

## **UC Davis**

### **UC Davis Previously Published Works**

#### **Title**

Visualizing the social and geographical embeddedness of local food systems

#### **Permalink**

<https://escholarship.org/uc/item/3n2933mq>

#### **Author**

Brinkley, Catherine

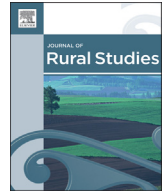
#### **Publication Date**

2017-08-01

#### **DOI**

10.1016/j.jrurstud.2017.06.023

Peer reviewed



# Visualizing the social and geographical embeddedness of local food systems



Catherine Brinkley

Community and Regional Development, Department of Human Ecology, College of Agriculture and Environmental Sciences, University of California, Davis, United States

## ARTICLE INFO

### Article history:

Received 5 November 2016  
Received in revised form  
28 June 2017  
Accepted 30 June 2017

### Keywords:

Direct marketing  
Farm-to-fork  
Soil-to-soil  
Agricultural economics  
Farmers' market

## ABSTRACT

Re-localizing food distribution is expected to geographically concentrate social and economic capital toward values that are beneficial to both consumers and producers. Yet, both the theory of how communities benefit from purchasing local food and the practice of promoting local food lack foundational empiric evidence that makes spatially explicit the procurement typologies and the communities that are connected. This research pilots a method for understanding the geographic patterns of local food supply chains in relation to the social networks formed through farm tours, byproduct sales, farm-to-farm collaboration, and donations to the local food bank. This method is expected to improve both the theory and practice of re-localizing food systems, thereby helping scholars and policymakers to identify and correct for inequities while also recognizing successful practices and opportunities in situ. Findings are based on a novel dataset from Chester County, Pennsylvania encompassing 1089 connections between 117 farms and 637 locations. Farms primarily engage with one marketing typology. The most common marketing practices are wholesale distribution and direct-marketing to consumers through farmers' markets; both market typologies have an average reach of over 50 km. Central to the social network, is a third typology characterized by sales to restaurants, collaboration amongst farms and participation with local food bank programming. Interviews with policymakers and market managers ground-truth and relate findings to state and local regulations.

© 2017 Elsevier Ltd. All rights reserved.

## 1. Introduction: *The rise of local food in policy and practice*

Encouraged by consumer preference for local foods (Yue and Tong, 2009; Feldmann and Hamm, 2015) and willingness to pay more than double the price for local products (Darby et al., 2008), both large and small-scale farming is increasingly turning to direct markets through you-pick operations, farm stands, farmers' markets, and Community Supported Agriculture (CSA). Currently, nearly 7% of U.S. farms are involved with direct marketing with an 8% increase in sales since 2007 (USDA NASS, 2012 Census of Agriculture). The federal government began tracking the number of farmers markets in 1994 and CSAs in 2007. The number of farmers' markets has more than doubled in the past decade, rising to 8284 in 2014 from 3706 in 2004 (ERS, 2014). Local food is also increasingly promoted through food hubs and sales to restaurants and grocery stores (Starr et al., 2003; Ilbery and Maye, 2005; Horst et al., 2016). Numerous practitioners of planning, land-use management, policy

and economic development encourage local food programming (Feenstra, 1997; Murdoch, 2000; Myers, 2004). 'Buy Local' campaigns have been codified in every state with branding (Onken and Bernard, 2010) and are buoyed through formal and informal economic development support in comprehensive planning documents.

With its growing popularity, the local food movement is expected to change both consumers and farmers. The movement often emphasizes 'weak social ties' (Granovetter, 1973) created through food as bringing together novel constituents for political persuasion which combines purchasing power with the 'soft power' (Nye, 2004) of a social movement. Where markets *should* emphasize the highest financial returns, economic sociologists have noted their non-economic logic (Polanyi, 1968), terming them 'embedded' in both geographies and social value systems (Granovetter, 1985). Hinrichs (2000) states that part of what direct marketing producers sell is "social connection. Local embeddedness itself then becomes some of the value added in the farmers' market experience" (p. 299). Embeddedness describes the non-economic logic of how markets yoke together two separate

E-mail address: [ckbrinkley@ucdavis.edu](mailto:ckbrinkley@ucdavis.edu).

geographies through shared economies and social values (Fig. 1).

This research asks: what is the extent and orientation of embeddedness in the local food system? First, a literature review demonstrates the current understanding in the field and the need for new methodologies to help test theories of embeddedness within local food systems. Namely, the local food movement is expected to transmit values through proximate economic and social networks. But which communities are connected, and across which local marketing strategies? In response to this question, I pilot a method for mapping the local food system socially and spatially. Document review and program director interviews help to verify and explain the findings as well as their consequences for food systems planning and economic development.

## 2. Literature review

### 2.1. Establishing the local food system as a theory of social change

Local food activists have reconceptualized food supply chains as a means of spatially distributing social values by leveraging economic capital. The values encompassed by the food system are exemplified by the over 300 different labelling schemes which promote fair labor, sustainable land-use, and animal welfare practices to name a few (O'Hara and Stagl, 2001; Howard and Allen, 2010; Grunert et al., 2014). Yet, only a few global corporations control distribution, connecting consumers to producers (Heffernan, 1998; Howard, 2009). This bottleneck in supply chains reveals an important lever for altering geographies and financing shared value systems. Renting et al. (2003) asserts that shortening the supply chain by decreasing the number of intermediaries involved in production, distribution, processing and purchasing should clarify the values and geographies involved. In sum, geographically explicit, personal relationships between producers and consumers are expected to raise awareness about social, economic, and environmental effects of food consumption by tightening feedback loops which concentrate economic and social capital toward values-based goals (Francis et al., 2003; Sage, 2003; Sundkvist et al., 2005).

Hinrichs (2000) cautions that even the shortest supply chains, such as direct marketing from farms to consumers, can have varied power structures. Namely, farmers often travel to cities for farmers' markets, while consumers travel to farms in which they own a share of the commodities produced in the CSA model. Hinrichs asserts that while both supply chain typologies emphasize direct, local consumer relationships with farmers, the resulting geo-social embeddedness of the network and the values it promotes will fundamentally differ.

In addition, local values-based supply chains are not limited to direct-marketing. Nearly 50,000 farms in 2012 sold some or all of

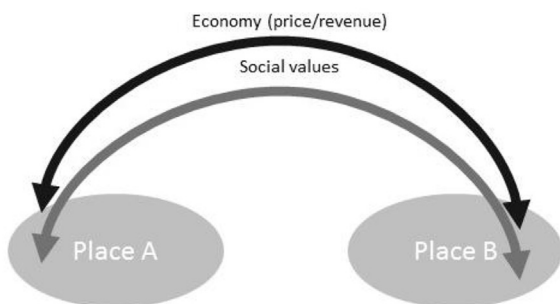


Fig. 1. Graphic explaining the embeddedness of markets which leverage shared social and economic values to alter geographies.

their products directly to retail outlets such as restaurants, grocery stores, schools, hospitals, or other businesses that in turn sold to consumers (USDA). Intermediaries between farms and consumers can also play important roles in food system-based social change. For example, chefs, like Alice Waters of Chez Panisse in California, are often seen as the forefront of the local food movement where they change consumer demand for certain types of local food. In the process, their search for ingredients resulted in direct contracts with farmers to grow specific products using agroecological methods (Starr et al., 2003). Similarly, farm-to-school programming is conceptualized as a means of encouraging healthy eating, transferring farming education to the next generation, and preserving local farming land-uses (Vallianatos et al., 2004; Joshi et al., 2008; Bagdonis et al., 2009). Sonnino (2010) finds that school food reform in the UK gave small producers access to new income streams while offering students food that is more nutritious. Similar rationales underpin the motivations behind promoting regional food hubs (Horst et al., 2016). Planning practitioners have also noted that public procurement anti-hunger efforts that champion local food have had a successful track record of protecting farmland, spurring rural economic development and increasing urban food security in Canada (Riches, 1999) and Belo Horizonte, Brazil (Rocha, 2001; Rocha and Lessa, 2009).

Most importantly, the geo-social embeddedness of food systems may not be driven solely by food purchases. In addition to supplying food, farms serve numerous socio-ecologic functions for urban users and nearby communities (Brown and Miller, 2008). In 2012, over 33,000 farms listed income from agritourism and recreational services such as farm tours, hayrides, school visits, and other activities (USDA). A review of the mission and vision statements from 130 nationally accredited farmland preservation agencies notes that ecosystem, social and cultural services are among the top reasons for preserving farmland, ranking far above food supply (Brinkley, 2012). Peri-urban agriculture plays an important role in waste cycling and wildlife habitat (Smit and Nasr, 1992; Assaad, 1996; Furedy et al., 1999; Lydecker and Drechsel, 2010; Drechsel et al., 2015). The geographical range, orientation and power dynamics involved in such non-food functions have yet to be assessed (Brinkley, 2012). In short, the many highly-valued social and ecological services that farms provide have not been defined spatially or related to marketing practices, though it is these very orientations that are important to theories of localization and its role in the practices of farmland preservation and management.

