

The results of this study show that the size of plots is not in itself a determinant of how much food will be produced in a garden. More important are the functions attributed by gardeners to the garden. These functions will determine their use of the plots and the space they reserve for food production. We have seen that it is very common for part of an individual plot, especially when it is large, to be dedicated to purposes other than production, such as cabins, lawn, playgrounds, picnic tables, and so on.

We suggest that when designing a new garden, what matters are the functions assigned to it by both future users and garden designers (we see here the importance of prior consultation). Of particular importance is the value placed on the food function: if the goal is relative self-sufficiency or a significant contribution to the gardeners' food provisioning, it may be best to create plots of 100m² to 200m² (1,076 to 2,153 ft²). We have found that plots larger than this are not necessarily used entirely for food production. However, as our sample is quite small we may not have seen all possible situations. For example, gardening organization experts whom we met during the study mentioned plots of 500m² (5,382 ft²) cultivated by families entirely for food purposes. On the other hand, if the goal is to cultivate a few fresh herbs and garden produce, a plot of 18 to 20m² (194 to 215 ft²), as in Montreal community gardens, can yield a substantial harvest.

We have witnessed a wide diversity of expectations among gardeners. A potential response to deal with this diversity of expectations would be to avoid having homogeneous plot sizes in one CG.

The pros and cons of creating individual versus communal plots have not been discussed yet in this paper. The communal plot that we monitored during the study produced a very small quantity of produce, but provided training for gardeners through continuous exchanges between the most experienced gardeners and the newcomers. Our findings have not however yielded insights on this issue. Further investigations would be needed to assess the potential of communal plots, which would depend on the organization of the group and its objectives. We merely wish to point out that communal plots fulfill different functions than do individual plots within a CG.

Another important feature of garden design is the multifunctionality of CGs that, as we have seen in this paper, is put into practice concretely by gardeners in their use of space. If the objective of the garden is to benefit as many people as possible, the garden designers might be tempted to attribute most of the available land to garden plots. However, we believe from our findings that it is crucial to maintain a space in CGs for uses other than food production, whether individually (within plots) or collectively. The second option is probably the most appropriate for gardens located in urban environments, where the lack of space is a major constraint. Garden designers might consider planning spaces dedicated to leisure, picnics, etc., in the shared area of each CG. Devoting space to leisure, between individual or communal garden plots and collective areas, is therefore a tool available to garden planners to guide the future uses of the garden.

Another tool available to garden designers is the regulations for use of the garden. We have seen that rules and regulations within a garden, such as the requirement that a certain percentage of the space be used for crops, may influence the choice of crops and, in part, the use of space, in particular the share of the plot dedicated to food production. As a complement to an intentional garden layout, we believe that garden rules, if they are chosen appropriately and in accordance with gardeners' expectations, may help to regulate the use of the garden while strengthening its multifunctionality.

Conclusion

The methods used, and in particular the harvest booklet, are a form of participatory science in

which we see increasing interest. Apart from providing data for research, we have witnessed gardeners' enthusiasm to learn about their own production. This largely explains why they agreed to engage in this demanding exercise. The harvest booklet is thus an interesting tool for understanding the diversity and levels of production in gardens and, to some extent, the destination of the produce. It also serves as a tool for researchers to discuss their practices with gardeners. Our approach was further innovative because we used comprehensive interviews in two locations that allowed us to analyze the results from a more global perspective, and because we conducted regular plot monitoring that was essential to understanding the complexity of gardeners' practices.

We conclude that the total size of a plot is a very unreliable indicator to estimate its potential food production. The cultivated surface area (S_c) gives a much more accurate view of the allocation of space on the plot. We witnessed the wide diversity of expectations and practices regarding the food function of urban CGs. While the size of the plot influences the harvest yielded, all gardeners obviously do not have the same expectations regarding food production in their garden. For instance, a large plot may very well have only one small vegetable patch. Once again, we emphasize the multifunctionality of these gardens, which is reflected in the gardeners' practices. A take-home message for garden planners or managing organizations is that the layout of the garden and its rules and regulations are powerful tools to guide the functions of the garden and to satisfy the expectations of garden users.

Regarding food production in CGs, there are promising avenues to explore to further our understanding of how they may affect the diet of gardeners' families. However, more data would be needed on losses after harvest, on other sources of supply (namely food purchases), and on the changes in fruit and vegetable consumption before and after accessing a garden.

