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Analyzing the Foodshed: Toward a More Comprehensive Foodshed Analysis

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Analyzing the Foodshed

Toward a More Comprehensive Foodshed Analysis

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ABSTRACT

Foodshed Analysis is a tool used by researchers to measure the feasibility of providing more local food to a community. That there are economic, environmental, and societal benefits provided by eating locally produced food is a central assumption of Foodshed Analysis research. These benefits, however, are not inherent to a localized food system, but instead are goals that local food system participants must work to achieve. Foodshed Analysis may be a helpful tool that can be used to advise food system reform to the benefit of a community's economy, environment, and society, but, in order for this tool to be effective, communities and researchers must move beyond over-valuing proximity and embrace the complicated nature of food systems. Foodshed Analysis researchers also need to address the problems of scale, boundaries, and variables that currently confound their studies. At this stage, Foodshed Analysis researchers have an opportunity to discuss how Foodshed Analysis can be most effective. This paper explores an application of Foodshed Analysis that respects and acknowledges the complexity of the issues it tackles, so that it can provide a comprehensive approach to analyzing, and perhaps improving, regional food systems.

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Foodshed Analysis is a tool used by researchers to measure the feasibility of providing more local food to a community. That there are benefits provided by eating locally produced food is a central assumption of Foodshed Analysis research. But local food, and the attempt to measure its ability to feed a local population, is complex. A closer look reveals that the assumed economic, environmental, and societal benefits of eating locally produced food have been oversimplified in the popular discourse. The broad universal claim that “local food is best” masks a complex and diverse production system in which local and global are not discrete and the environmental, economic, and social value of products lies in the intentions and actions of the food system participants. Foodshed Analysis may be a helpful tool that can be used to advise food system reform and benefit communities. But, in order for this tool to be effective, communities and researchers must move beyond over-valuing proximity and embrace the complicated nature of food systems.

Foodshed Analysis is a new field, and as such, researchers have not yet reached consensus on the goals, methods, and variables of their studies. At this stage, Foodshed Analysis researchers have an opportunity to discuss how Foodshed Analysis can be most effective. The field would benefit if researchers established thoughtful methods for addressing the problems of scale, boundaries, and variables that currently confound their studies. If these issues are addressed, and the researchers respect and acknowledge the complexity of food systems, Foodshed Analysis can provide a comprehensive approach to analyzing, and perhaps improving, regional food systems.

The Assumed Benefits of Local Food

The discourse surrounding ‘local food’ asserts that localizing food systems is the antidote to the problems of the global food system (Feenstra 1997, Kloppenburg, Hendrickson, and Stevenson 1996, Pollan 2006, Kingsolver 2007, Hewitt 2009, Haweil 2002, Nabhan 2002). Specifically, local food advocates believe that eating locally is good for the economy, environment, and society. This list of benefits has become so commonly stated that advocated now often assume that local food automatically provides these benefits by virtue of its localness alone.

My examination of these assumed benefits begins with food system localization literature of the 1990s, in which local food was presented as a cure-all for ailing communities. For example, Feenstra wrote “the way food is grown, distributed and eaten ... profoundly affects the economic, environmental, social, and spiritual well-being of the community. In many places, a logical and appropriate way to revitalize a community is by the development of a local food economy” (Feenstra 1997, 28). Feenstra goes on to highlight the values of a local food systems, saying “local food systems are rooted in particular places, aim to be economically viable for farmers and consumers, use ecologically sound production and distribution practices, and enhance social equity and democracy for all members of the community” (Feenstra 1997, 28). The food system localization literature of this era is characterized by putting local food systems in direct opposition to the dominant global food system which is characterized as harmful to the environment, economy, society, and spirituality of a community (Feenstra 2002, 100). This dichotomy is also illustrated by the 1996 article, “Coming into the Foodshed” (Kloppenburg, Hendrickson and Stevenson 1996). They present wasted energy, soil and water degradation, decreased nutritional value, negative economic effects, poor access to food by the

underprivileged, agribusiness replacing local knowledge of the land, and disempowerment of local actors as the characteristics of the current global food system (Kloppenborg, Hendrickson and Stevenson 1996, 35-36). They then describe their “preferred future” as one in which people withdraw from the dominant food system and transfer their resources and commitments to a new system that fundamentally values proximity (1996, 38). These authors believe that communities can achieve a host of benefits by turning to a localized food system.

Today, this sentiment is continued in the popular discourse presided over by Barbara Kingsolver, Alisa Smith and J.B. Mackinnon, Michael Pollan, Gary Paul Nabhan, and others. In *Animal, Vegetable, Miracle: A Year of Food Life*, popular author Barbara Kingsolver describes the first year that her family of four “made every attempt to feed ourselves animals and vegetables whose provenance we really know” (2007, 10). Her family prioritized food that was grown so close to their home that they most likely knew the people who grew it (2007, 10). Kingsolver describes it as a “decision to step off the nonsustainable food grid” (21) and an attempt to prove that they did not need to rely on industrial food (22). In *Plenty: Eating Locally on the 100 Mile Diet*, Alisa Smith and J.B. Mackinnon also chronicle a year during which they ate only local food in an attempt “to live more lightly in an increasingly crowded and raggedy-assed world” (2007, 4). A large portion of *The Omnivore’s Dilemma*, by Michael Pollan gives voice to Joel Salatin, a farmer who is charismatically attempting to revitalize a local (and organic) food chain. Pollan presents Salatin’s local food chain in contrast to the industrial food chain he outlines and criticizes in the preceding section of his book. In *The Town that Food Saved*, Ben Hewitt tells the story of a group of people who are trying to create a model localized food system that can inspire other communities (2009). Hewitt believes that “over the past century, America’s food system has become increasingly industrialized and centralized” and

suggests that “we need to rethink our entire food-supply chain for reasons of economic security, health security, and even social security. We need to reinvent how we grow and distribute food; we need to re-scale and decentralize” (2009, 6). In *Home Grown: The Case for Local Food in a Global Market*, Brian Halweil puts it most colloquially when he states that “the ‘global vending machine’ often displaces local cuisines, varieties, and agriculture” (2002, 5). Halweil sees the solution in the local foods movement which he says “can help restore rural areas, enrich poor nations, return fresh and wholesome food to cities, and reconnect suburbanites with the land” (6). These popular authors all frame food system localization as a way to counteract the negative effects of the industrialized global food system. It is true that, by its nature, popular literature cannot be as nuanced as academic literature. And yet, popular literature is guiding the local food discussion and influencing the academic studies in the field, as evidenced by the presence of Kingsolver, Pollen, and Halweil in the bibliographies of Peters et al (2008b), Giombolini et al (2010), and Blum-Evitts (2011).