### 2.2. The local food system and values of social justice?

Last, production, relationships and proximity do not necessarily beget mutually beneficial feedback loops between environmental and social justice objectives. Food insecurity in farm workers is more than triple the national household average in multiple areas of the country (Quandt et al., 2004; Weigel et al., 2007; Hill et al., 2011; Wadsworth et al., 2016).

Naturally, markets will gravitate toward more wealthy and powerful communities that are better positioned to help farmers achieve their end goals of profitability and secure farm tenure. Indeed, there is evidence that many direct marketing networks target consumers in the wealthiest neighborhoods. Farms involved in direct marketing are more likely to be located in the Northeast or the West Coast, near densely populated urban markets in areas with high median home values (Brown and Miller, 2008; Low and Vogel, 2011). Schupp (2016) finds that farmers markets locate in areas where the neighborhood population has attained higher education levels and a higher percentage identify as white than the national average. Direct market customers are more likely to be

middle-aged, middle-income or above, well-educated, suburban women (Brown, 2002; Onianwa et al., 2005; Conner et al., 2010). However, different types of local food marketing, beyond direct marketing through farmers' markets, may differ significantly in demographics of clientele, economics and geographies.

While the local food movement grows, so does demand for food assistance. As the federal government removed welfare programs, non-profit food banks have rapidly grown in number since the 1980s (Poppendieck, 1999). Today, one in seven Americans rely on food banks to feed their families (Babic et al., 2015). To meet the needs, food banks source from nearby farmers, distributors and retailers, and they are increasingly sourcing fresh, local food (Vitiello et al., 2013, 2015). Indeed, the market embeddedness that enabled Belo Horizonte, Brazil to achieve food security for all its citizens (Rocha, 2001; Rocha and Lessa, 2009) may be differently oriented spatially and socially than a food system that localized with the objective of influencing production practices.

Empiric research on the embeddedness of food supply is growing to help understand how such theories play out in practice. Penker (2006) shows the alternate routes for grain from harvest to mill to bakery with unique social and geographic distinctions between whole meal and standard bread chains. Moragues-Faus and Sonnino (2012) review three olive oil producers and their sourcing regions to show the socio-spatial place-making in branding. This research will be the first to explore multiple sales and donation practices in relation to one another. The aim of the research is to identify the geo-socially embedded intersections and deviations in the local food system.

### 3. Methods

The research is not exclusively focused on consumers and their relation to farms, but rather on the interplay of a variety of immediate relationships with farms around sales, visits, and donations, referred to collectively as networks. Geo-social network findings are triangulated using comprehensive planning documents and expert interviews. To start, the methods section will provide a description of the case study region and its relevance the research questions raised in the above literature review to help make sense of the methods employed, how networks were coded, and profiles of interviewees selected.

#### 3.1. Case selection

This study focuses on Chester County, PA due to its long history of direct marketing local food. Located in the northeast, near high to median home values in close proximity to large urban markets of New York, Philadelphia and Washington D.C (see Figs. 2 and 3 for nearby urban areas), Chester County has similar characteristics to what the literature defines as the average landscape involved in direct marketing which both grounds this study and broadens its application to similar cases. The county has historically held widely spaced towns and villages (for example, Downingtown, Kennett Square, and Oxford) surrounded by new growth forest, livestock operations, row crops, horse farms, and mushroom farming activities (see Fig. 2 for agricultural profile).

Farms face economic pressure from the housing market. Having added 70,000 people from 2000 to 2010, Chester County has the highest population growth rate of any county in Pennsylvania and ranks second in Pennsylvania, only after adjacent Lancaster County, for farm production. Because of heavy development pressure, agricultural land-uses face continual competition from the residential housing market. The 2007 Census of Agriculture reported a 10 percent decline in the number of farms and 14 percent decline in farm acres from the previous census in 2002.

Food insecurity is actively tackled by the local food movement. One in 20 of the 500,000 Chester county residents receive Supplemental Nutrition Assistance Programs compared to one in seven for the state (State of Hunger Report, 2013). The food bank, which has been in operation for over 80 years, started its gleaning program in 1996 with the help of state Senator Andy Dinniman and the newly hired Larry Welsch, the Chester County Food Bank's current director. The concept of gleaning is based on the Biblical description of scavenging for food left in harvested fields. Some farmers' crops are earmarked for the food bank while others make their leftovers available to be picked by volunteers. Chester County Food Bank has become a national leader in purveying local, fresh food by harnessing the goodwill of a large volunteer base and generous farming community. The food bank supplies fresh, local food through a variety of programs: gleaning, urban gardening, and school-based high-tunnel greenhouses. In addition, the food bank runs several outreach programs whose education and social networking aims dovetail with gleaning program farms. The Chester County Food Bank ranks sixth nationwide in the percentage of fresh food it disperses, with over twenty-two percent of the 2,000,000 pounds of food distributed being fresh, according to a study by the University of Pennsylvania (Vitiello et al., 2013, 2015). This amount does not include the many pounds of fresh food grown in raised beds at food cupboard sites and distributed directly to the community without being transferred through the food bank.

#### 3.2. Data collection

No comprehensive list of farms and their market connections currently exists in Chester County. I employed a cross-sectional design to create a novel database, which required a range of sources. Farm and market data was gathered from civic documents, market promotion material, media, farm website listings, county farm listings, Local Harvest affiliates, and buyer associations. Farm managers were queried with an IRB-approved electronic questionnaire (see Appendix) to identify their geographic coordinates, raw products and direct sale/donation markets. Non-local products sold through the farm (ie products the farm did not produce) and processed products are not included in this study. In turn, markets were queried by an email, which asked them to identify other direct sale farms in a double verified snow-ball sampling technique.

Market and farm locations are geocoded by latitude and longitude based on the exact address. The geographic location of farms and markets were virtually site checked using Google Street View imagery from 2007 to 2015 to verify the location. CSA member purchases are coded at the zipcode level to protect client confidentiality. CSA members were not queried to verify zipcode or network connection. This technique allowed the researcher to capture direct farm networks within, moving into or going from Chester County. Email surveys were sent to 700 farms and 2000 markets/users, and responses from 117 farms and 637 unique users/markets confirmed network connection.

#### 3.3. Network coding

This research takes a broader approach in accounting for any immediate relationship with a farm, including sales to distributors and wholesale grocers, donations of unprocessed food, and visits to farms. Relationships, including donations, sales and farm visits, are referred to collectively throughout as "network." Networks trace the connections formed through the sale or donation of raw product and services (composting and school visits) produced by the farm to their first point of sale/donation to customers, institutions, and distributors. In this way, the research encompasses a range of the immediate interactions with farms to assess the spatial



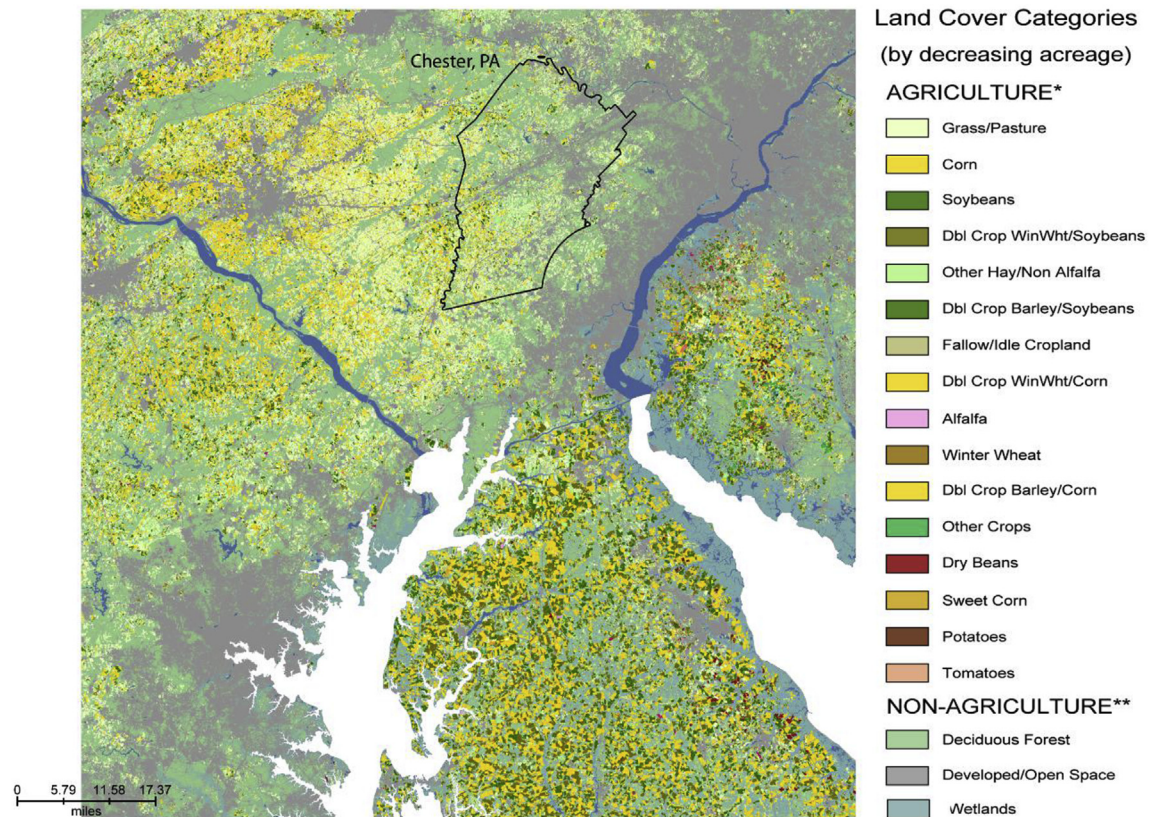


Fig. 2. Agricultural and urban land-use profile of Chester County and surrounding environs. Land-use coverage data from Cropscape (2012).

distribution and typologies of networks in which farms engage in relation to one another.