This study confirms the need to recognize the food function of CGs in their diversity, even in the case of small plots, and therefore to pursue the assessment of what Smith and Harrington (2014) call "community food production," embracing issues such as food security and the organization and governance of urban food systems in various geographical, institutional, and cultural contexts.

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Appendix

Table 6. Study Sites for this Research

Garden name	Year opened	Total size (m^2 and ft^2)	Number of plots	Type of plots	Mean size of plots (m^2)	Location	City program
Paris Area							
• **Family gardens:** Gardens in which families tend their own plots, yet share in the garden's overall management. In the Parisian region, they are the successors of 19th-century *jardins ouvriers* ("workers' gardens") and are predominantly located in the suburbs of Paris. Plot sizes are usually between 100m^2 and 500m^2 or 1,076 and 5,382 ft^2.							
Bd de l'Hôpital	2002	5,600 (60,278)	26	Individual	28 (301)	Paris, 13th *arrondissement;* at the foot of social housing buildings	Yes (Main Verte)
AJOAC garden	1942	53,000 (570,487)	290	Individual	200 (2,153)	St-Cloud (92); in a public park	No
Pointe de l'Ile	1954 (ca. 1980)	3,500 (37,674)	15	Individual	220 (2,368)	Les Moulineaux (92) on the artificial extension of an island	No
• **Shared gardens:** Gardens that are shared by a group of citizens, usually people who live in the nearby neighborhood (Basset, Baudelet & Roy, 2008). Plots can be grown communally or individually, but are usually relatively small (with individual plots between 2 and 20m^2 or 22 and 215 ft2).							
Ecobox	2009	200 (2,153)	25	Individual	4 (43)	Paris (18th *arrondissement)* on a parking lot, entirely in containers	Yes (Main Verte)
Jardin des Bordes	2004	35,000 (376,737)	51	Individual	150 (1,615)	Chennevière-sur-Marne (94); in a nature reserve	No
Jardin aux habitants	2001	500 (5,382)	13	Individual	22 (237)	Paris (16th *arrondissement),* on a street; created in 2001 by artist Robert Milin	No
Le Sens de l'Humus	2007	500 (5,382)	1	Collective	500 (5,382)	Montreuil (93), located on a former site of fruit production	Yes (On sème à Montreuil)
Montreal							
• **Community gardens:** Neighborhood gardens in which individuals have their own plots where they grow and consume their own harvest, yet share in the garden's overall management (Duchemin, Wegmuller & Legault, 2010; Lawson, 2005). In Montreal, community gardens are administered jointly by citizen organizations and city boroughs, and offer plots mainly of 15 to 20m^2 (161 to 215 ft^2).							
Basile-Patenaude	ca. 1987	2,000 (21,528)	76	Individual	18 (194)	District Rosemont Petite-Patrie	Yes
George-Vanier	1985	1,950 (20,990)	64	Individual	18 (194)	District Ville-Marie	Yes
De Lorimier		5,257 (56,586)	120	Individual	18 (194)	District Plateau-Mont Royal	Yes
Pointe-Verte	1984	1,000 (10,764)	51	Individual	15 (161)	District Sud-Ouest	Yes

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Making do or moving forward: An assessment of our global food system

Book review by Linda M. Young *
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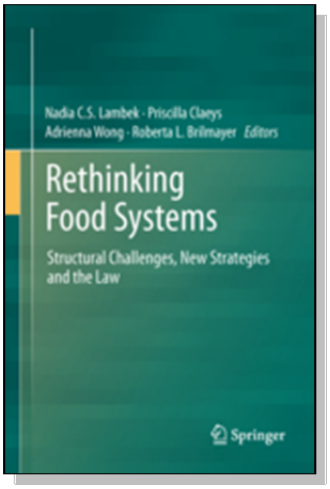

Review of *Rethinking Food Systems: Structural Challenges, New Strategies and the Law,* edited by Nadia C. S. Lambek, Priscilla Claeys, Adrienna Wong, and Lea Brilmayer. (2014). New York: Springer. Available in hardcover; 250 pages. Publisher's website: http://www.springer.com/environment/sustainable+development/book/978-94-007-7777-4

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The rich and diverse perspectives of Lambek, Claeys, Wong, and Brilmayer in *Rethinking Food Systems: Structural Challenges, New Strategies and the Law* lend a great deal to their assessment of the extent to which our current system of institutions and law supports the achievement of a "just, equitable and sustainable" food system. The law here comprises a messy and complex mix of covenants, trade agreements, World Trade Organization (WTO) jurisprudence, and national laws. This book addresses the law, both as it exists and as it is being written in developing countries, while recognizing the institutional context and interests at play.