In addition to local food literature, there are also many current organizations and movements focused on local food as the antidote to the problems of the global food system. The San Franciscan group behind *locavores.com* claims that the distances food travels impacts “air pollution and global warming, the ecological costs of large scale monoculture, the loss of family farms and local community dollars” (Prentice, et al. 2010). Another example comes in the form of a document produced by Oregon’s Multnomah County called the Multnomah Food Initiative Action Plan, which outlines 4 “action pillars” as goals for the local food system. These pillars are: local food, healthy eating, social equity, and economic vitality (Multnomah County Office of Sustainability 2010). In certain communities, “Buy Local”, “Locavore,” and “Slow Food” have become common phrases associated with the idea that valuing local food will provide many

benefits and combat the problems of the global food system. A quick internet search for “reasons to eat local” produces websites like *eatlocalnow.org* and *locavores.com* which list reasons such as “preserves genetic diversity,” “builds stronger more vibrant local economies,” and “improves food security in our communities” (Eat Local Now, 2013). This list of the benefits of local food is now pervasive in the popular local food discourse.

Economic Benefits of Local Food

Many people believe that buying local food provides economic benefits. According to a report by the USDA, expanding local food systems in a community can increase employment and income in that community (Martinez et al. 2010, 42). Increasing local employment is very important to a local community, especially in economically trying times. More employment in the production of local food is good for the community in which the food is produced. In addition to providing jobs, direct sales of food within a community between growers and the consumers mean most of the revenue generated is retained within that community (O'Hara 2011, 17). It seems counterintuitive to import food and export dollars in order to feed a community if that community has the ability to produce its own food. The benefit of keeping dollars within the local community is, to many people, the most important benefit of the local food movement.

Environmental Benefits of Local Food

A common environmental concern associated with the current global food system is the concern of high “food miles.” A highly influential report conducted by the Leopold Center for Sustainable Agriculture in 2003 defined food miles as “the distance food travels from where it is grown to where it is ultimately purchased or consumed by the end user” (Pirog and Benjamin 2003, 1). Many people believe that food miles are the primary environmental problem with a global food system and the most significant reason to “eat local.” This belief is reflected on the

Global Development Research Center's Food Miles web page, which states that "the more food miles that attach to a given food, the less sustainable and the less environmentally desirable that food is." The concern is primarily associated with greenhouse gas emissions produced during the transportation of the food products. A statistic that is often quoted in popular literature is that produce travels over 1,500 miles on average before being consumed. This figure comes from the Leopold Center study quoted above. Jane Black points out that this statistic has been quoted in the *New York Times*, *Newsweek*, *Time*, and *Slate*, as well as in a press release by WalMart (2008). Barabara Kingsolver uses this statistic in her book, directly stating that "each food item in a typical U.S. meal has traveled an average of 1,500 miles" (2007, 5). Smith and Mackinnon use the statistic in their book as a starting point from which they make the decision to eat locally for a year (2007, 3). The statistic also appears in Hewitt's *Home Grown* (2002, 4) and Nabhan's *Coming Home to Eat* (2002, 23). The popular repetition of the figure makes it seem more credible and hard to ignore.

Societal Benefits of Local Food

In addition to beliefs about economic and environmental benefits, there is also a popular belief that if consumers are closer in proximity to the people who grow and process their food, they will be more socially accountable. And therefore, eating locally is better for society. Examples of this belief are seen in the food system localization literature of the 1990s. Gail Feenstra champions a locally based food system as a way to "revitalize a community" and claims that because local food systems are rooted in particular places, they "enhance social equity and democracy for all members of the community" (1997, 28). Kloppenburg, Hendrickson, and Stevenson state that a localized food system is "one vehicle through which we reassemble our fragmented identities, reestablish community, and become native not only to a place but to each

other” (1996, 34). And Brian Halweil says that “long-distance food erodes the pleasures of face-to-face interactions around food” (2002, 5-6). These statements highlight a belief that by buying and eating locally-grown food people are choosing to engage with other members of their community and therefore they become accountable to one another in a way that cannot be achieved in a global food system. That direct connection creates a sense of trust that the producer is acting in a responsible manner toward the consumer, and vice versa.

Foodshed Analysis

Once a community has decided that localizing its food system can provide a number of benefits, the next logical question is often whether or not it is possible to feed the population from locally-sourced food. A growing number of researchers have turned to Foodshed Analysis in order to evaluate the answer to this question and thereby inform the conversation surrounding local food. Foodshed Analyses are studies which attempt to scientifically measure the current or potential agricultural ability of a region to provide enough food to feed the local population.

What are Foodsheds & Foodshed Analysis

The term “foodshed” is used to describe the geographical extent within which the food for a certain population is grown. The term has been defined and used by a number of authors; often the way in which it is used suggests a naturally defined area for every population. One of the first known uses of this term was by Walter Hedden, who described foodsheds as similar to watersheds with different barriers: “the barriers which deflect raindrops into one river basin rather than into another are natural land elevations, while the barriers which guide and control movements of foodstuffs are more often economic than physical” (1929, 17). Sixty two years

later, in a popular article, Arthur Getz borrowed the term “foodshed” from Hedden (1991). Getz argued that our current foodshed may cover the entire globe and that, as a result, the total cost of food is not reflected in the purchase price. Robert Feagan described the concept of the “foodshed” as taking into account “the more ‘natural’ place variables of micro-weather patterns, soil types, water availability, slope conditions, etc” that “play a role in determining the potential and risks of agriculture” (2007, 26). Kloppenburg, Hendrickson, and Stevenson point out that the similarity between the words foodshed and watershed “connects the cultural (‘food’) to the natural (‘...shed’)” (1996, 34). And Feenstra adds that “a local foodshed not only describes a geographic area and the foods that can be grown within it, but also the social and cultural elements of a community” (1997, 28). These various definitions of the term “foodshed,” taken together, provide an understanding that natural features, weather patterns, cultural and social values make up the context in which food is produced. This term is effective because it is flexible. It acknowledges that the foodshed for each place can be defined differently, and it allows for differences in scale.

History of Foodshed Analysis

Foodshed Analysis has been used to capture the feasibility that a local region would be able to provide enough agricultural products to feed its population. Kloppenburg, Hendrickson, and Stevenson introduced the concept of Foodshed Analysis, proposing that it should seek to answer the questions “where is our food coming from and how is it getting to us?” (1996, 40). They describe foodsheds as “streams of foodstuffs running into a particular locality, their flow mediated by the features of both natural and social geography” and they believe that Foodshed Analysis should be responsible for “measuring the flow and direction of these tributaries and documenting the many quantitative and qualitative transformations that food undergoes as it

moves through time and space toward consumption” (40). This description is highly metaphorical and leaves the technical aspects of how exactly to measure the flow and direction of food through space up to future researchers. Modern Foodshed Analysis researchers are currently in the process of defining the scale, boundaries, and methods that make up Foodshed Analysis. Peters et al. are at the forefront of scholars conducting Foodshed Analysis studies today (2008a). They define Foodshed Analysis, similarly to Kloppenburg, Hendrickson, and Stevenson, as the “study of the actual or potential sources of food for a population, particularly those factors influencing the movement of food from its origin as agricultural commodities on a farm to its destination as food wherever it is consumed” (2008a, 2). They expand the definition beyond Kloppenburg, Hendrickson, and Stevenson however, by advocating for Foodshed Analysis as a way to evaluate “how the geography of the food system influences its impact on the environment and the vulnerability of populations to disruptions in their food supplies” (2008a, 5). And they go on even further to suggest that Foodshed Analysis would be helpful for planners when determining how food systems should change in order to enhance sustainability.¹

Modern Foodshed Analysis

Foodshed Analysis is a new field and there is not yet full consensus on what these studies should aim to achieve or how they should achieve it. My research included studies done by Peters et al., (2008b), Giombolini et al., (2010), Blum-Evitts (2009), and Desjardins et al., (2010). The goals, methodology, and results of these four Foodshed Analysis studies vary greatly.