A priori coding is based on theoretical considerations. Informed by the theory of local food's embeddedness (Hinrichs, 2000), this study parses direct marketing networks by their social construct. For example, farms can market directly to consumers through Community Supported Agriculture (CSA) or farmers' markets. Farmer's markets are seasonal and represent a direct connection for consumers with the farmer where the farmer usually travels to an urban or suburban location. CSA and Buyer Club networks bring the product and end consumer in contact through drop-off/pick-up locations. Thus, CSAs constitute a different socio-spatial type of farm network when compared to farmers' markets, but not buyers clubs, and are coded thus. Wholesale networks represent purchases by larger-volume distributors and grocery stores which act as intermediaries between farms and end-users. Institutions are large-scale buyers which, like the smaller-scale restaurants, represent a steady relationship between the purveyor and farmer to cater to consumer demand. Agricultural byproduct, farm-to-farm sales, and educational visits are also noted as important networks between farmers, farms and their communities. School trips to farms bring students to the farm and represent regional knowledge networks captured in the 'education visits' variable. Farm-to-farm sales represent the agricultural social networks involved in sales of raw products.

A priori coding of network type yielded 10 network codes:

- 1) Wholesale: farm sale to wholesalers such as supermarkets, auctions, or distributors
- 2) Institution: farm sales or donation to institutions, such as schools and hospitals
- 3) Farmers' markets: farm sales to farmers' markets
- 4) Restaurants: farm sales to restaurants and cafes
- 5) Farm-to-farm: farm sales to other farms
- 6) CSA: Community Supported Agriculture (CSA) or Buying Clubs (BC) purchases through direct farm pick-up or off-farm drop-off locations, CSA and BC member zipcodes were used for mapping
- 7) Educational visits: school or educational group visits to farms
- 8) Byproduct: farm byproduct sale or donation in the form of compost, spent mushroom substrate, spent grain, hog feed, or poultry litter.
- 9) Gleaning: donations to food banks and food cupboards
- 10) Gardens: garden donations to food banks and cupboards.

### 3.4. Limitations of farm network mapping

The generated network map is an under-estimate of a county's farm networks for a variety of reasons. Some categories of farm networks are not captured in this data. Many farms allow online purchases through their own website or a crowd-sourcing website. Farms also sell directly from their farmgate. These sales and connections are not documented in this study. Larger direct-distribution networks were not captured in this study mainly because large suppliers did not respond to the query nor do they list their outlets online. Conversely, many smaller-scale suppliers readily listed market outlets on their websites and confirmed them in the research query. Additionally, the online query method limited the response to farms whose networks could be verified by email correspondence. Farms that only listed phone numbers were not contacted. For example, numerous Amish farms were not included in this study due to inability to reach the farmers via email. Conversely, many farmers' markets list Amish farmers as



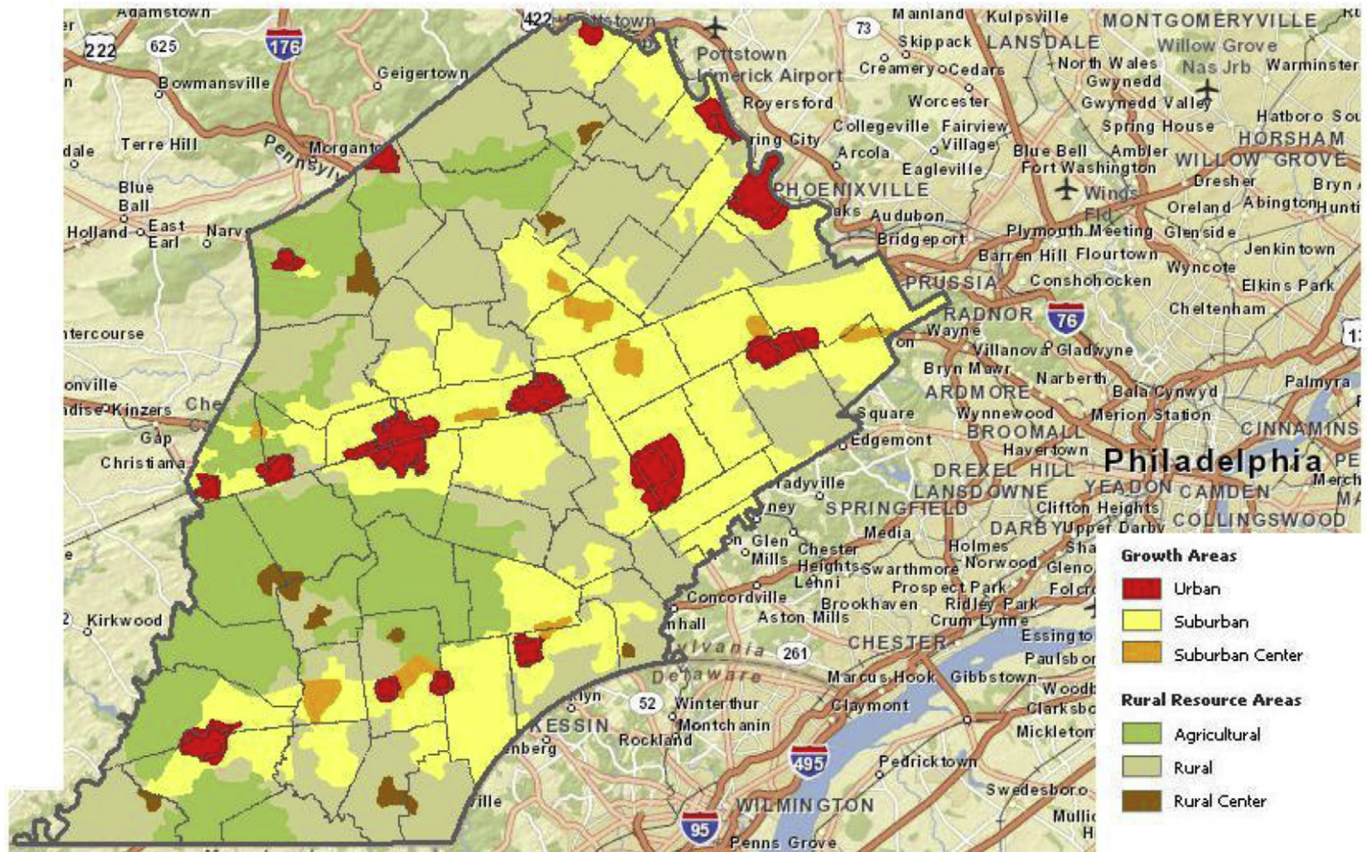


Fig. 3. Map of Chester County, Pennsylvania and its planned and existing landscapes, from Landscapes2 (2009). Gray lines represent township districts.

prominent suppliers. This study does not include non-food producing farms, thereby omitting many fiber alpaca farms, greenhouse nurseries, and horse farms that play a vital role in supporting food-producing farms through the sale and purchase of ancillary products such as horse manure for mushroom substrate. The size of the farm and product sold are not noted. Seller, buyer, and market manager characteristics, which may be highly relevant to the social and geographical nature of supply chains were not noted in this study.

Further, coding the type of network is imperfect. Some farms sell through supermarkets that they run from their farmgate. Many retail establishments may operate a café through which they serve locally-sourced farm products. In these instances, the duplicated forms of retail were noted. For example, if a farmers' market is operated from the parking lot of a grocery store that uses some of the food in its on-site café, food sold through the farmers' market is coded as a farmers' market *and* restaurant though the primary venue use is for wholesale.

### 3.5. Social network analysis

Networks between farms and markets are visualized with the "geolayout" function in Gephi software. A custom-built plugin designed by Jonas Persson (2016 <https://github.com/d99joper/gephi-plugins/tree/master/modules>) measured network direction, average distance, and magnitude for each category of farm-network. Magnitude is calculated as the sum of vectors. For example, if CSA members all equally surround a farm, the magnitude of their vectors should sum to zero. The geospatial network is overlaid with census-defined Urban Areas to ascertain where

networks were located in relation to farmland and urban areas (Fig. 4).