The fundamental question asked by the authors is whether the current institutional and legal structure governing global food systems can be rethought to serve communities, particularly the poor, rather than corporate interests and the elite. This question is the thread that unifies discussion of the "right to food" and disparate issues, such as how some states are incorporating this right into their constitutions, legal structures, and policies; the rejection of free trade for food sovereignty by an international social movement of peasants; the challenges presented by an increase in land grabs; and negotiation of competing concepts and treaties governing the intellectual property of farmers.

The book begins with a discussion of how an international constituency of peasants and small farmers, aligned through the international peasants' rights organization Via Campesina, contest both the intent and the process of the WTO's involvement in domestic agricultural policy. They reject the current practice of negotiating domestic agricultural policy at the international level in order to

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the intent and the process of the WTO's involvement in domestic agricultural policy. They reject the current practice of negotiating domestic agricultural policy at the international level in order to facilitate trade. Via Campesina argues that food sovereignty gives local and national constituencies a collective right to determine their agricultural and food policies. Claeys' chapter discusses the challenges faced by this social movement and the contradictions inherent in Via Campesina's framing of food sovereignty as a collective right, as rights emanate from the framework of liberalism—the same framework that gives rise to the capitalism and neoliberalism that underlie the WTO. Claeys explains how the food sovereignty movement is hampered by disagreement about whether these rights should be institutionalized from above, or nurtured from below with the design of challenging the entire institutional structure.

Some national governments are trying precariously to balance pressures for food sovereignty with their current involvement in the international trading regime. Araújo and Godek describe how the government of Nicaragua has passed the Law of Food and Nutritional Sovereignty and Security (SSAN) to promote Nicaragua's food self-sufficiency, support small and medium-sized farmers, and use a multistakeholder process for the development of agricultural policy at the local and national level. At the same time, the government of Nicaragua is ratifying regional free trade agreements that contradict the policies and processes of food sovereignty embraced by SSAN. This example epitomizes the tension faced by national governments caught between the demands of local constituencies for food sovereignty and by other, largely international, constituencies for free trade.

In sharp contradiction to the concept of food sovereignty is the increasing practice of "land grabbing," in which national governments and corporations lease large tracts of agricultural land for 50 to 100 years from developing countries. These agreements are usually regulated only through bilateral investment treaties, as they lie outside the scope of WTO and other multilateral disciplines. The authors of two chapters, Brilmayer and Moon, and Borras and Franco, argue that the root causes of rural poverty in lessor countries include insecure property rights, a democratic deficit in national policymaking, and the dominance of an export-oriented agricultural system controlled by transnational corporations. The authors concur that land grabs are more likely to deepen these problems than to ameliorate them, as long-term leases of large tracts of land result in the expulsion of small producers with insecure property rights and an increase in food insecurity for the poor.

However, the authors diverge in their discussion of possible solutions. Brilmayer and Moon assess the feasibility of using social labeling and import restrictions for the goods produced via land grabs as a way to reduce demand for them. They explore the fates of similar efforts that have been litigated under the Technical Barriers to Trade Agreement of the WTO, but their analysis yields little assurance that these are viable mechanisms to address the issue.

Borras and Franco assess whether codes of conduct proposed by multilateral organizations and institutes are adequate to address the consequences of land grabs. They conclude that such codes of conduct will legitimize these land grabs without recognizing and addressing the underlying conditions causing rural poverty. Given that the current institutional structure has nurtured an export-oriented agricultural system controlled by transnational corporations, lack of acknowledgment that this structure itself is to blame for rural poverty in these countries is not surprising, nor is it surprising that the proposed codes of conduct are unlikely to help ameliorate the consequences of land grabs.

The book has a rich discussion on the right to food and its ramifications for citizens, national governments and international institutions, and law. Rae examines the how stakeholders, government, and the legislature in Uganda are tackling interpretation of their 1995 constitution that recognizes the right to food. Rae's discussion highlights the challenge of clarifying the state's role in "respecting, protecting and fulfilling" the right to food. Rae attributes the process involved as contributing to democratization in Uganda, as local stakeholders play a pivotal role in defining the right to food, despite the undue influence of international donors. Rae distinguishes between "the right to food" and

the "right to be fed," as the latter implies a substantial resource obligation on the part of the government. Rae does not address this reader's concern about the opportunity cost of devoting so many resources to the creation of rights by countries that do not have the institutional structure needed to interpret and deliver them.