¹ These definitions come from an article titled *Foodshed Analysis and Its Relevance to Sustainability*, which laid the ground work for modern Foodshed Analysis

The goal of the Peters et al. study of New York State is to determine if local agriculture could potentially meet local food needs in New York State. They do this by “develop[ing] a spatial model for mapping potential, local foodsheds,” that estimates distance between food production and consumption as well as how much of the state’s food needs could be met in-state (2008b, 73). Peters et al used Geographic Information Systems (GIS) and other software to conduct the detailed analysis. In a previous article (Peters et al 2007), they had determined the average land requirements needed to provide a complete diet for one person for one year (74). They divided the state of New York into five kilometer by five kilometer “production zones” and developed an equation based on soil and landuse data to determine the potential food production of each production zone (75). They then determined the food needs of each population center by assigning every resident of New York State to the nearest population center and created an equation to determine the food consumption capacity of each of those population centers (76). Finally, they measured the distance traveled between each production zone and each population center and used an optimization model to allocate the food from the production zones to the population centers with the least distance traveled (76). The schematic for how Peters et al. conducted their analysis can be seen in Figure 1. The results of this study showed that New York State can only provide about thirty four percent of the total food needs of the state (78).

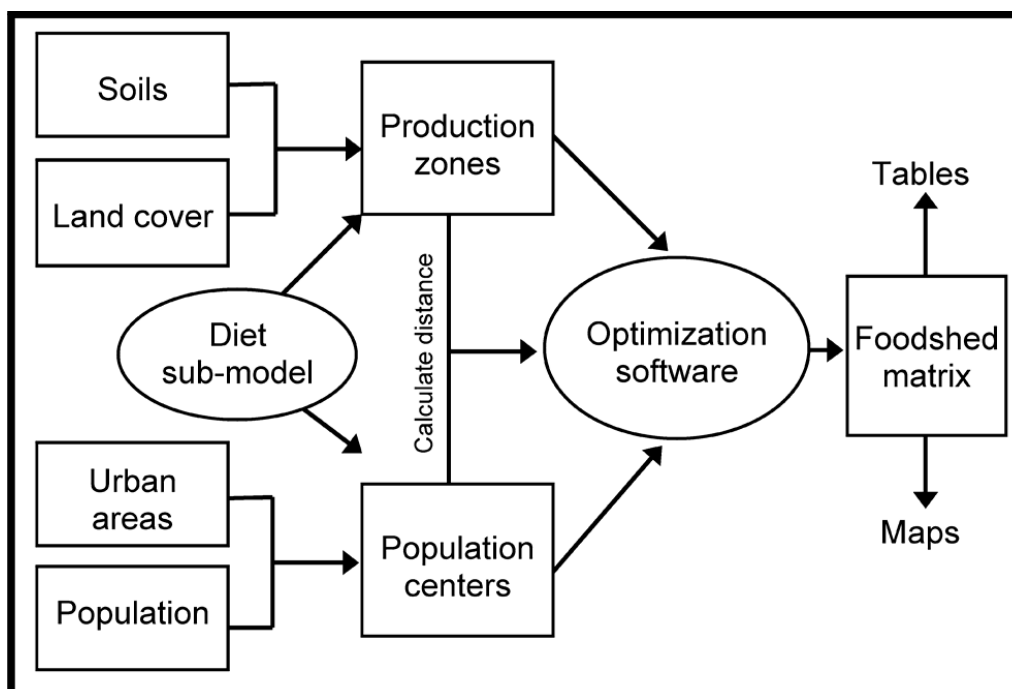


Figure 1: Schematic of analysis used by Peters et al. (2008b, 73)

In 2010 Giombolini et al., followed the example set by Peters et al., with their own Foodshed Analysis study of the Willamette Valley of Oregon. The goal of this study was to determine if agricultural production currently meets the recommended dietary needs of the residents of the Willamette Valley (3). While Peters et al measured the potential for agricultural production; Giombolini et al. measured the agricultural production as it currently exists. Giombolini et al. also differed from Peters et al. in that they specifically did not want to use GIS or any other expensive software, because they wanted to “provide a means by which community organizations could conduct their own analysis to determine if agricultural production in their area met the recommended dietary requirements of the local population” (3). The methods of this study began with acquiring the last five years of agricultural production yields data from the Oregon State University Extension Service, which keeps a database on Oregon agricultural information (3). They then converted all the various measurements for each type of crop grown in the Willamette Valley to grams and determined how many grams constitutes a serving for

each crop (4). This left them with the number of servings yielded by each crop for each of the past five years (4). They then categorized the crops into the food groups designated in the “Dietary Guidelines for Americans” by the United States Department of Agriculture (USDA) and the United States Department of Human and Health Services (USHHS) to get servings per food group produced in the Willamette Valley each year (4). Using population statistics acquired from the Population Research Center at Portland State University and the USDA/USHHA recommended dietary guidelines they determined the total servings needed for each food group to feed the Willamette Valley population for one year (6). A schematic of their methods can be seen in Figure 2. Their results showed that the Willamette Valley agricultural production did not meet the dietary requirements of the population; it met only 67% of grains, 10% of vegetables, 24% of fruit, 59% of dairy, 58% of meat and beans, and 0% of oil (7). While not as spatially focused as the study conducted by Peters et al, this study could become very useful in presenting other groups with a more accessible methodology for conducting their own analyses.