### 3.6. Interviews

Six semi-open ended hour-long program director interviews provide context for Chester County networks, verify the network findings, and make sense of why certain networks flourish in the context of state and county-level policies, geographies and urban markets. Interviewees were chosen based on their central roles in multiple farm-to-market networks. Chester County interviewees represent the agricultural extension office, economic development planning, and Buy Fresh Buy Local chapter, farm-to-city non-profit, and local food bank purveyor. Interviews were recorded and transcribed. Interviewees include:

- John Berry, Agricultural Marketing Director of Penn State Extension since 1997. As a liaison between the land grant research institute and numerous community and business projects, Mr. Berry's work in Chester County supports educational programs for direct-to-consumer retail and agri-tourism farm marketers.
- Marilyn Anthony, Eastern Regional Director of the Pennsylvania Association for Sustainable Agriculture (PASA) since 2006. PASA is a state-wide farmer support group that supplies grants and technical assistance for marketing. While at PASA, Ms. Anthony created a land-leasing program connecting beginning farmers with land owners, started an annual local foods showcase called the "Philly Farm & Food Fest", and initiated the annual Bike Fresh Bike Local ride with Victory Brewing, along with



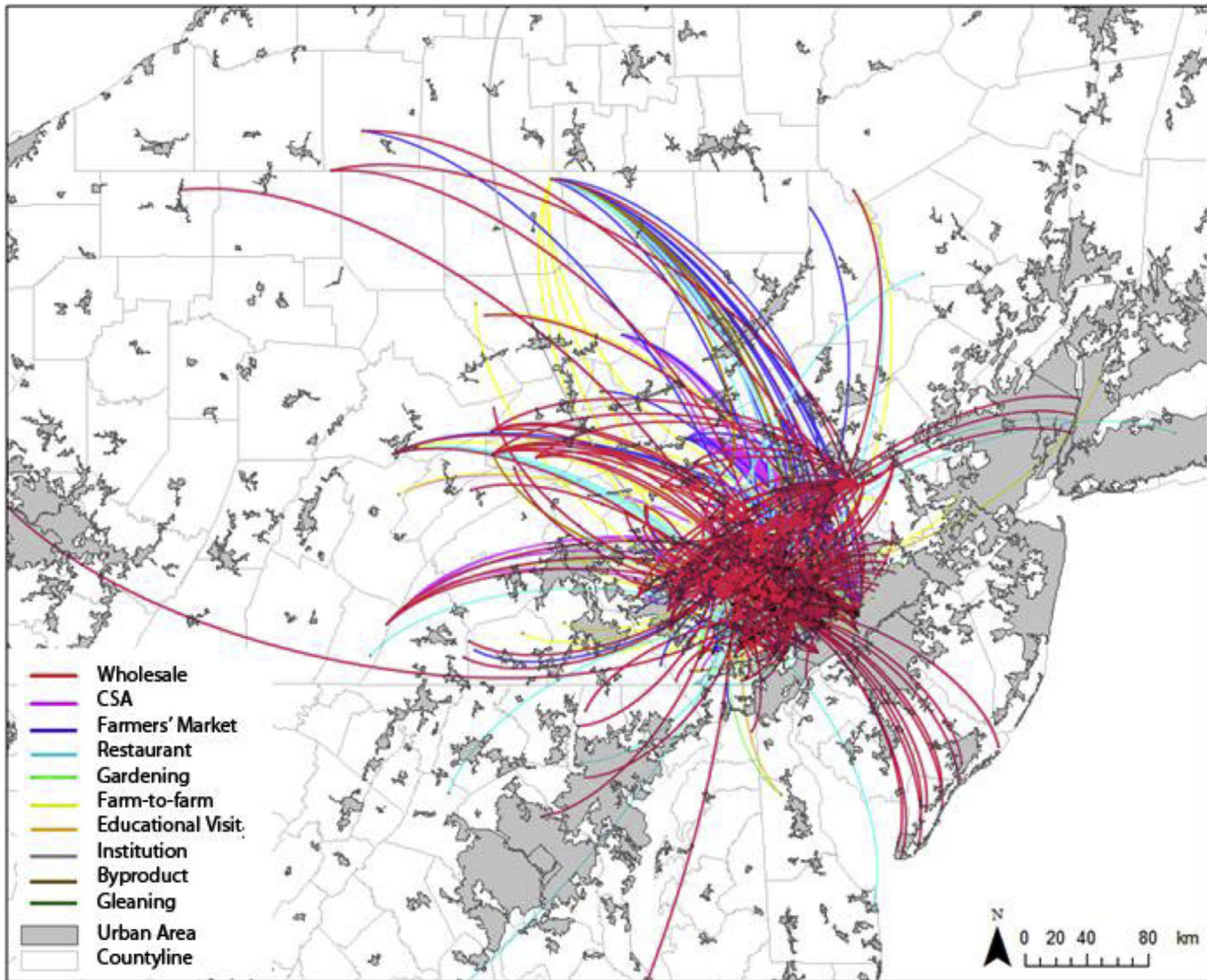


Fig. 4. Farm networks in Chester County.

Farmbook, a yearly collaboration with Grid Magazine. Ms. Anthony is currently executive director for Lundale Farm whose mission is to foster new farm enterprises on 420 acres of preserved farmland in Chester County. Ms. Anthony formerly worked as a restaurant chef, with business development for a corporate foodservice company, as CEO of the nationally known White Dog Café, and as the owner/operator of a farm to table restaurant, Summerhouse Grill.

- Larry Welsch, Director of the Chester County Food Bank for nearly 20 years. Mr. Welsch has been instrumental in pioneering numerous programs around establishing urban gardening at food cupboards and with community organizations, sourcing from urban gardens, outreach in schools to introduce tastings and establish school gardens, and coordinating a volunteer network of several thousand people for on-farm gleaning to supply the foodbank with fresh, local food.
- Matthew Wiess, Program Manager at Farm to for Farm-to-City, a Philadelphia-based non-profit which helps farmers navigate urban market regulations while also helping communities who would like to open a farmers' market in their neighborhood.
- Bryan Snyder, Director of Food Routes, a LLC that supplies technical support, networking and information resources to organizations nationwide that are working to rebuild local, community-based food systems. Mr. Snyder is one of the original founders of Buy Fresh Buy Local, a national local food marketing campaign that started in Pennsylvania.

- Hillary Krummrich, Director of Chester County, PA Agricultural Development Council housed in the County Planning Office

## 4. Findings

### 4.1. Chester County landscape and land-use planning

Like many regions involved in direct marketing, the Chester County Comprehensive Plan bemoans decades of sprawl and farmland loss while seeking to correct for it (2009). Land use zoning promotes relatively large lots, and 1 acre minimum lot size is common. Yet, planning and zoning are fragmented by 73 local units of government, wherein municipalities are not required to adopt county land-use plans.

#### 4.1.1. Isolated geographically, connected socially

The 2009 Chester County Comprehensive Plan is divided into urban, suburban, and rural landscape visions which seek to isolate active farming areas from residential developments while connecting these land-uses through local food marketing (Fig. 2). In essence, the planning regulations seek to divorce producers from users physically, while promoting their connections socially. Some agricultural activities are included within the suburban landscape vision. Community Supported Agriculture (CSAs), small specialized farms and nurseries, community gardens, and farmers markets in suburban areas are meant to “provide residents with fresh locally-

grown food.” The rural landscape vision has three components: small villages that make up rural centers, a rural landscape of scenic vistas without active farming, and an agricultural landscape (Fig. 2). The agricultural landscape is largely located in western Chester County, where the character is similar to the large agricultural area in Lancaster and Berks Counties as opposed to the nearby Philadelphia metropolitan urban area. Agricultural production is diverse, including dairy production, horses and other livestock, poultry, mushrooms, nurseries, orchards, and field crops. This landscape is not planned to accommodate future projected growth, and is dominated by a concentration of active farms, Agricultural Security Areas, large clusters of land permanently protected by agricultural easements, and areas with municipal commitment to adopt effective agricultural zoning. In eastern Chester County, the rural zoning is typically one house per two acres, with only a few municipalities requiring one house per 10 acres.

Chester County’s master plan seeks to acknowledge and support agricultural economic planning through a variety of measures that focus economic development efforts on farm-related businesses, promote agritourism, transition younger farmers into employment, and allow construction of farm labor housing. The county has committed its own staff for agricultural economic development and local food marketing within the county, while offering county facilities as host sites for farmers markets. The county plan also recognizes the synergy between agricultural land uses and alternate energy or emerging biofuel markets- but does not go so far as to encourage model siting legislation for these industries.

Going further than agricultural economic planning, Chester County ties its county plan to food security planning. In the effort to keep farms viable, the county makes a commitment to work with the Delaware Valley Regional Planning Commission (DVRPC, 2010) in regional food system planning. The County plans recognize that nearly 25% of the county is food insecure and encourages local farms and citizens to volunteer in the local food bank’s gleaning program (A-3g).

