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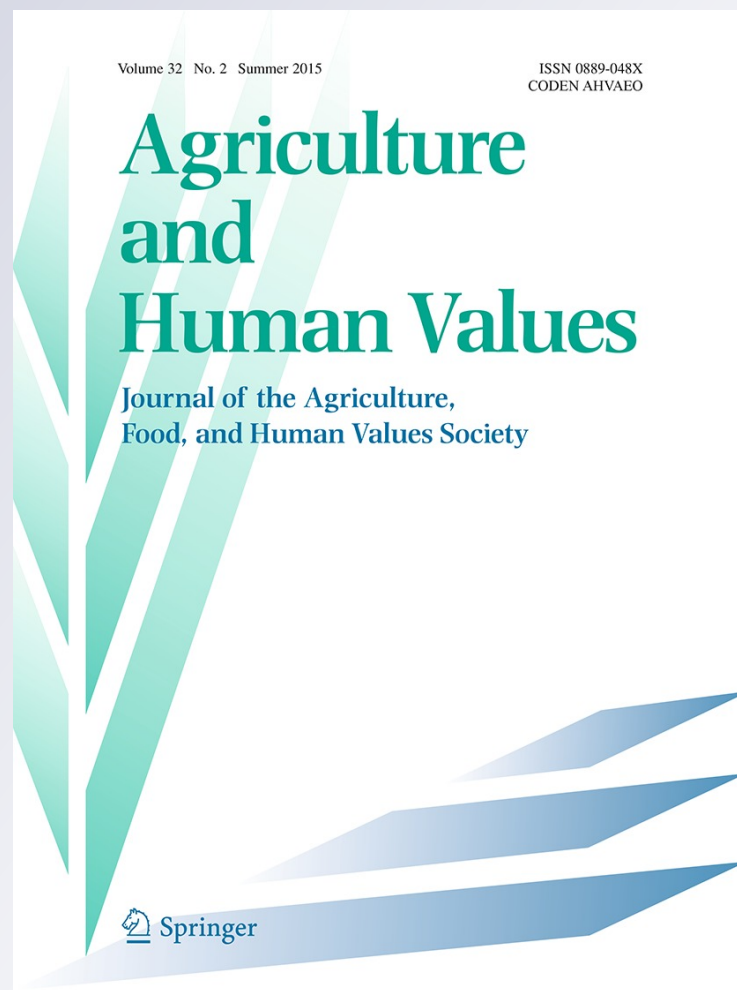
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Operationalizing local food: goals, actions, and indicators for alternative food systems

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Abstract Spatial localization, often demarcated by food miles, has emerged as the dominant theme in movements for more socially just and environmentally benign alternative food systems, especially in industrialized countries such as the United States. We analyze how an emphasis on spatial localization, combined with the difficulty of defining and measuring adequate indicators for alternative food systems, can challenge efforts by food system researchers, environmental writers, the engaged public, and advocacy groups wanting to contribute to alternative food systems, and facilitates exploitation by the mainstream players using “localwash” to maintain the status quo. New indicators are urgently needed because research shows that spatial localization in general and minimized food miles in particular are not adequate or even required for most of the goals of alternative food systems. Creating indicators to operationalize goals for alternative, local food systems requires asking the right questions to make sure indicators are not misleading us: *What are the goals of alternative food systems? What actions and policies will most effectively achieve those goals? What is the potential of reducing food miles as an action and a policy for achieving goals? What are the best*

indicators for measuring progress toward goals? We discuss how these questions can be answered for a wide range of alternative food system goals via four categories according to the role of food miles reduction as an action and policy in promoting them: necessary and sufficient, necessary but not sufficient, potentially important, and potentially supportive.