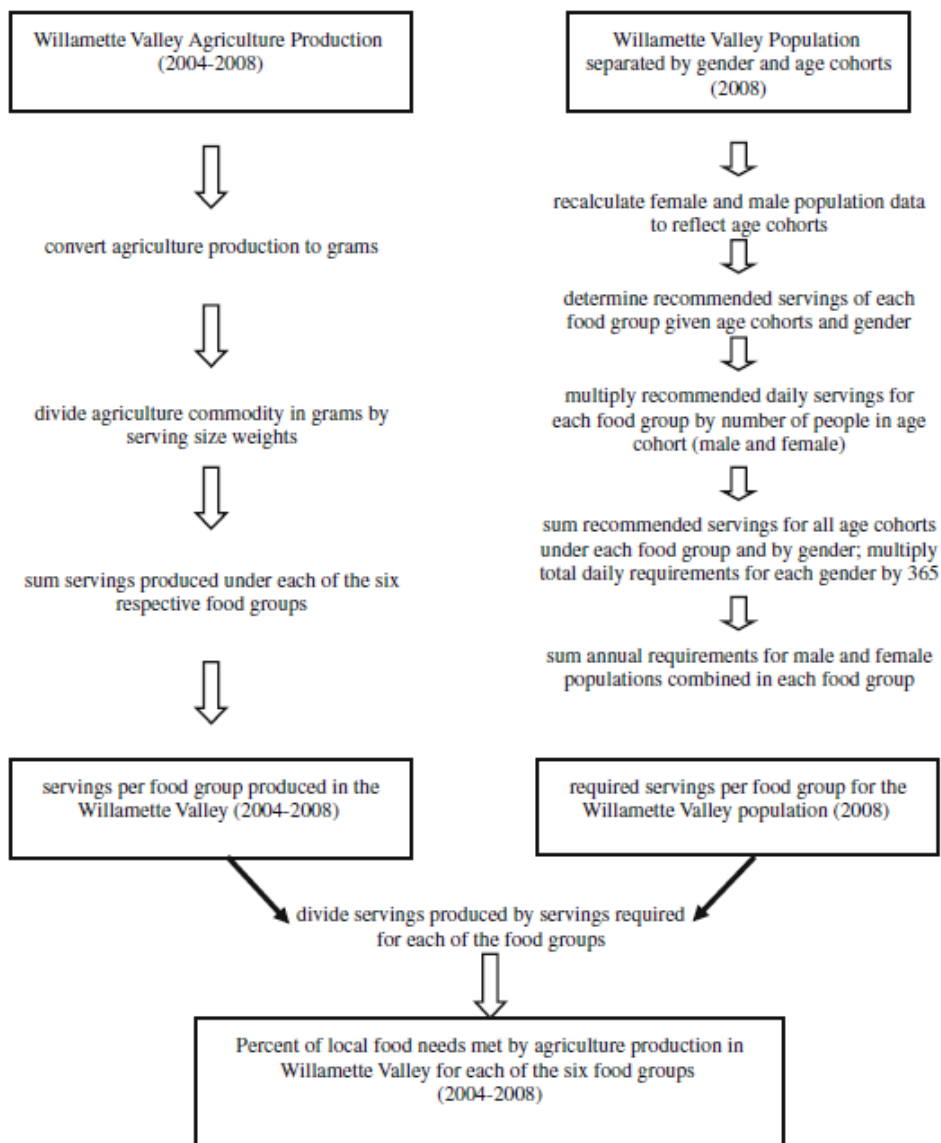


Figure 2: Schematic of analysis used by Gimbolini et al. (2010, 8)

Shermariah Blum-Evitts tackled the task of designing a Foodshed Assessment Model (2009). Her goal was to provide guidance on how to conduct regional foodshed assessments that predict the ability of agricultural production to meet a region's dietary needs using accessible methodology. She first determined consumer food demand through the Consumer Expenditure Survey, which compiles statistics on household purchasing habits and presents the data in dollars spent per commodity group (36, 43). This approach did not focus on optimal nutrition as the previous studies have, but rather on current purchasing patterns (36). She then determined the

current local food production, the data for which was gathered from the Census of Agriculture conducted by the United States Department of Agriculture (USDA) (37). This data includes a translation from farm sales value to retail dollars, which allows the farm sales to be directly compared to consumer spending data (37). Finally, she determined the quantity of potential farmland using soils and landuse data in a GIS, similarly to the Peters et al. (2008b) (38-40). This methodology is more accessible than the complex methodology used by Peters et al., but still achieves analysis of potential agricultural production which the study by Giombolini et al. lacks.

Desjardins et al. took a different approach for the Waterloo Region of Canada. Their stands apart from the others summarized here because it aimed to estimate the capacity to improve nutrition for the population of Waterloo Region, Canada, by growing more of the foods that are insufficiently consumed by that population (2010, 135). They did this by estimating the quantity of vegetables, fruit, legumes, and whole grains needed by the population of the Waterloo region as well as estimating how much of these requirements could be met by agriculture within the region by the year 2026 (130). This study did not seek to provide all of the necessary dietary requirements of the population from within the region, it allowed for food to be imported from other regions of Canada and internationally (136). Instead the goal was to increase the production of crops for local consumption and to do it in such a way that it would improve local nutrition. This study is important because it acknowledges that many agricultural products are not appropriate to be grown in the region being analyzed (135). This study is not as comprehensive as those by Peters et al and Giombolini et al, but it might set more realistic goals for agricultural production.

	Peters et al.	Giombolini et al.	Blum-Evitts	Desjardins et al.
Area of Study	New York State (1 state)	Willamette Valley, OR (1 watershed)	Pioneer Valley, MA (3 counties)	Waterloo Region, Canada (1 regional municipality)
Goal of Study	Determine the <i>potential</i> ability of NYS agriculture to feed NYS pop.	Determine the <i>current</i> ability of WV agriculture to feed WV pop.	Determine current and potential ability for PV agriculture to feed PV pop.	Estimate capacity to improve nutrition of pop. through local agriculture
Measure of Food Production	Model using soil and landuse data	Last 5 years of agricultural yields (OSU Extension)	Current production: Census of Agriculture (USDA) Potential production: model using soils and landuse data	Estimate based on soil, climate, amount of available land
Measure of Food Consumption	Complex equation accounting for 42 different diets to produce per capita area of land required	USDA “Dietary Guidelines for Americans”	Consumer Expenditure Survey (stats on household purchasing habits)	Optimal food consumption based on Canada’s Food Guide (Health Canada). Focus on foods currently under-consumed
Calculation of Distance travelled	Euclidean Distance between production zones and population centers	none	none	none

Figure 3: Matrix of attributes of the four Foodshed Analysis studies

This burgeoning field of study is still in its early stages and it seems an appropriate time to reflect on how to proceed. How should researchers conduct Foodshed Analyses? The goal of these studies is to determine the feasibility of localizing specific regional food systems. But the underlying motivation is to provide a scientific approach for localizing food systems and therefore help communities access the assumed benefits of local food. In doing this, researchers risk becoming too caught up in popular rhetoric. It is important for researchers to respect and acknowledge the complexity of food systems by exploring whether local food actually provides the economic, environmental, and societal benefits that they assume it does. If Foodshed Analysis aims to inform communities about how to effectively make change to their food

systems, as Peters et al. (2008a) recommend that it should, then Foodshed Analysts should aim to conduct studies that realize the limitations of a preoccupation with local food.