#### 4.2. Farm networks

Farming networks are represented by 754 unique geographic locations with 1087 connections between these nodes. The total farm network reach on average was 44 km, drawn to the east with a magnitude of 89 km, indicating that the majority of farming networks are drawn to the urban market of Philadelphia and surrounding suburbs (Figs. 2–4). Despite using methods which were expected to reveal more direct-to-consumer relationships, findings are dominated by sales to wholesalers, representing medium and large-scale grocery chains, food hubs, and produce aggregators (Table 1). Farm sales to farmers’ markets, CSAs and Buyer’s Clubs are the next most prominent networks.

The longest reaching networks are farmers’ markets, farm-to-

farm sales, wholesale distribution, and sales to restaurants (Table 1). Farm participation in farmers’ markets exhibits the direct network with the longest average reach, with farm employees travelling nearly 60 km (47 miles) to visit farmers’ markets, predominantly located in the south east toward urban populations in Philadelphia. Conversely, the most common relationship in farm-to-farm networks are those where farms located in more rural western settings partner with Chester County farms for farm-gate sales. For example, one farm outside the county supplied milk to a Chester County farm that made cheese, which it sold further from its farm gate and to local wholesale distributors. The reach of farmers’ markets and restaurants contrasts those of the CSA and institutional sales, which are roughly half the distance and oriented more toward surrounding suburbs.

The most proximate networks are those for byproduct, educational visits and the county food bank, showing that these networks may rely more on proximity of resources and social contacts. Farm byproducts, such as compost and spent grain generally move away from urban areas toward rural land. Similarly, the gardening and gleaning programs organized by Chester County Food Bank are proximate in space.

##### 4.2.1. Social network analysis

Social network mapping of Chester County farm networks by the ten network-type codes indicates the degree to which various farm relationships are intertwined (Fig. 5). The food bank is the hub surrounded by the network of gardening donations (Fig. 5). Based on the network connections, the food bank plays an important role in linking volunteer groups to educational farm visits. Many of the farms involved in the food bank’s gleaning program are centrally located in the social network, and are connected to numerous other networking typologies. For example, farms that participate in the food bank’s gleaning programs are also likely to host educational visits from the same institutions that participate in the gardening program for the food bank.

The Force Atlas layout (Fig. 5, right) of the social network draws apart disparate nodes based on their network coding. From this layout, we see that many farms specialize in one network type, be it CSA sales, sales to wholesale distributors, or participating in multiple different farmers’ markets. One can also see threads that run centrally to the social network, such as farm-to-farm and farm-to-restaurant sales. This view also allows us to see overlap in networks. Every CSA node has a link to a farmers’ market, but the opposite is not true. Likewise, many farms that specialize in wholesale markets also sell through farmers’ markets.

##### 4.2.2. Triangulation with interview material

Interviews with key agricultural and food policy experts helped to verify the social network findings and provide explanations. Many interviewees emphasized how networks evolve over time

**Table 1**  
Direct farm networks as a percentage of total Chester County farm network types, including their reach to end-users of products and services.

Network type	Percentage of total network, N	Average distance (km)	Magnitude (km) and direction
Farm-to-Wholesale	34%, 370	56	8810 (E)
Farm-to-CSA	13%, 141	36	3280 (E)
Farm-to-Farmers’ Market	13%, 141	58	5690 (SE)
Farm-to-Restaurant	11%, 120	57	2780 (SE)
Garden-to-Food Bank	10%, 109	20	1040 (NW)
Farm-to-Chester County Farm	9%, 98	54	1100 (E)
Educational Visits-to-Farm	5%, 55	22	480 (NW)
Farm-to-Institution	2%, 22	38	420 (NE)
Farm Byproduct-to-Elsewhere	2%, 22	37	390 (S)
Farm Gleaning to Food Bank	1%, 11	17	200 (NW)



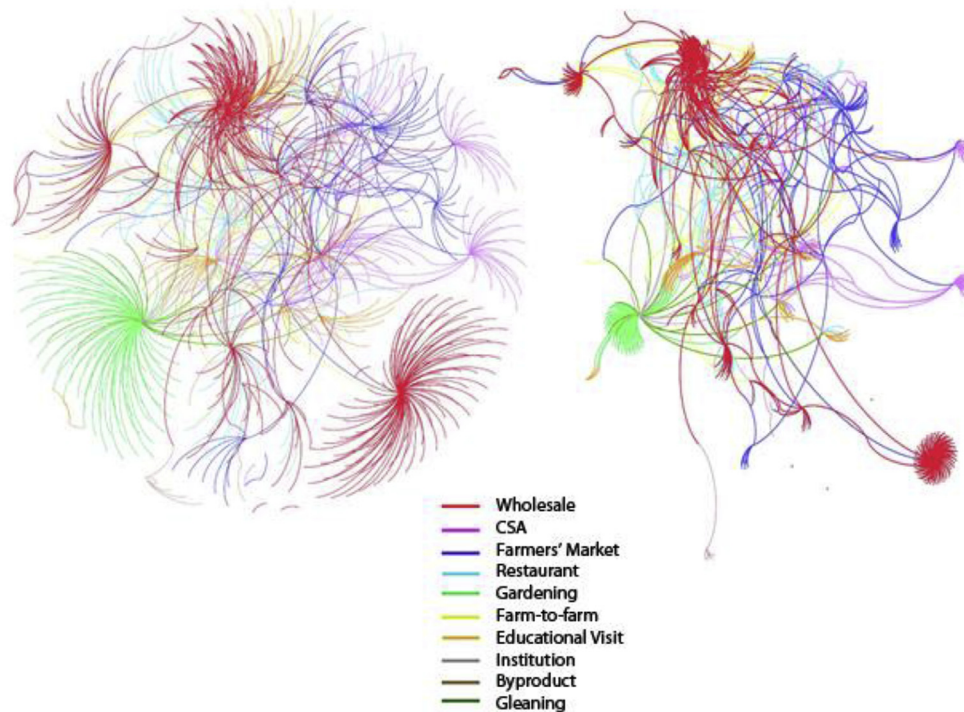


Fig. 5. Social network mapping of Chester County farm networks by network type (Left: social Fruchterman Reingold layout, right: Force Atlas).

and in relation to one another, adding a time-component to this analysis. Chester County has had a long history of direct-to-consumer sales. Interviewees agreed that the proximity of suburbs, particularly wealthy suburbs, aided in the establishment of farm-to-market networks throughout the region. According to John Berry, the agricultural extension officer in Chester County,

“In colonial times, we had a thriving direct-to-consumer farm sector. It’s kind of had its ups and downs through the years, but we have a long history of using the excellent soil and growing conditions that we have to meet the needs of the public consumers right across the street from us. ... We are ideally situated for a thriving direct-to-consumer farm business.”

Berry goes on to say that the geography of Chester County continues to play an important role in social networks formed around food. Urban proximity is a marketing strength for Chester County.

“I think we’re fortunate here in this part of the east coast because we have ready consumers almost at the end of the farmers’ driveway. The big cities have a bigger concentration of consumers and there’s always commercial activity moving to the big cities, but there’s not necessarily a need to travel. Many farmers have a road side stand and go to the local farmers market and as they develop more and more productive capacity they maybe go to some markets in the big cities and add that to the mix.”

The geographic predilection of vending opportunities was similarly stated by Marilyn Anthony, the director of the Pennsylvania Alliance of Sustainable Agriculture, a state-wide farmer support group that supplies grants and technical assistance for marketing. In explaining how farmers’ markets help spur clientele for CSAs, Anthony notes:

“If you are suburban or rural, the likelihood of farm pick-up is much greater. We get into the dilution of the basic principle of the CSA. They really were started to bring people onto the farm. To foster that direct involvement, commitment and participation with the producers. ... The CSA is more about restoring the role of that land (peri-urban) as an integrated part of the community.”

These statements indicate that the geographic distance-decay function of social networks built around food marketing. Indeed, Anthony’s assertion that farms involved with CSAs “bring people to the farm” is visualized with the social network map where numerous farms involved in CSAs also host educational visits that tend to be geographically proximate in nature (Figs. 4 and 5).

The central role of the food bank in purveying directly from farms and coordinating on-farm volunteer efforts may also help explain the breadth of Chester County farming networks. Larry Welsch, director of the Chester County Food Bank, notes that the food bank currently has a fleet of over 3000 volunteers, which “flock” to volunteer opportunities on farms after school and on the weekends. The size and willingness of this volunteer base speaks to Chester County’s wealth but also the draw of agritourism. Through the volunteer participation in the gleaning program, the farms generate goodwill and donate excess food to the food bank. Larry Welsch, asserts that the gleaning allows farms to showcase the good work they do to volunteers and further build their market potential for agritourism activities beyond volunteer days. As a result, farms involved in the gleaning program get practice and market exposure, helping them to later operate on-farm agritourism events, CSAs, and farmers’ market stands to further their market base and generate more profit per pound of product sold. Indeed, the social network mapping indicates that participating food bank farms use multiple networks that are all highly localized geographically (Figs. 4 and 5). Welsch noted that the majority of the

forty farms that participate in the gleaning program are incapable of contiguous expansion and surrounded on all sides by urban and suburban land-uses. The network analysis in this research captures only 11 farms currently involved in the food bank gleaning program (Table 1). Welsch also noted that many of the participating farms are located in southwest Chester County, the headquarters of the Food Bank before it moved to its more central location in 2010. Though the northwestern portion of Chester County has large, contiguous blocks of farmland, few of these farms participate in food bank programs.