Keywords Alternative food systems · Food miles · Indicators · Local food movement · Local trap · Localization · Locavores · Sustainability

Abbreviations

CRLA	California Rural Legal Assistance
CSA	Community supported agriculture
CUESA	Center for Urban Education about Sustainable Agriculture
EBT	Electronic benefit transfer
FPC	Food policy council
GFPG	Good Food Purchasing Guidelines
GFPP	Good Food Purchasing Pledge
GHGE	Greenhouse gas emissions
LAFPC	Los Angeles Food Policy Council
LCA	Life cycle assessment
NAFTA	North American Free Trade Agreement
NGFN	National Good Food Network
RFC	Real Food Challenge
SBC	Santa Barbara County
UFW	United Farm Workers
US	United States

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Introduction

The mainstream agriculture and food system, while successful in increasing total food production and yield per

unit of land, is widely acknowledged to be unsustainable. The negative environmental, social, and economic impacts of the conventional food system are numerous and well documented, including groundwater contamination from pesticide and synthetic nitrogen use, soil erosion and degradation, a large volume of greenhouse gas emissions (GHGE), and persistently high levels of food insecurity and disease (IAASTD 2009; Vandermeer 2009).

The growing movement for localizing (or re-localizing) food systems has gained in popularity as a means to address these problems and foster alternative food systems, especially in the industrial world and, perhaps above all, the United States (US). Advocates for alternative food systems often seek to transform the mainstream system toward the goals of economic and social justice, improved nutrition, and environmentally nurturing production methods (Kloppenborg et al. 1996), based on the belief that the large spatial, structural, and economic scale of the centralized mainstream system is the chief cause of its negative impacts. Therefore, scale, especially spatial scale, typically measured as food miles, is often the focus of localization efforts, media coverage, public policy, and food system research. This is true both because of the simplicity and intuitive appeal of the concept, and because more effective actions and indicators of the many goals for alternative food systems are more difficult to define and measure. To the extent that the localization concept also assumes that reducing the miles food travels from sites of production to sites of eating is important or necessary, and sometimes even by implication, sufficient, for achieving many of the complex alternative food system goals, it becomes an assumption in need of testing.

Not testing this assumption can result in conflating alternative goals with the indicator of food miles, and can detract from efforts to achieve the more fundamental goals for change favored by advocates of alternative food systems (Cleveland 2014). This applies both to actors who recognize the local trap in theory and question the sufficiency of food miles as an indicator, as do many food policy councils (FPCs), and to “newcomers” to the localization movement who are drawn to farmers markets, community supported agriculture (CSA) programs, and locavore diets for a variety of reasons. The focus on food miles can also facilitate the co-optation of the alternative food movement by global food retailers and agricultural corporations, making it increasingly susceptible to localwashing.

Although scholars have issued warnings about the problems involved in using spatial scale as an indicator of the goals of alternative food systems (Born and Purcell 2006), and have shown that reducing food miles is not sufficient for realizing either the social (Hinrichs 2003) or environmental (Weber and Matthews 2008) aims of

localization, the focus on the distance food travels (and on the spatial scale of food systems more generally) is an unresolved issue in academic research, food writing, grassroots activism, and among the engaged public. There has been very little analysis of the creation and popularization of the food miles concept and its effect on the alternative food movement in terms of how “local” food can be effectively *operationalized*. In fact, a major contributor to the power of reducing food miles as an action for and indicator of alternative food systems stems partly from is the difficulty of identifying, implementing, and measuring more appropriate actions and indicators.

Our objectives in this article are *first*, to analyze the origin and effects of the focus on spatial scale, especially reducing food miles, on the alternative food movement, and *second*, to build on this analysis by operationalizing the concept of “local food.” We begin by outlining some of the limitations of food miles as the most popular indicator for measuring the goals of alternative food systems. We then describe the extent to which food miles in particular and spatial localization in general have been highlighted by some researchers and a group we term “locavore” writers. We then analyze the challenges faced by engaged eaters and advocacy groups in moving away from spatial localization and food miles, and how mainstream players have taken advantage of this via co-optation and localwashing. Finally, we suggest how local food can be operationalized through delineating actions and policies that would further the many and varied goals of alternative food systems, and identifying additional appropriate indicators to measure the effectiveness of those actions and policies.

Spatial scale as an indicator of alternative food systems

The spatial scale of food production and distribution is a concrete and relatively measurable aspect of food systems as compared with structural or economic scale and other properties. It is thus a commonly used indicator for gauging negative impacts of the conventional system as well as progress toward and impacts of alternatives. “Food miles” (usually defined as the distance food travels from farm to retail, or “direct transport”¹) has become a popular indicator for assessing not only spatial scale but also other

¹ Food miles refer most commonly to the distance from farm gate to the eater’s plate, or “farm to fork.” In the life cycle assessment (LCA) research on food systems, the concept of transport distance is used as a measure of spatial scale, and refers to all transport within the system, including for example the distance that natural gas travels in pipelines to nitrogen fertilizer factories, or the distance food waste travels from homes to landfills. “Direct transport” is the most commonly used equivalent to “food miles” but only includes the distance from farm gate to retail, and does not include the retail to consumer, or other portion (Weber and Matthews 2008).

variables such as GHGE, nutrition, and community investment in the local food economy. In this section we clarify the relationship between the broad goals for alternative food systems and localization efforts using food miles as an indicator.