The Complexity behind the Assumed Benefits of Local Food

In his book *Just Food: Where Locavores Get it Wrong and How We Can Truly Eat Responsibly*, James McWilliams critiques the way local food advocates reduce the complexity of food systems into just one issue: eat local (2009). One critic of McWilliams says “the problem with this argument is its irrelevance. The few truly orthodox locavores who presumably exist (do you know even one?) aren’t close to persuading the world to eat the way they do” (Ogburn, 2009). But McWilliams’s critique of Local Food *is* relevant to Foodshed Analysis, where the primary goal has been to ascertain if and how a local region would be able to provide enough agricultural products to feed its population. In the case of Foodshed Analysis, the research does focus on local food as the primary factor of foodshed reform, and the analysis is built around the central assumption that local food is good for the economy, environment, and society. The arguments championed by the food systems literature of the 1990s and carried on by today’s popular discourse are valid, that eating locally benefits the economy, environment, and society. Each of those claims, however, can also be challenged. As Born and Purcell state, “for some goals and in some contexts, the local can be an appropriate scale for action. But it is never necessarily so” (204). The assumed benefits are not inherent to a localized food system, but instead are goals which local food system participants must work to achieve. It is rarely the case that being local is what makes a food product better for the economy, environment, and society. The benefits of local food lie in the intentions and actions of the local food participants, not in the localness of the products alone. Taking a closer look at the assumed benefits of local food

from a critic's point of view reveals that the local food discourse has greatly oversimplified a very complex issue. Considering common beliefs about local food from a critical point of view can help focus researchers in defining the goals and methods of Foodshed Analysis.

Local Food and the Economy

The argument that local food is beneficial to the local economy makes strong points. Redundant trade is a key aspect of the current global food system, and redundant trade is bad for local economies. Judy Maan Meidema describes redundant trade as “needless trade. It is the simultaneous exporting and importing of the same product to the same region, regardless of the season” (2006, 3). She provides an example: “in tomato season in Ontario (July, August, and September 2005), Ontario exported \$69 million worth of fresh tomatoes. During those same months, Ontario also imported \$17 million worth of fresh tomatoes” (Miedema 2006, 3). Another example comes from the New York Times where Oxford University economist Paul Watkiss is quoted as saying that Britain “imports — and exports — 15,000 tons of waffles a year, and similarly exchanges 20 tons of bottled water with Australia” (Rosenthal 2008). Furthermore, the price for imported produce is often as low as, or lower than, local produce (Miedema 2006, 15). A study of redundant trade in Canada found that “when farmers market their products in the global food system, they receive \$0.09 on each dollar that the consumer spends on food ... local farmers involved with direct marketing receive between \$0.80 and \$0.90 on each dollar” (Miedema 2006, 3). This indicates that selling products locally is financially better for farmers, but importing similar products creates potentially unfair competition for those farmers in the market place. This is a legitimate argument for choosing to support the local food economy over imports.

More problematic, however, is when choosing to support the local food economy steps over into the extreme of import substitution. Bellows and Hamm (2001) define import substitution as “when community food security efforts lead to substituting local production for what has previously been imported” (271). Import substitution goes beyond keeping the products that are already being grown locally close to home; it also means that communities actively increase certain types of local production to edge out imported products. Import substitution is problematic when it means producing food that is not suitable to a specific region. It is inefficient to put a community’s resources toward growing seasonally or regionally inappropriate products just so that they could be produced locally rather than imported. While import substitution may benefit the local economy by diverting dollars that would have paid for imported products toward local products, it does not necessarily achieve the local food advocate’s broader goals which include benefitting the local environment and community. If the goal of food system localization is to benefit all three (economy, environment, and society), communities need to be wary of stepping over into the extreme of import substitution for the sake of economics alone.

It is also relevant to note that many of the agricultural products that make the biggest impact economically are not food products. According to the National Agricultural Statistics Service and the Oregon State University Extension Service, three of Oregon’s top agricultural commodities are not food products. Greenhouse and nursery products are the most valuable agricultural product of Oregon at a value of \$742,457,000 in 2011 (National Agricultural Statistics Service 2011). Also included in the top 10 are grass seed and Christmas trees. The economic value of these products is significant, but there may not be room for them if the first priority for use of local agricultural land is growing food for the local population.

Local Food and the Environment

It is important to note that a local food system is not inherently better for the environment. The assumption that it is better for the environment is primarily based in the concept of “food miles,” which focuses only on the distance that food travels between production and consumption. As I pointed out before, the pervasive statistic that produce travels over 1,500 miles on average originated in a report by the Leopold Center for Sustainable Agriculture. James McWilliams points out that “although the figure has saturated the locavore literature, it was derived from a small database and a set of flimsy assumptions” (2009, 20). Jane Black wrote an article on this same subject for Slate in which she points out that the researchers who came up with the figure examined only thirty-three kinds of vegetables, measured the distance they traveled to only one city (Chicago), and relied on “terminal market data” collected by the USDA which handles only 30% of the nation’s produce (2008). The equation that produced the figure also only takes into consideration the origin points of food products, amount of products coming from each point of origin and the distance traveled by those food products (Pirog & Benjamin 2003, 2)². Food miles have become commonly accepted by the local food community as a representation of environmental impact, but in fact, they represent only the transportation of food products. And transportation is only one of the many ways that food impacts the environment.

² Pirog & Benjamin’s food miles equation:

$$\text{WASD} = \frac{\sum (m(k) \times d(k))}{\sum m(k)}$$

where:

k = different location points of the production

m = weight (amount) from each point of production, and

d = distance from each point of production to each point of use (or sale).

(Pirog and Benjamin 2003, 2)

In addition to proximity, there are many variables that need to be included when attempting to determine the environmental impact of the current food system. A much more robust way to study the environmental impact of a food systems is Life Cycle assessment, a method that takes more (and more relevant) variables into account than just food miles. Some researchers propose Life Cycle Assessment as a way to “consider both the direct emissions from activities like transport, alongside those generated during manufacture of the relevant inputs, e.g. fertilizer, pesticides, electricity, and machinery” (Edward, Jones et al. 2008, 267). Life Cycle Assessment more comprehensively measures environmental impact because it takes into account the production, processing, packaging, storage, transport, resource depletion, air and water pollution, and waste generation associated with the food system. Several studies have been conducted using Life Cycle Assessment (Webers and Matthews 2008, Sim et al 2007), and among these studies there is agreement that transportation creates only a small amount of the total greenhouse gas emissions associated with food consumption. Using Life Cycle Assessment, Weber and Matthews found that “transportation creates only 11% of the 8.1 metric tons (t) of greenhouse gases (in CO₂ equivalents) that an average U.S. household generates annually as a result of food consumption” (Engelhaupt 2008, 3482). These findings are supported by the Food Climate Research Network (FCRN) which found that “transport accounts for about 10 per cent of the food system’s emissions” (Chi, MacGregor, and King 2010, 16). The popular assumption that local food is better for the environment can be seen, in this light, as overly simplistic. Life Cycle Assessment shows that the distance a food product travels is only one environmentally damaging variable in the complex food system equation. If one of the goals of localizing food systems is to do better by the environment, then researchers need to be aware that focusing on food miles masks the other variables that significantly impact the environment.