The food bank readily leverages geographically and socially proximate networks. Welsch attributes the success of gleaning program with spawning the more recent “raised-bed” program, in which local churches, businesses, schools or residents grow produce for the Food Bank. The Food Bank now has 546 gardens at 129 sites, including 49 schools, up from a total of 25 in 2009. From this rapid success, the Food Bank launched a greenhouse initiative, providing schools with high tunnels so that students can grow food year-round for their cafeterias. The school presence spurred the development of curriculums for healthy eating, farming and nutrition in elementary and middle schools with high tunnels. Staff have pioneered cooking classes and lunch-time tastings of fresh food, such as frozen squash popsicles, in order to introduce children to vegetables that they grow and try to persuade school catering companies to source locally and provide more fresh food. All of these programs make use of the same networks to facilitate food donations through gardening and gleaning along with farm visits for educational purposes with the aim of promoting healthy eating for low-income Chester County residents.

Chester County interviewees agreed that the limits to farm networks were not based on farmer will or consumer demand, but land-use regulation. As Marilyn Anthony stated, “The barriers to entry-it’s policy, regulation. Many of those things are controlled by small groups-whether that’s county commissioners or land conservation groups. They can change the language in their easements, but that doesn’t happen easily.” Moreover, zoning regulations “can be counter-intuitive, irrational, arbitrary. A lot of it is really outdated. It’s based on false assumptions of agriculture.” These sentiments are supported in recent studies, such as the Green Space Alliance Commission’s report on “Transforming Open Space,” which highlights zoning language as an obstacle for the transformation of vacant land (2012). Zoning restrictions apply not only to the farm parcel, but to traffic regulation. As Anthony explains, “you may be farming in an area that is zoned agricultural, but it may not be able to have any retail or commerce on that site, so you would have ag(ricultural) zoning but not commercial. And you may not be able to conduct retail or have a farm store. There may be ordinance restrictions on traffic, so you may not be able to have parking for 20 cars- or it’s a two-lane road and they don’t want that level of traffic on it.” Such land-use regulations would limit the ability for farms to host any network which brings users to the farm, such as: education tours, gleaning volunteers, CSA pick-up locations, or roadside stands. Restrictive land-use regulations may force farms into a long-distance network typology characterized primarily by wholesale marketing.

Interviewees noted that farms struggle not only with land-use regulations at the farm, but also variations in state and county-level land-use regulations encountered en route to the market. Matthew Wiess works for Farm-to-City, a Philadelphia-based non-profit which helps farmers navigate urban market regulations while also helping communities who would like to open a farmers’ market in their neighborhood. Farm-to-City manages over 20 farmers markets in Philadelphia, but does not work with New Jersey farms or farmers’ markets due to the numerous differing county and state health regulations. Wiess notes that the chief concern for

farmers’ market managers is the cost of street closure permits and various approval processes for new farmers market citation. Philadelphia has an ordinance allowing farmers’ markets, but to put a new site on the ordinance, the city council member in the proposed district has to introduce and pass new legislation. Weiss notes that the demand for farm-city connections is as much as urbanite-driven as farmer-driven. At the time of the interview, Farm-to-City had a waiting list of 40 farms for farmers’ markets and over 20 applications to open new farmers’ markets throughout the city. The waitlist speaks to both an abundance of supply and demand, but forming the connection for each farm network is difficult due to land-use regulations and public service limitations in access to restrooms, parking and water. Moreover, Farm-to-City likes to see desire by neighbors for the market in the form of resident petitions. Some residents may not want the traffic, noise or commercial activity that a farmers’ market brings.

Bryan Snyder, one of the original founders of Buy Fresh Buy Local, a national local food marketing campaign that started out of Pennsylvania, goes further in asserting that more local networks could be had if there were higher quality public receiving points in urban areas. The farm-to-city network requires infrastructure; ironically, an infrastructure that most cities had until shortly after the 1950s when many central covered farmers markets were removed for public health reasons (Donofrio, 2014). As recently as 1918, a majority of cities (56%) in the United States with populations over 30,000 had a municipal food market where local and fresh produce was hocked to urbanites (Rogers, 1919).

“That kind of infrastructure used to be common. If you were in a coastal city, you could go to the market and get fresh seafood plus fresh produce from farmers. Sometimes the farmers get blamed for not going into the city. But at the same time they are often not treated very well in the city. There’s often not a friendly place to go with a cover over their heads and a bathroom. Sometimes farmers have to go a mile away from the farmer’s market to go to the bathroom. That kind of stuff could all be dealt with.”

## 5. Analysis and synthesis

### 5.1. Embedded niches

The empiric findings from this research present practical and theoretical considerations for those interested in the local food movement and the potentially uneven distribution of its social and economic capital. First, this study displays the unique arrangements of social and geographic food routes. This research shows that farms typically specialize in one type of marketing, which, in turn, orients them to unique niches socially and spatially. Chester County farms are largely engaged in wholesale and farmers’ market supply chains, which penetrate greater distances to eastern urban areas.

By relating marketing practices to one another, this research presents novel data on the alliances across the local food system. Three main patterns emerge:

1. **Far-reaching:** farms largely involved in wholesale networks often contract sales through a distribution company for delivery to an urban area. This farm network rarely interfaces directly with consumers through the occasional farmers’ market and is more engaged with farm-to-farm cooperation.
2. **User-oriented:** farms primarily engaged in CSA and farmers’ market sales sell directly to consumers.

3. **Nexus:** farms operating through multiple networks with emphasis on restaurants and farm-to-farm collaboration. Nexus farms more frequently interface with food bank programming and educational farm visits.

As Hinrichs (2000) supposed, CSAs and farmers' markets appear to connect over differing geographies as represented by the generalized reach diagram (Fig. 6). Namely, CSA markets are more proximal (Table 1). Yet, this research shows that CSAs and farmers' market networks cluster socially (Fig. 5); and both marketing typologies are not well interwoven in other food system networks. This finding begs the question: are direct markets embedded socially at the local level?

The social network analysis reveals the important role that the food bank plays in convening many of the farms involved at this nexus of networks (Fig. 5). Interviews and review of the comprehensive plan corroborate the social embeddedness of the food bank in land-use policy and food planning in Chester County. The Chester County Food Bank offers a large social network of volunteers and affiliated institutions, such as schools. Many of the farms participating in food bank programs offer on-site visits for educational groups. Involved farms also partner extensively with restaurants and more rural farms.

Indeed, no single network typology dominates the center of Fig. 5, indicating that some farms which engage in wholesale practices may be no more removed from what Hinrichs (2000) calls "the aura of personal relations and social connection" than those which market through farmers' markets. On the other hand, the most socially intertwined networks are farm-to-farm sharing of product and farm-to-restaurant (Fig. 5). Farm-to-farm networks may be important, and often overlooked, threads in the social fabric of food policy. Indeed, these networks are overlooked in the County Comprehensive Plan.

Embeddedness theory is further complicated by the realization

that many farms engage in multiple networks. Every farm engaged in CSA marketing also attends a farmers' market, but the reverse is not true (Fig. 5). Many farms that specialize in wholesale marketing also market through farmers' markets. As the interviewees note, networks are in flux. Farmers may attend a farmers' market to build a clientele list for CSA sales.

In turn, the ability of the farm to host pick-up and farm visits is regulated through zoning, such that some farms which participate in farmers' markets and which may be inclined to host CSA sales are unable to do so. In this sense the embeddedness of local food may be constrained as much by price and values as land-use regulations.

In summary, the Chester County networks grew out of proximal, historic relationships between farms and urban areas. County experts agree that there is more capacity to grow these networks, particularly if already existing networks are leveraged to create more synergies. Gleaning farms already participate in a variety of CSAs, farmers markets, school education outreach and host school field trips. To allow these farm networks to flourish, zoning codes could better accommodate farm visits with parking, signage, and the non-traditional farm uses associated with multifunctional farming (Zasada, 2011). Interviews suggest that zoning reform to allow or promote urban gardening, raised beds, or high-tunnels may also help indirectly stimulate agricultural education programs, fresh food production, and nutritional meal plans for the county's under-served through work with the food bank.