Food miles and environmental and social impact

In the context of the increasing research interest in alternative food systems, many scholars have questioned popular assumptions about scale. Spatial scale captures only a portion of the environmental impacts of food systems, and comprehensive life cycle assessment (LCA) is increasingly seen as a more valid, but much more challenging, method of assessing these impacts. For example, an input–output LCA conducted by Weber and Matthews found that food transport in the US as of 1997 accounted for only 11 % of domestic GHGE, of which ~40 % was from direct transport (farm to retail, or food miles); put differently, food miles contributed ~4 % of total food system GHGE. The great majority of GHGE (83 %) was from food production and processing (Weber and Matthews 2008, p. 3511).

The common assumption that decreasing food miles will usually result in lower GHGE in a particular region has been increasingly challenged in favor of a more holistic assessment of food systems (Edwards-Jones et al. 2008), and empirical studies have shown that food miles and GHGE can in some cases be inversely correlated (Coley et al. 2009, p. 154, 2011; Saunders and Barber 2008). These LCA studies do not negate other social and environmental benefits of spatial localization, but demonstrate that no single indicator can stand in for the complex factors and practices that determine the environmental impacts of a particular food system or specific components within it (Weber and Matthews 2009). More specifically, they illuminate just how complex contemporary food systems are in terms of their multiple sources of GHGE and energy consumption, and suggest that “local food systems remain embedded in the same environmentally unsustainable industrial infrastructure as long distance foods, but the fault(line) lies with industrialism itself, not simply the food system” (Mariola 2008, p. 196).

Food miles can also be a poor indicator of the progressive social goals that mobilize alternative food activists and NGOs, such as advocacy for fair labor conditions, animal welfare, improved human nutrition, community economic development, and food sovereignty. A focus on food miles can come at the expense of addressing social inequities related to farm and restaurant labor, and to community food access (Goodman et al. 2012; Guthman 2008, 2011). It may even be antagonistic to these goals. For example, Guthman (2008) claimed that the locavore “emphasis on educating people to the provenance of their

food” (p. 431) unintentionally taps into xenophobic ideas of “national vigor, purity, [and] home soil” (p. 435) that were also present in US culture during the Second World War. Saxton (2012) observed that the identity of a “locavore” is often out of touch with the reality of migrant workers and other marginalized people in California who produce “local” food. In other geographical and cultural contexts, scholars have shown that the local is not the only scale at which communities form meaningful senses of place and enact sustainable food systems, particularly in an era of transnational political coalitions and virtual communities (Appadurai 1996; Beck 1986; Castells 1996; Heise 2008).

The local trap

In short, the food miles indicator can be helpful, and in some contexts necessary, but is far from sufficient as an indicator for the broad range of goals for alternative food systems that advocates are pursuing; it has become in some cases a “local trap” (Born and Purcell 2006). The local trap impedes movements for transformative change to the extent that advocates transmogrify the concept of reduced food miles, from one indicator for the broad goals of alternative food systems, into the chief indicator, or even their major goal.

Born and Purcell’s solution to this problem was to suggest that scale per se is socially constructed, and has no inherent properties, although they acknowledge that there can be linkages between spatial scale and alternative food system goals. Whether food miles are large or small, the factors that contribute to the negative and positive effects of different food systems are manifold. Therefore, Born and Purcell contend that we need to look not to the scale of the food system but to the ideological investments and material practices of the players. However, while they offer some examples of more effective approaches to promoting localization goals, they do not provide specific alternatives to food miles indicators for alternative food systems.

The popularization of food miles in research and writing about alternative food systems

In the US, the popularity of reducing food miles stems from a spatial emphasis in defining alternative food systems that has dominated food movements. As a result, spatial localization often becomes a central goal, and then reduced food miles as indicator of localization is itself transformed into a central action for and goal of alternative food systems. Here we focus on the role that researchers and locavore writers play in this transformation.