While transportation does have an environmental impact, it is just one of many aspects of the food system that does. Other findings in Life Cycle Assessment studies suggest that individuals may be able to make more of an impact on greenhouse gas emissions by altering personal behavior beyond just buying food with less food miles. Weber and Matthews report that a change of diet could make a significant impact. They claim that if the average American household refrained from red meat and dairy for just one day a week, they would make the same climate impact as if they had bought all of their food from local providers (2008, 3512). In another study, Coley, Howard, and Winter found that individual consumer transport to and from the grocery store contributes more greenhouse gas emissions than much of the rest of the food system combined (2008, 154). This demonstrates that the food's miles are not the most important part of the equation. Individual personal behavior may have some impact on reducing carbon emissions from the food system, but buying food with less "food miles" is not the behavior with the most impact. Therefore, "local" may not deserve the weight that local-minded consumers give it when making their food purchasing decisions. Supporters of the local food movement may be conflating small food production operations with local ones, assuming the local food means food that is produced by a small operation with low inputs. But, even large-scale production facilities, such as concentrated animal feeding operations (CAFOs), are local to someone. If a plan for food system reform only considers proximity, it may include these types of facilities because they are located close-by and exclude facilities with more environmentally responsible practices that are farther away. A healthy food system should be designed with the intent to comprehensively reduce the negative impact on the environment. This effort requires considering more than proximity alone.

Local Food and Society

One of the common claims of the local food movement highlighted earlier in this article is that eating locally benefits society. This is a broad claim, and it is easily debated. Social relations are not inherently better in a local versus a global food system. Some argue that, when cast in a certain light; it is even possible to see them as societally problematic. Specifically, food system localization has been criticized as running the risk of becoming xenophobic, elitist, and unjust.

It is possible to see an emphasis on buying and eating local food as a way of defining one's sense of place through othering, which can lead to xenophobia. Gillian Rose states that one way that people can establish a sense of place is "by contrasting themselves with somewhere they feel is very different from them" (1995, 92). Clare Hinrichs, a thoughtful critic of food system localization, points out that a community may use food system localization in a way that "tends to stress the homogeneity and coherence of 'local' in patriotic opposition to heterogeneous and destabilizing outside forces, perhaps a global 'other'" (2003, 37). When people and communities develop their sense of place through contrast to others, they run the risk of being exclusionary. Food plays a significant part in culture, and if people begin to feel that their local food is inherently better than food that comes from elsewhere, they are on a slippery path toward excluding not only other food but other cultures and other people. This way of thinking can lead to xenophobia, where people become afraid of things that originate outside of their local realm of experience. This may seem like an exaggerated view of the local food movement, but it is worth considering the potential risks of openly preferring things that are local to things that are foreign.

Another criticism is that “local food” empowers the wealthy and powerful over the poor and powerless in society and is thus elitist. Born and Purcell argue that “no matter what its scale, the outcomes produced by a food system are contextual: they depend on the actors and agendas that are empowered by the particular social relations in a given food system” (2006, 195-196). In this way, when the people who drive food system localization view themselves as benefactors who are making decisions that protect a place or a people, that localization runs the risk of being elitist and patronizing. The Slow Food organization, which was founded as local food movement in Italy, has been criticized for this very way of thinking. Donati suggests that the attempts the Slow Food organization makes at preserving high quality rare foods primarily serve the privileged minority who can afford those foods (Donati 2005, 229)³. Donati says that “Slow Food unwittingly reinforces an imperialist dichotomization of the Western self and its ‘other’—civilized and underdeveloped, powerful and powerless, generous benefactor and unfortunate beneficiary” (233). This suggests that the Slow Food movement potentially harms certain populations because it encourages beliefs and behavior in which members are superior to the people whose food culture they are seeking to preserve. Bellows and Hamm also point out that the local food movement tends to provide benefits to wealthy populations rather than poor ones, saying “local, fresh production often feeds already secure rather than food insecure populations,

³ The Slow Food movement is an organization that attempts to “counter the rise of fast food and fast life” (Slow Food website). One of the ways in which they aim to do this by keeping a list of food products that they seek to “identify, protect, and promote” (Jones et al., 2003, 300). In order to make it onto this list of foods to be protected, the food products must meet very specific guidelines concerning their quality, native habitat, cultural significance, and rarity (Jones et al., 300). Jones et al., concluded a case study on the organization by saying that it “taps into a deep cultural well that romantically harks back to illusory images of a rural idyll or utopian past in which people and nature lived together in simple harmony” (2003, 303). In 2005, Donati argued that the Slow Food Movement romanticizes the “other,” and holds a paternalistic attitude toward the traditional food systems and people that it seeks to “save”. She says “with Slow Food’s membership comprised predominantly of upper-middle-class members, I question the extent to which Slow Food is truly subverting the industrialized food supply and suggest that there is a tendency to fetishize cultural diversity in order to satisfy the appetites of a privileged minority” (229).

magnifying existing unequal relations of consumption locally” (2001, 273). These critics believe that the benefits of food system localization are largely benefits to the wealthy and powerful members of society, not society as a whole.

Some critics have even argued that the local food movement can create injustice. Hinrichs and Allen argue that ‘Buy Local’ is a selective patronage campaign, and that selective patronage campaigns, “can run counter to international social justice efforts” (342). They claim that “Buy Local Food campaigns represent a response to the perceived threats of a globalizing, industrialized food system. Yet that system comprises not only investors, directors, managers, and technicians, but also vulnerable workers” and therefore “a strategic focus on ‘selective patronage’” of local food producers could have the unintended effect of harming – or at the least, not helping – vulnerable food and agricultural workers in distant places, at the same time that it seeks to protect and support “‘local’ agriculture.” (342-343). Based on their study of historic selective patronage campaigns, Hinrichs and Allen encourage local food advocates to avoid valuing their local community to such a degree that they ignore the wellbeing of other, sometimes vulnerable, players in the global food system. Matthew Mariola echoes this sentiment when he states that “framing an issue strictly in terms of local effects and divorced from the larger sociopolitical context blinds observers to political machinations that uphold the status quo and perpetuate social inequalities” (2008, 193). These critiques highlight that everyone is part of a global community and it would be irresponsible not to think about how local actions impact people around the globe.

These critical views of the central assumptions of the local food movement are presented to illustrate how complex the issues surrounding food systems actually are. Communities seeking food system reform need to maintain awareness of this complexity and avoid being distracted

from real effective change by oversimplified slogans. “Buy local” is not food system reform. Foodshed Analysts have the opportunity to provide a model for reforming the food system by incorporating factors beyond proximity in their research.

The Problems Facing Foodshed Analysis

Foodshed Analysis is faced with three major problems which confound the results of the studies. Foodshed Analysis researchers have yet to reach consensus on how to approach the problems of scale, boundaries, and variables in their research. In addition to relying too heavily on the beliefs of the local food movement, these problems prevent researchers from realizing the full potential of Foodshed Analysis as an effective tool that can be used by communities to reform regional food systems.