## 6. Conclusion

### 6.1. Structural holes and opportunity hubs in local food systems

This research provides empiric evidence for recent theories on the geographic and social embeddedness of the local food movement. As a result of the geo-social niches of marketing typologies, programs that seek to augment particular themes and the resulting

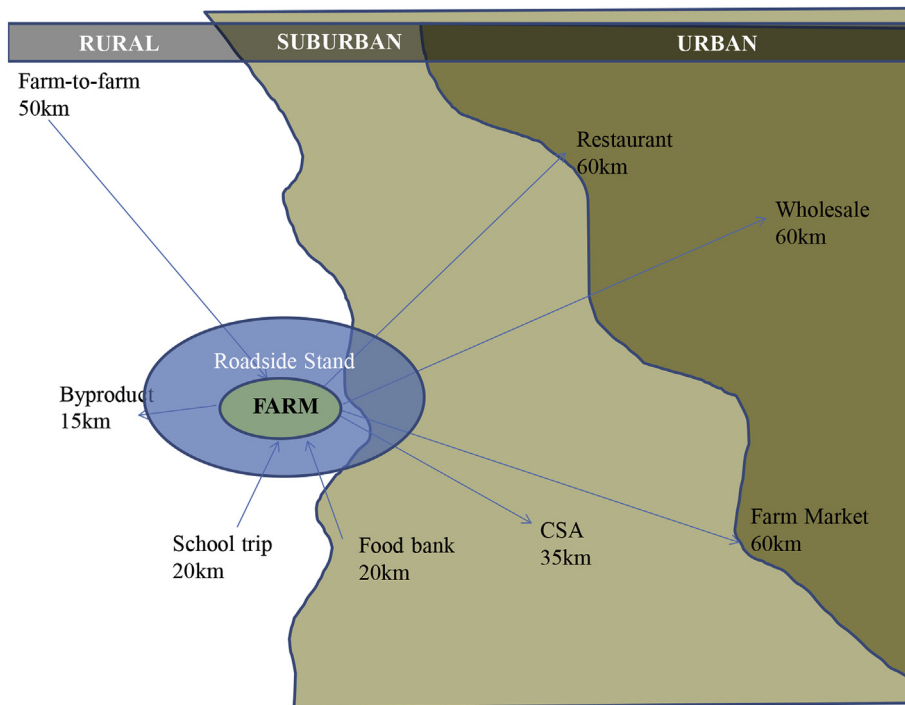


Fig. 6. Generalized reach and direction of averaged farm network sub-sets in relation to urban, suburban and rural land-use patterns based on network analysis and program director interviews.



socio-ecologic feedback loops they engender would do well to acknowledge existing the constraints and possibilities of networks. The most geographically proximate networks with farms involve the movement of byproduct, educational visits, and programming through the county food bank. Farm-to-school programming may wish to align with curricula on food waste recycling, combining farm visits with byproduct recycling education to engender greater knowledge feedback loops that are pertinent to already existing social networks.

In addition, this case would suggest that the inclusion of food banks, and to some extent restaurants, offer well-connected social entry points. For those wishing to reorient food systems, such hubs involved in nexus networks represent platforms for broad reform. Recognizing these unique social networks can allow policymakers to identify key actors in local food policy.

This research also allows practitioners to identify gaps or 'structural holes' in the local food network. For example, farms involved in wholesale supply are less likely to engage with the food bank or local public schools. This lack of engagement may represent an opportunity for targeted outreach to farms and their various geo-social networks, thereby helping practitioners connect novel user groups both spatially and socially. By recruiting such farms, the food bank could break into an entirely different geo-social network, furthering embedding the value of food security. For example, farms that primarily distribute to wholesalers are more widely connected through farm-to-farm sharing of products and may be more embedded in rural social networks. Engagement with large-lot farming operations in western Chester County will better distribute gleaned programs spatially, and potentially socially as well.

If the goal of the food movement is to tighten feedback loops between farming practices and consumer demand for local, socio-ecologically just food, knowing how these networks start and evolve is as important as knowing how they are distributed spatially and socially. Network change over time will allow researchers to see which socio-spatial networks alter practices, and increase collaboration and access across different user groups. Similarly, comparative studies will help researchers understand what influences social and geographic hubs within the local food system.

## 6.2. Complicating embeddedness

Last, this research points to new theoretical considerations for how social relationships play out over socially governed spaces. As previous authors have noted (Renting et al., 2003), the division in marketing strategies can be partially explained by the scale of supply and demand. Larger farms with greater supply would find contracts with wholesalers to be an easier method to move large quantities of product. Mid-sized farms with a limited supply of product would find a nearly bottomless market in large, wealthy urban areas. Smaller-scale operations would turn to more diversified practices that involve agritourism and local social networks for educational school trip visits (Zasada, 2011). Scale of the farming operation was not assessed in this study, but opens an avenue for future inquiries. Scale of operation, however, is often determined by another form of social control over geography: land-use regulations. Interviews suggest that land-use regulations, overseen by a small group of citizens, underpin which forms of geosocial networks can be made with farms. The limits to Chester County's zoning in relation to current and potential networks can be analyzed in future research. For now, the findings suggest a further bottleneck in food supply: land-use planning.

## Appendix. Farm Network Solicitation Materials, approved by IRB

### *Farm Network Recruitment Email Query:*

"Dear [Name],

I am a researcher at the University of Pennsylvania in the Department of City and Regional Planning. I am mapping local food networks, and wondered if you have a list of restaurants, farmer's markets, wholesale, auctions and institutions that you sell or donate to? If you have a list of CSA member zipcodes and schools/institutions that have visited your farm in the past year, this will also help me situate you better in the mapped network of local food movements.

Additionally, if you have accepted or donated/sold compost or other food byproducts (spent grains, or used programs like beneficial residual management)- these programs can be added to your "food network profile."

Please feel free to contact me if you would like more information about this study. [phone number]

Sincerely,

Catherine Brinkley

### *Retail locations that were reported to do business with identified farms, were verified through response to the following email query:*

"Dear [Name],

I am a researcher at the University of Pennsylvania in the in the Department of City and Regional Planning. I am mapping local food networks, and wondered if you have a list of producers/farms that sell/donate?

Farm X has reported that they sell/donate Y product to/through your business, can you confirm?

Please feel free to contact me if you would like more information about this study [phone number]

Sincerely,

Catherine Brinkley

## References

- Assaad, R., 1996. Formalizing the informal? The transformation of Cairo's refuse collection system. *J. Plan. Educ. Res.* 16 (2), 115–126.
- Babic, M., Dys, T., Jake, M., O'Leary, M., Waxman, E., Yarrow, A., 2015. From Paycheck to Pantry: Hunger in Working America. Feeding America and Oxfam Report.
- Bagdonis, J.M., Hinrichs, C.C., Schafft, K.A., 2009. The emergence and framing of farm-to-school initiatives: civic engagement, health and local agriculture. *Agric. Hum. Values* 26 (1–2), 107–119.
- Brown, A., 2002. Farmers' market research 1940–2000: an inventory and review. *Am. J. Altern. Agric.* 17 (04), 167–176.
- Brown, C., Miller, S., 2008. The impacts of local markets: a review of research on farmers markets and community supported agriculture (CSA). *Am. J. Agric. Econ.* 90 (5), 1298–1302.
- Brinkley, C., 2012. Evaluating the benefits of peri-urban agriculture. *J. Plan. Lit.* 27 (3), 259–269.
- Chester County Comprehensive Policy Plan, 2009. Landscapes2: bringing growth and preservation together for chester county. [www.landscapes2.org](http://www.landscapes2.org).
- Conner, D., Colasanti, K., Ross, R.B., Smalley, S.B., 2010. Locally grown foods and farmers markets: consumer attitudes and behaviors. *Sustainability* 2 (3), 742–756.
- Darby, K., Batte, M.T., Ernst, S., Roe, B., 2008. Decomposing local: a conjoint analysis of locally produced foods. *Am. J. Agric. Econ.* 90 (2), 476–486.
- Delaware Valley Regional Planning Commission, 2010. The Greater Philadelphia Food Systems Study.
- Donofrio, G., 2014. Attacking distribution: obsolescence and efficiency of food markets in the age of urban renewal. *J. Plan. Hist.* 13 (2), 136–159.
- Drechsel, P., Danso, G., Qadir, M., 2015. Wastewater use in agriculture: challenges in assessing costs and benefits. In: *Wastewater*. Springer, Netherlands, pp. 139–152.
- Economic Research Service of the United States Department of Agriculture (ERS USDA), 2014. <https://www.ers.usda.gov/topics/natural-resources-environment/organic-agriculture/organic-market-overview/> (Accessed 9 July 2017).
- Feenstra, G., 1997. Direct farm marketing as a rural development tool. *Rural. Dev.*