Researchers

Although researchers have documented the lack of correspondence between spatial scale and the goals of alternative food systems as described above, research has also contributed unintentionally to conflating these. One of the first reports of research on food miles in the US was a 2003 estimate that conventional fresh produce sold in Iowa traveled an average of almost 1,500 miles (2,414 km) (Pirog and Benjamin 2003). This estimate is often cited as representing the entire U.S. food system, even though it was not comprehensive or meant to be by the authors (Schnell 2013, p. 617), who saw the significance of calculating food miles as a “metaphor to explain several benefits associated with local food systems” for use in marketing activist efforts (Pirog and Benjamin 2003, p. 6). The repeated unqualified citation of this number lends credence to the assumption that *long-distance food travel* is not just one indicator of a host of ills associated with conventional agriculture and agribusiness, but itself one of the main ills to be remedied and, in turn, fuels caricatures that serve to discredit alternative food movements by rehearsing the now well-known limitations of the food miles construct. However, an increasing body of research has focused on the potential for spatially defined populations to be fed from within arbitrarily defined foodsheds, defined primarily in terms of food miles.

For example, a study by American Farmland Trust estimated the potential for feeding San Francisco from farms within a 100-mile radius of the Golden Gate (Thompson et al. 2008), assuming that “the closer food is produced to where it is eaten, the greater the likelihood that it will be fresh, in-season and better tasting, and that getting to the market will use less energy and produce less pollution” (p. 3). Another study by American Farmland Trust (2012) evaluated the potential for localization of the 19 counties of western Washington state, and assumed that “when we eat locally, we support a sustainable future for farmland in western Washington,” “decreas[e] the time and steps involved in bringing food from the farm to the table,” “ensure that our food is nutritious,” and “ensure that we have dependable supplies of nutritious food in an uncertain future” (pp. 8–9). However, the connection with the food miles indicator is documented only for the first of these goals.

Other studies have estimated the minimal distance within which food could be produced to feed a defined population. For example, a study of New York State calculated “the minimum distance possible” between farms and population centers within the state because it “may offer a valuable planning tool for creating more secure and less environmentally destructive food systems if we in the sustainability community can identify which issues would

most benefit from geographic analysis” (Peters et al. 2009, p. 81). Another study, of the Midwest US, focused on “minimizing the distance between population centers and available cropland” in eight Midwestern states based on the assumption that “reducing the distance food needs to travel is an important goal of sustainability and resiliency” that addresses a shift in “economic direction toward technologies that are smaller, more adaptable, and more decentralized in nature” in response to “a backlog of transportation-related costs” (Hu et al. 2011, pp. 1–2).

While all of these researchers recognize the inadequacy of uncritically using food miles reduction as an action and indicator for most alternative food system goals, and especially of using it as an overall goal, the lack of an equivalent research effort on alternative, more effective actions and indicators can lead to reinforcing unfounded assumptions among some audiences.

Locavore writers

A group of widely read North American writers has popularized the idea of alternative, local food systems in writing about their own locavore practices and diets. Although they recognize the diversity of alternative food system goals, they offer few alternatives to food miles, other than personal experiences, as indicators for those goals. As a consequence their stories can be interpreted as making food miles an abstract symbol and a concrete goal for alternative food systems. This group includes Nabhan (2002), Ozeki (1998, 2003, 2004, 2008), Kingsolver (2007), and Pollan (2006, 2008).

Myths are forms of storytelling that convey values, beliefs, and practices that foster cultural identities. The popular books of these writers tend to mythologize the local through their compelling portraits of the values, beliefs, and practices that define the locavore. The “locavore memoirs” (Carruth 2013) we surveyed contribute to the assumption that consuming foods produced within a certain distance of one’s home is an indicator of, and sometimes a substitute for, the multiple goals of alternative food systems.