Lambek clarifies that the right to food encompasses much more than the obligation for the state to feed the hungry. It also requires that "the state and third parties must not hinder the ability of individuals to meet their own food needs" (p. 101). Gonzalez explains the implication: "As such, the state is obligated to ensure that agricultural policies do not deprive farmers of their livelihoods. The state must also protect the right to food by taking measures to prevent third parties from depriving people of the means to either grow food or purchase food" (p. 168). From this starting point, Lambek recommends actions to support local communities and agricultural smallholders, including a reduction of agricultural subsidies in rich countries; use of WTO exceptions to enact policies supportive of smallholders; and disciplines on transnational corporations for anticompetitive practices. Lambek and Gonzalez (in separate chapters) each provide a rich interpretation of how international covenants form the legal basis for a right to food, and possible ramifications for agricultural policy at both the domestic and international levels.

Lambek et al. provide a detailed analysis of the tensions inherent in our current institutional and legal systems for agriculture and food. There is tension evident between the rights of producers and companies over intellectual property rights; between the rights of sovereign nations to lease land and the rights and needs of their smallholders; and between the role of the local communities and international institutions in developing agricultural policy. Underlying these tensions are fundamental challenges to our current system.

Claeys and Lambek question whether a "just, equitable and sustainable" food system can be achieved with our current institutions, and the nine chapters in the book provide a wealth of analysis on pivotal issues. However, Claeys and Lambek do not use the extensive analysis in the book to systematically answer the question they pose.

Several authors propose using the flexibility provided in current agreements to better serve local communities and small producers and discuss a host of suggested policies; however, the book does not articulate the question of whether the political will (Raile, Raile & Post, 2014) to do so exists. Lambek et al. do present an aspirational view of the need to restructure our food system and the concepts, such as the right to food and food sovereignty, that might underlie it. Further work on the public will that is needed to achieve these aspirations would be a worthy successor for their book.

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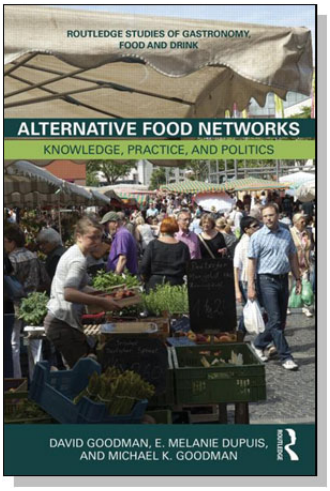
Exploring the politics of possibility



Book review by Rachael E. Kennedy *
Virginia Tech

Review of *Alternative Food Networks: Knowledge, Practice, and Politics,* edited by David Goodman, E. Melanie Dupuis, and Michael K. Goodman. (2011). Abingdon, UK, and New York: Routledge. Available as paperback (2013); 308 pages; US$51.95. Publisher's website: http://www.taylorandfrancis.com/books/details/9780415747691/

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After 40-plus years of visioning and planning, are the basic tenets of the food movements, such as reconfiguration of capitalist society, relocalization, social justice, and sustainability, still credible? Further, will more progress be made if we critically outline the failings of activist projects and force a reckoning, or should more purchase be given to highlighting socially progressive efforts created by food movements as a way to stimulate momentum? These are the questions I ponder into the wee hours of the night. These are the questions my monthly sustainable foods community of practice salons chew on. These are the questions Goodman, Dupuis, and Goodman ask. Perhaps these questions resonate with you.

It was with great anticipation that I bought *Alternative Food Networks: Knowledge, Practice and Politics* as soon as it was released in paperback (2013). David Goodman, E. Melanie Dupuis, and Michael Goodman are noted agri-food systems scholars with a penchant for pushing the lines of inquiry toward increasingly substantive discourse and for clarifying the murkiness of relatively neglected aspects of the food system. I fully expected to find a book striking a balance between critical evaluation and constructive analysis—and I was not disappointed.