The Problem of Scale

One complex problem faced by Foodshed Analysis is defining foodshed scale. “Local” is defined differently by each user of the term. For example, the book *Plenty: Eating Locally on the 100-Mile Diet* (Smith and Mackinnon, 2007) popularized the effort to feed oneself with food that originates within 100 miles of home. This figure of 100 miles was based on the ecological footprint model developed by Dr. William Rees, which gives “200 miles or less” as the lowest option for average distance of food travel (Smith and Mackinnon, 2007, 7). Smith and Mackinnon drew a 200-mile circle around their Vancouver home and decided that it seemed too big, so instead they defined their own local region using geographical features as the extent and ended up with a 100-mile circle (8-10). There is very little justification for this definition of “local.” But there is no consensus of the definition of local in general, so each individual is left to define it on an individual level. Similarly, In Foodshed Analysis, every study defines the

foodshed they are studying at a different scale. The only justification that Peters et al., give for choosing New York State as their area of study is that it is “home to the largest city in the nation..., the largest protected natural area in the 48 coterminous USA states ..., and a multi-billion dollar agriculture industry” (2008b, 73). While these are good reasons for why the state would be an interesting area of study, they do not explain why the state qualifies as a foodshed. Giombolini et al., justify their use of the Willamette River watershed by arguing that the watershed has a “relationship to soils, temperature, water and climate” (2010, 13). This argument aligns well with the definition of a foodshed that emphasizes the natural characteristics of the environment that affect agriculture, but it does not take into account the non-natural influences such as society and economy (Feagan 2007, 26; Feenstra 1997, 28). And it does not explain why agricultural products from as far South as the city of Eugene would be within Portland’s foodshed while those from Southern Washington State, which is physically closer to Portland, would not be. Blum-Evitts points out that defining the extent of the foodshed in Foodshed Analysis often depends more on data availability than on the transportation routes, regional geography, and markets that should more specifically make up the foodshed (2009, 35). Addressing the issue of scale and “local” in Foodshed Analysis may help the field move beyond its preoccupation with localness.

The Problem of Boundaries

Boundaries provide another complicating issue for Foodshed Analysis. Earlier in this article, I pointed out that the term “foodshed” implies an area delineated by natural features specific to each populated place. This definition is effective because it allows for differences in the foodsheds of different places. However, this definition can also be problematic because foodsheds do not have hard physical boundaries like watersheds. In the current system, many

different populations in different places may gather food from shared sources, and much of the food grown in one place may feed the populations of other places. The boundaries of foodsheds, therefore, unlike watersheds, are permeable to the point that specific boundaries are almost useless. In reality, there are no foodshed boundaries. Even among the most serious locavores the foodshed for one person blurs and blends with that of her neighbor. The political boundaries used for Peters et al.'s (2008b) New York State foodshed are purely imaginary. It is unrealistic to propose that someone who lives near the border of a state will source all of his food from within that state simply because the state has been defined as the local foodshed. The same goes for natural boundaries such as Giombolini et al.'s (2010) watershed-wide foodshed. While it may be condemning for Foodshed Analysis, which so far has relied on studying specific places, it is worthwhile to consider whether it is productive to conceptualize food systems within the framework of physical or political boundaries.

The Problem of Variables

The most complex issue challenging Foodshed Analysis is defining the variables involved in the analysis. For example, how researchers define the populations' dietary needs will lead to drastically different results of whether or not communities can meet those needs with local agricultural production. In the case of dietary needs alone there are many possibilities to consider: do communities want to aim to produce enough food for a population according to the USDA dietary guidelines, or would they rather aim for diets that are closer to the current reality of how people actually eat as reflected through consumer survey research. Or, more complicated yet, do communities want to propose an ideal diet for the population that reduces the amount of meat, sugar, and fat and increases the amount of vegetables? Each of the Foodshed Analysis studies that I studied uses a different combination of variables. They all begin their methodology

by first determining the dietary needs of a population. Peters et al. (2008b), base dietary needs on their previous research, which constructed 42 different diets varying in quantity of meat and percentages of fat (Peters et al. 2007, 147). Giombolini et al., base dietary needs on the federal *Dietary Guidelines for Americans* (2010,4). Blum-Evitts uses data from the Consumer Expenditure Survey which compiles statistics on household purchasing habits (2009, 36). Each of these choices is well thought out, but such variety of possibilities guarantees that the findings of each of these studies can be critiqued with the argument of “what if the researchers had used a different definition of dietary needs?”

All of these studies determine the food production capacity of local land. Peters et al., base production on soil and land use data (2008b, 75), while Giombolini et al. base production on the last five years of agricultural yields in the area (2010, 3), and Blum-Evitts bases production on data from the Census of Agriculture (2009, 37). While these methods are similar in a broad sense, they are very different in the complicating details. For example, Peters et al. divided the state of New York into five kilometer by five kilometer “production zones” and developed an equation based on soil and land use data to determine the potential food production of each of these production zones (2008b, 75). The resulting “food production” values of the land could potentially be very different than the values reflected in the data from the Census of Agriculture, which is what Blum-Evitts used in her analysis. And, of course, in creating an equation for determining potential food production there are a great number of variables that could be considered including soils, temperature zones, moisture regimes, irrigation analysis, and topography. Each could greatly affect the findings.

There are also many different possible sources for the data needed. Each Foodshed Analysis study will use different sources based on what the researchers deem to be the most

accurate representation of current reality or the most desirable potential reality. For example, Giombolini, et al., chose to use USDA guidelines as their definition of dietary needs, but Woolf and Nestle (2008) would argue that the USDA guidelines are faulty and should not be the standard for feeding a population.

In addition, there are variables that are considered in some studies, but not in others. The Giombolini et al., study of the Willamette Valley did not consider transportation at all. Peters et al. incorporated the distance between where food is produced and where it is consumed in their study of New York State, but they estimated the distance using Euclidean distance from the center of each production zone to the center of each population center (2008b, 76). To add a third option, I would argue that a more accurate way to measure distance would be along the transportation networks that the products travel from origin to destination. These different approaches to one variable contribute to very different findings.

Making the choice to use any one definition of any one of the variables involved in Foodshed Analysis automatically eliminates all the other definitions. This limits the analysis to one very specific set of circumstances and makes it difficult to find a broader meaning in the results of the analysis. Therefore, the findings of these studies are not necessarily applicable to other places, situations, or arrangements of variables. What is learned from Foodshed Analysis is largely hypothetical, and does not help in the development of food systems that take better advantage of local food to achieve benefits to the environment, society, and the economy.