Like the research described in the previous section, the locavore memoir identifies a distance around which to define the local, and food miles thereby become central for defining alternative food systems. For example, Nabhan’s *Coming Home to Eat* (2002) revolves around his 15-month experiment in procuring, cultivating, and consuming foods from within a 250-miles radius of his Arizona home; Kingsolver’s *Animal, Vegetable, Miracle* (2007) documents her family’s year-long dedication to home gardening and a CSA in their rural Virginia community; and Pollan’s international bestseller *The Omnivore’s Dilemma* (2006) describes foraging and hunting for food close to his

Berkeley home as the culmination of his investigation into industrialized agriculture and alternative food systems.

These three authors convey a variety of motivations for their localization efforts, and their stories affirm that alternative food systems are about much more than food miles, or in Kingsolver's words it "isn't just a minimum-distance food buying contest" (2007, p. 348). However, such reflections do not prompt them to develop new indicators beyond food miles for alternative food system goals. Rather, they seem to conflate spatial scale with goals such as fostering non-corporate economic structures and reforming the negative ecological and human health impacts of the mainstream food system. That is, in the absence of other indicators to measure progress toward the goals of alternative food systems, reducing food miles implicitly becomes the chief indicator of, action for, or even a main goal.

Nabhan (2002), for example, hopes that during his 15-month locavore experiment, "nine out of every ten kinds of plants and animals I would eat over the coming months would be from species that were native to [the Sonoran desert region] when the first desert cultures settled into farm here several thousand years ago" (p. 38); "I had but one prevailing inclination [in eating locally]: to ensure that my friends and family ate in a ways that supported the conservation and not the degradation of the creatures in our foodshed and watershed" (p. 190). However, while the "one prevailing inclination" (or goal) for the action of reducing food miles is conservation of local biodiversity, Nabhan does not measure the efficacy of food miles in achieving this goal, nor does he suggest other indicators. The untested assumption is that the action of reducing food miles contributes to the goal of local biodiversity conservation, and by implication, that food miles is an indicator for that conservation.

A notable exception among locavore writers is urban agriculture advocate Novella Carpenter's memoir *Farm City* (2009), which introduces indicators for the goals of cultural diversity, water and energy conservation, gift economies, and social networks, some of which are trans-local or global in scale, and through which knowledge and resources circulate. *Farm City* articulates the crucial distinction between goals for and indicators of food system change and helps develop new indicators, thus empowering readers to operationalize local food.

The role of food miles in the movement toward alternative food systems

The popularity of food miles as a goal, action, and indicator for alternative food systems affects eaters, activists, and mainstream players. *First*, eaters wanting to support a wide range of goals for alternative food systems through their food purchases may believe that "buying local" is the most

important action and indicator, and can be less interested in using other actions and indicators when purchasing food. *Second*, advocates' efforts to achieve these same goals become more difficult when the majority of time and resources are invested in reducing food miles, when this may not necessarily contribute to most of those goals. *Third*, the popularity of food miles provides the corporations that currently profit from the global food system an opportunity to use "local-wash" tactics as a means of hiding their own aims, which are often directly opposed to those of most alternative food system advocates.

The engaged public

The public discourse about alternative food systems often reflects the emphasis of researchers and locavore writers on reducing food miles. Thus, although many factors seem to motivate eaters to value and purchase locally produced foods (Kemp et al. 2010; Zepeda and Li 2006) these studies also suggest that local food supporters implicitly view geographic distance as a major determiner of whether food systems are "good" or "bad." Other studies have indicated that eaters in the US who deliberately purchase local foods tend to correlate geographic origins and by implication food miles with an array of environmental and social impacts (Martinez et al. 2010, p. 32).

As a case study of public opinion in the US, we analyzed the 496 substantive comments of 790 online comments posted to a *Huffington Post* article summarizing a study showing that spatially localizing the Santa Barbara County, California (SBC) food system would have limited impacts on GHGE and nutrition (Zeller 2011). This study found that in 2008 SBC imported 95 % of the produce eaten there, even though the county produced nine times the amount eaten in the county, and that if 100 % of produce eaten in SBC were grown in SBC, it would not significantly reduce GHGE or necessarily improve nutrition (Cleveland et al. 2011a, b). This finding was widely discussed and led to the phrase "the Santa Barbara syndrome" (Estabrook 2011).