- Perspect. 12, 19–25.
- Feldmann, C., Hamm, U., 2015. Consumers' perceptions and preferences for local food: a review. *Food Qual. Prefer.* 40 (2015), 152–164.
- Francis, C., Lieblein, G., Gliessman, S., Breland, T.A., Creamer, N., Harwood, R., Salomonsson, L., Helenius, J., Rickerl, D., Salvador, R., Wiedenhoef, M., 2003. Agroecology: the ecology of food systems. *J. Sustain. Agric.* 22 (3), 99–118.
- Furedy, C., Maclaren, V., Whitney, J., 1999. Reuse of waste for food production in Asian cities: health and economic perspectives. In: Koc, M., Mougeot, L.J.A., Welsh, J. (Eds.), *For Hunger-proof Cities: Sustainable Urban Food Systems*. International Development Research Centre, Canada, pp. 136–144.
- Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. *Am. J. Sociol.* 91 (3), 487.
- Granovetter, M.S., 1973. The strength of weak ties. *Am. J. Sociol.* 78 (6), 1360–1380.
- Grunert, K.G., Hieke, S., Wills, J., 2014. Sustainability labels on food products: consumer motivation, understanding and use. *Food Pol.* 44, 177–189.
- Heffernan, W.D., 1998. Societal concerns raised by CAFOs. In: *Manure Management Conference*, Sponsored by the West Central Region of the Soil and Water Conservation Society, February, pp. 10–12.
- Hill, B.G., Moloney, A.G., Mize, T., Himelick, T., Guest, J.L., 2011. Prevalence and predictors of food insecurity in migrant farmworkers in Georgia. *Am. J. Public Health* 101 (5), 831–833.
- Hinrichs, C.C., 2000. Embeddedness and local food systems: notes on two types of direct agricultural market. *J. Rural Stud.* 16, 295–303.
- Horst, M., Ringstrom, E., Tyman, S., Ward, M., Werner, V., Born, B., 2016. Toward a more expansive understanding of food hubs. *J. Agric. Food Syst. Community Dev.* 2 (1), 209–225.
- Howard, P.H., 2009. Consolidation in the North American organic food processing sector, 1997 to 2007. *Int. J. Sociol. Agr. Food* 16 (1).
- Howard, P.H., Allen, P., 2010. Beyond organic and fair trade? An analysis of ecolabel preferences in the United States. *Rural. Sociol.* 75 (2), 244–269.
- Ilbery, B., Maye, D., 2005. Alternative (shorter) food supply chains and specialist livestock products in the Scottish -English borders. *Environ. Plan. A* 37, 823–844.
- Joshi, A., Azuma, A.M., Feenstra, G., 2008. Do farm-to-school programs make a difference? Findings and future research needs. *J. Hunger Environ. Nutr.* 3 (2–3), 229–246.
- Low, S.A., Vogel, S.J., 2011. Direct and intermediated marketing of local foods in the United States. *USDA-ERS. Econ. Res. Rep.* 128, 38.
- Lydecker, M., Drechsel, P., 2010. Urban agriculture and sanitation services in Accra, Ghana: the overlooked contribution. *Int. J. Agric. Sustain.* 8 (1–2), 94–103.
- Moragues-Faus, A.M., Sonnino, R., 2012. Embedding quality in the agro-food system: the dynamics and implications of place-making strategies in the olive oil sector of alto Palancia, Spain. *Sociol. Rural.* 52 (2), 215–234.
- Murdoch, J., 2000. Networks – a new paradigm of rural development? *J. Rural Stud.* 16, 407–419.
- Myers, G.S., 2004. Howard County Farmers' Market Economic Impact Study 2004. Howard County (MD) Economic Development Authority, Agricultural Marketing Program. Report.
- National Agricultural Statistics Service (NASS) CropScape Cropland Layer Data from 2012. Available online: <http://nassgeodata.gmu.edu/CropScape/> (Accessed 9 July 2017).
- Nye, J.S., 2004. *Soft Power: the Means to Success in World Politics*. PublicAffairs.
- O'Hara, S.U., Stagl, S., 2001. Global food markets and their local alternatives: a socio-ecological economic perspective. *Popul. Environ.* 22, 533–554.
- Onianwa, O., Wheelock, G., Mojica, M., 2005. An analysis of the determinants of farmer-to-consumer direct-market shoppers. *J. Food Distrib. Res.* 36 (1), 130–134.
- Onken, K., Bernard, J., 2010. Catching the "local" bug: a look at state agricultural marketing programs. *Choices* (Accessed: February 10 2017). <http://www.choicesmagazine.org/magazine/article.php?article=112>.
- Penker, M., 2006. Mapping and measuring the ecological embeddedness of food supply chains. *Geoforum* 37 (3), 368–379.
- Polanyi, K., 1968. The economy as instituted process. In: LeClair, E., Schneider, H. (Eds.), *Economic Anthropology*. Holt, Rinehart and Winston, New York, p. 126.
- Poppendieck, J., 1999. *Sweet Charity?: Emergency Food and the End of Entitlement*. Penguin.
- Quandt, S.A., Arcury, T.A., Early, J., Tapia, J., Davis, J.D., 2004. Household food security among migrant and seasonal Latino farmworkers in North Carolina. *Public Health Rep.* 119, 568–576.
- Renting, H., Marsden, T.K., Banks, J., 2003. Understanding alternative food networks: exploring the role of short food supply chains in rural development. *Environ. Plan. A* 35 (3), 393–411.
- Riches, G., 1999. Advancing the human right to food in Canada: social policy and the politics of hunger, welfare, and food security. *Agric. Hum. Values* 16 (2), 203–211.
- Rocha, C., 2001. Urban food security policy: the case of Belo Horizonte, Brazil. *J. Study Food Soc.* 5 (1), 36–47.
- Rocha, C., Lessa, I., 2009. Urban governance for food security: the alternative food system in Belo Horizonte, Brazil. *Int. Plan. Stud.* 14 (4), 389–400.
- Rogers, S.L., 1919. *Municipal Markets in Cities Having a Population of over 30,000*. Department of Commerce, Bureau of the Census. Government Printing Office, Washington, DC.
- Sage, C., 2003. Social embeddedness and relations of regard: alternative 'good food' networks in south-west Ireland. *J. Rural Stud.* 19 (1), 47–60.
- Schupp, J.L., 2016. Just where does local food live? Assessing farmers' markets in the United States. *Agric. Hum. Values* 33 (4), 827–841.
- Smit, J., Nasr, J., 1992. Urban agriculture for sustainable cities: using wastes and idle land and water bodies as resources. *Environ. Urbanization* 4 (2), 141–152.
- Sonnino, R., 2010. Escaping the local trap: insights on re-localization from school food reform. *J. Environ. Pol. Plann.* 12 (1), 23–40.
- Starr, A., Card, A., Benepe, C., Auld, G., Lamm, D., Smith, K., Wilken, K., 2003. Sustaining local agriculture barriers and opportunities to direct marketing between farms and restaurants in Colorado. *Agric. Hum. Values* 20 (3), 301–321.
- State of Hunger Report, 2013. Chester county (Accessed June 28, 2017). [https://www.hungercoalition.org/sites/default/files/uploads/chestercounty%20hunger%20factsheet\\_final.pdf](https://www.hungercoalition.org/sites/default/files/uploads/chestercounty%20hunger%20factsheet_final.pdf).
- Sundkvist, A., Milestad, R., Jansson, A., 2005. On the importance of tightening feedback loops for sustainable development of food systems. *Food Pol.* 30 (2), 224–239.
- Transforming Open Space to Sustainable Farm Enterprises In Philadelphia, Delaware, Chester, Montgomery and Bucks counties, Pennsylvania (July 2012). Greenspace Alliance. [http://www.dvrpc.org/Food/pdf/2012-07\\_OpenSpaceToAg.pdf](http://www.dvrpc.org/Food/pdf/2012-07_OpenSpaceToAg.pdf)
- U.S. Censuses of Agriculture. 2007 and 2012.
- Vallianatos, M., Gottlieb, R., Haase, M.A., 2004. Farm-to-school strategies for urban health, combating sprawl, and establishing a community food systems approach. *J. Plan. Educ. Res.* 23 (4), 414–423.
- Vitiello, D., Grisso, J.A., Fischman, R., Whiteside, K.L., 2013. Food Relief Goes Local: Gardening, Gleaning, and Farming for Food Banks in the US. Center for Public Health Initiatives, Philadelphia.
- Vitiello, D., Grisso, J.A., Whiteside, K.L., Fischman, R., 2015. From commodity surplus to food justice: food banks and local agriculture in the United States. *Agric. Hum. Values* 32 (3), 419–430.
- Wadsworth, G., Rittenhouse, T., Cain, S., 2016. Assessing and Addressing Farmworker Food Insecurity in Yolo County, CA. California Institute for Rural Studies.
- Weigel, M.M., Armijos, R.X., Hall, Y.P., Ramirez, Y., Orozco, R., 2007. The household food insecurity and health outcomes of U.S.-Mexico border migrant and seasonal farmworkers. *J. Immigr. Minor Health* 9, 157–169.
- Yue, C., Tong, C., 2009. Organic or local? Investigating consumer preference for fresh produce using a choice experiment with real economic incentives. *HortScience* 44 (2), 366–371.
- Zasada, I., 2011. Multifunctional peri-urban agriculture—a review of societal demands and the provision of goods and services by farming. *Land Use Pol.* 28 (4), 639–648.