Conclusion: Re-Focusing Foodshed Analysis

Foodshed Analysis as a field has succeeded in informing the local food debate through modeling hypothetical situations and estimating relationships between food consumption and

production in specific places. Each of the Foodshed Analysis studies that I researched is interested in determining the capacity of local agriculture to meet local dietary needs. Peters et al. (2008b) and Blum-Evitts (2009) are interested in the potential to meet all dietary needs locally, Giombolini et al. are interested in measuring the current ability to meet all dietary needs locally, and Desjardins et al. are interested in the potential to improve local nutrition through increased local production of certain foods. In these goals, these studies were successful; they successfully informed the local-food conversation through scientific research. However, the current utility of the field of Foodshed Analysis ends there. When Peters et al. defined modern Foodshed Analysis in “Foodshed Analysis and Its Relevance to Sustainability,” they stated that Foodshed Analysis “would help to plan how the geography of food systems should change to enhance sustainability,” and that Foodshed Analysis “should provide valuable insights into the crafting of policy that enhances food security and reduces the food system’s ecological impact” (2008a, 5). In these goals, the field has not yet succeeded. Foodshed Analysis is not yet a tool that can be used to inform policy decisions. The first reason for this is an over-dependence on the belief that “local food is best,” which has limited the field by focusing too heavily on providing more locally produced food, rather than focusing on reducing the environmental, economic, and societal problems of regional food systems. The second reason is that the problems of scale, boundaries, and variables have confounded analyses to the extent that the results and methods of the studies are not reliable or transferable.

Moving Beyond “Buy Local”

Food systems are complex. Saying that local food systems are better than global ones greatly oversimplifies the issue. Foodshed Analysis should go beyond local for local’s sake. The field should be trying to answer the question: what changes can we make to food systems that

will remedy what many in the local food movement see as problematic to the environment, society, and economy? The answer will undoubtedly be a complex one that cannot be reduced to a slogan like “buy local.”

Born and Purcell (2006) emphasize that people must not let localization become the goal, but rather that they should use it as the path to achieving our goals. They say that the local food movement “treats localization as an end in itself rather than as a means to an end, such as justice, sustainability, and so on. Planners, therefore, can become sidetracked pursuing localization and become distracted from pursuing their real goal, whatever that might be.” (2006, 197). This appears to be the case with Foodshed Analysis. People who want to improve regional food systems should be aware not only of the fact that they want to “eat local,” but also keep sight of why they are choosing to do so. Feagan advises that food system localization “must be wary of xenophobic, place ‘purity,’ and anti-democratic orientations, while also developing spatial delimitations which mitigate against and confront the larger structural issues which gave rise to such resistance and counterpressure in the first place” (2007, 39). This statement encourages local food advocates not to give up on food system localization, but to make a conscious effort to work toward the ideals that motivate localization rather than assuming that the ideals are inherent to localization. Researchers interested in food system reform can carry this responsibility by acknowledging the complexity of the issues in food production and distribution, rather than falling back on designing hypothetical food systems based solely around proximity.

Local food advocates should also be cautious that they don’t let a fixation on the actions of individuals distract them from making effective change to the food system. Laura DeLind argues that “the concept of locavore privileges the individual” (2010, 4). By this she means that the locavore movement places too much emphasis on the actions of the individual and does not

put the responsibility for food system problems where it belongs. She says that the movement “suggests that what is wrong with the world (from monoculture practices, to obesity, to global warming) can be addressed through altered personal behavior” and that “ultimately, such rhetoric does more to comfort and accommodate the individual eater ... than it does to challenge inequity and existing power structures” (2010, 4). DeLind is suggesting the while it is true that there are problems with the current dominant food system; changes need to be made to the system, not to individual eating habits.

It is also important to acknowledge that the local cannot exist without the global. Hinrichs (2003) stressed that global and local cannot be treated as discrete from one another. Instead she proposed a “diversity-receptive localization” which “recognizes variation and difference both within and outside of the spatial local” and “sees the local embedded within a larger national or world community” (37). In reality, it is impossible to separate local from global. Doreen Massey argues that a “local” place can be unique and still connected to the global “constellation of social relations” (1994, 154). She says that places are not introverted, but are influenced from the outside and that to understand a place we must understand its wider geographical context (155). Hinrichs agrees with this sentiment when she insists that local and global are not discrete but rather that “what is ‘global’ and what is ‘local’, as well as the processes of globalizing and localizing, are fundamentally related within an overall system” (35). Even Feenstra in 1997, while advocating for developing local food systems said “this does not mean they completely isolate themselves from trade, but that they adapt local food production and markets based on local environmental and community health priorities” (Feenstra, *Local Food Systems and Sustainable Communities* 1997, 28). To develop an exclusively local food system may be an impossible task, and one that Foodshed Analysis can abandon, because local

places cannot be separated from global influences just as the global food system cannot be separated from local influences.

I believe that of the studies that I researched, Desjardins et al. (2010), was the least distracted by localness and made the most effective attempt to suggest food system changes that actually will benefit the environment, society, and economy. Their study of Waterloo, Canada did not seek to provide all of the necessary dietary requirements of the population from within the region, it allowed for food to be imported from other regions of Canada and internationally (136). Instead, the goal was to increase the production of crops for local consumption and to do it in such a way that would improve local nutrition. This approach is much more realistic, and therefore the results are much more widely applicable, than the other studies.

Addressing the Problems of Scale, Boundaries, and Variables

The problems of scale, boundaries, and variables influence researchers' ability to effectively study the sources and movement of food, and therefore prevent researchers from realizing the full potential of Foodshed Analysis as an effective tool that can help reform regional food systems. It is difficult to accurately measure and analyze something as complex as a foodshed without being reductive. Thoughtfully addressing these problems, however, may help Foodshed Analysis studies become more flexible and therefore more useful.

The problem of scale, in the case of Foodshed Analysis, is primarily a problem of defining what is local. If Foodshed Analysis can move away from its focus on localness, as discussed earlier, then defining what is local may no longer be a central issue to the field of study, and therefore will no longer be a problem. The ability to escape the need to defining the term "local" relies, however, on addressing the problem of Foodshed boundaries.

The problem of boundaries may be addressed by approaching a Foodshed Analysis study with the goal of determining the foodshed for one population center, rather than beginning with a pre-defined foodshed area as previous Foodshed Analysis studies have done. By starting with the population center and then defining the foodshed needed for that area, the researchers would avoid the problem of boundaries. This approach may also make it easier to allow for foodsheds with permeable boundaries, meaning that the foodsheds for different population centers may overlap, as they do in reality. Again, of the studies I researched, Desjardins et al. (2010) were the most successful at avoiding hard definitions of scale and boundaries and allowing for the flexibility and flow of reality. This is the example that I suggest future Foodshed Analysis studies follow.

Solving the problem of which variables to include in Foodshed Analysis is a complex problem, as discussed earlier. This will be a process of trial and error, in which researchers collectively develop the formula of what to consider in their analyses. No matter what variables are used in the analysis, researchers should clearly explain their reasoning for choosing their variables as well as the possible limitations associated with those choices.

Foodshed Analysis is an important new field of study, the value of which is yet to be realized. To fully realize its potential, researchers in the field must embrace the complicated nature of food systems and work to clarify their methods. Foodshed Analysis studies have the potential to help planners, policy-makers, and communities determine how the geography of food systems should change to benefit the economy, environment, and society. If researchers can move beyond a fascination with localizing food systems, and address the problems that the field faces in its current form, Foodshed Analysis may yet do more than just inform the food system debate; it may advise food system reform.

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