Surprisingly, what I also found was development of a unifying framework of three cross-cutting analytical themes: reflexivity, shared knowledge practices, and alterity. Embracing reflexivity requires that both the causes for and effects of alternative food networks (AFNs) are,

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from a critical distance, deeply considered. By taking a reflexive stance in their review of relevant AFN data, "local is not idealized as a space insulated from power relations and anomic global capitalism but is acknowledged as a publicly contested site of political-economic struggle, exploitation, and accumulation" (p. 8). The concept of shared knowledge practices hones in on the split in research between production, "growing food," and consumption, "knowing food." Thus they explore the politics of consumer-producer relationships and benefits of establishing formative linkages between theories and practices. For example, they bring focus to new "social practices of consumption" generated by fair trade and ensuing North-South debates (p. 9). Finally, alterity, new ways of doing things, is investigated in terms of economic, socio-cultural, and political foundations to assess intersections with politics of boundary maintenance, social reproduction, and collaborative governance strategies.

The authors' goal is to explore debates and controversies in a comparative perspective in an attempt to answer if assimilation can be resisted, and concomitantly, "what kind of social change can 'conventionalized' social movements achieve?" (p. 5).They seek to expose the "politics of possibility" that are available given that AFNs must secure their social reproduction within the extant spaces of neoliberal capitalism.

Four distinct sections feature different aspects for consideration, complementing each other in their return to the three-part framework for comparative vantage. Part 1, "Alternative Food Networks Reflexivity and Shared Knowledge Practice," lays the groundwork for understanding AFNs as socio-ecological assemblages. Theoretically dense, this section presents readers with major philosophical propositions and conceptually adroit discussions, including Habermas's "colonization of lifeworld," Friedland's "commodity systems analysis," and Latour's "actor-network" approaches. Further, the place of food as either a Marxian fetish or a Durkheimian totem is addressed, with many scholarly views presented. An introduction to feminist standpoint theory shows how food illuminates everyday gendered practices. In essence, this section forces a much needed, deeply sociological awareness on the subject of food systems.

Part II, "Alternative Food Provisioning in the U.K. and Western Europe," gives short sketches of confluent social movements, institutional practices, and catalytic events within the U.K. and Western Europe set the stage for processing notions of *terroir*, horizontal networks, and "new realism." They critique the obfuscated ways "the protagonists in these recaptured spaces [are] contesting, rather than reproducing, 'embedded' structures of wealth, property, privilege, and power" (p. 84). Playing with "framing/overflowing" metaphors, the relationships between corporate actors and activists in "permanent negotiation and conflict" (p. 103) are also explored.

Part III, "Alternative Food Movements in the U.S.A.: Formative Years, Mainstreaming, Civic Governance, and Knowing Sustainability," paints a picture of U.S. AFNs seeking identity and purpose within the ineluctable mainstreaming neoliberal pressures. This section questions whether new modes of governance, such as deliberative democracy (see Gutmann and Thompson, 2004, for discussion), can successfully couple with the multiple ways of knowing to maintain or advance alterity. However, doubts are raised by examples that have been "intrinsically inegalitarian" (p. 156).

Part IV, "Globalizing Alternative Food Movements: The Cultural Material Politics of Fair Trade," explores the history of the fair trade movement and network development as a Global North to Global South enterprise. Antecedents of the marketization of the fair trade "ethics of care" are dissected. Cases further elucidate the paradoxes inherent to the success of fair trade and illuminate concerns over the celebritization and resultant "tyranny of quality," issues previously untapped. At the heart of this segment is concern for the deepening invisibility of the lives of those who these networks were set to assist.

As much as this book is about AFNs, it is at the core relational with the wave of social activism resisting the global industrial food system. The new politics of food build on multiple imaginaries that challenge the capitalist logics and rationalizing worldviews. Evocative of Held and Young's (2013) statements that "cosmopolitan" society will become more fragmented and risk-laden and

Chandhoke's (2002) work processing the limits of civil society, the authors seek to determine if *any* measure of success can be replicated as communities strive to find food security and resiliency.

This book is extremely valuable for scholars and activists dissecting factors that condition and delineate AFNs. However, I caution that to embrace the full vigor of the text, scholarly proficiency is advantageous due to the dense prose and heavy theoretical underpinnings. The strength of this book, and why I recommend it, is the comprehensive overview and analysis of the most relevant literature on AFNs within the U.S. and Western Europe as well as the international fair trade network. Further, this book's systematic critique exposes the underlying problematics of AFNs in ways that provoke needed changes in order to address the politics of possibility. I urge libraries to order this as an e-book to make it more accessible to activists and practitioners, as they will no doubt find great benefit from the critiques and suggestions.

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