The *Huffington Post* article highlighted the original study's finding that food miles have a relatively small impact on the GHGE of the entire food system (Zeller 2011). The great majority of comments on this article condemned the results of the research as an attack on alternative food system goals. In fact, both the original research article, and the *Huffington Post* article by Zeller emphasized that the research results did not question these goals, but contributed to increasing the efficacy of the alternative food movement. The unifying thread of the comments was the feeling that any criticism of food mile reduction is a criticism of alternative food system advocacy.

Table 1 Analysis of representative statements about local food posted in response to *Huffington Post* article reporting on research critiquing the food miles indicator

	Representative comments (verbatim)	Goals for localizing food systems, explicit or implied
1	My main reason to buy local is to support small farmers in my area. I also can visit the farm where my vegetables and meat are grown and raised. Plus, since I don't buy my food from a grocery store more profit is going directly to the farmer and I get cheaper higher quality organic food	"Support small farmers," "cheaper higher quality organic food"
2	Eating local isn't just about environmental impact of locally grown food versus imported food. It's about supporting local farmers and local economy. It's about independence, if you grow your own. It's about keeping food natural instead of relying on genetically altered food from Monsanto. I'll stick with farmers markets in my area as well as my own garden as much as possible, thank you very much	"Supporting local farms and local economy," "keeping food natural"
3	[This article] does not take into account the higher nutritive value of fresh food. What about eating local organic produce, versus produce grown halfway around the world laced with unknown chemicals? What about the impact of locally grown food on the local economy, or the social, environmental and ethical ramifications of growing local? There simply is no rational debate against locally grown food	"Fresh food," "local economy," "social, environmental and ethical ramifications"
4	1. No one in the locavore movement sees this as a panacea 2. No one that I know of thinks that transportation costs are the full benefit of eating locally 3. The elephant in the room is agribusiness not recognized as a legitimate target of eating locally or villainous player 4. Eating locally is a much healthier alternative to pesticide laced, half ripe, tasteless factory farm food 5. It is soulless to fail to recognize eating locally as a sensual connection to place. Take away the environmental and health benefits and eating locally still provides enormous value	"Healthier alternative," "sensual connection to place"
5	Tom Zeller, the author of this article, completely misses the point. It's not just eating locally grown and ranched food, but also eating seasonally, living and working locally and utilizing the resources. It encourages diversity, self-reliance and community, and smart development	"Diversity, self-reliance and community, and smart development"
6	So when you get to know your local producers and ask them how they raise their crops or their animals, when you teach people how to raise their own local food, you are reducing the poisons being put into the environment and also being more conscious of your own (and others') nutrition. "Miles traveled" is not the only ingredient in a sustainable agricultural model	"Reducing the poisons," "conscious of ... nutrition"
7	Of course most food is exported. That isn't news. I don't eat local because I expect it to save the planet ... we're [way] past that point. I eat local because I want to make sure that once the oil runs out and the food distribution networks and the supermarkets collapse I still know how to even <i>get</i> food	"How to even <i>get</i> food"
8	Eating local is a piece of the puzzle. But eating local can involve many things. Getting to know the producer, buying from organic and sustainable producers, growing your <i>own</i> food locally, learning how to preserve the local food you buy so you don't have to buy so much shipped in during the off-season, making sure that all segments of society have access to local food, etc. I could go on	"Eating local is a piece of the puzzle" and thus is a goal in and of itself
9	It's like intellectual monoculture to approach the question of eating locally as if it were simply about greenhouse gas emissions. My local food producers get better prices when they can sell direct, so it's good for the economy. My local food producers are beholden to the community that eats their product, so we never have ecoli outbreaks. Good local food producers are stewards of the land, ensuring that valuable soil does not erode into the rivers and that excess fertilizer does not wash into the oceans, creating dead zones ... Nothing I can buy at my farmers market received major farm subsidies, and none if will help you get diabetes	Good for the economy, land, food safety, nutrition, and marine environments

Therefore, our goal in analyzing the 496 comments was to identify the major goals that commenters associated with reducing food miles as an action for and indicator of alternative food systems. Table 1 gives representative samples from the comments. We identified four major themes from our analysis of the comments: (1) eating local food is *not* primarily about reducing GHGE; (2) eating local food is about social benefits: supporting local farmers, communities and economies; (3) eating local food is about personal benefits: better taste, food safety, and food self-reliance; (4) people should not stop eating local food just because the GHGE mitigation potential (via food mile reduction) is small.

The majority of the commenters rejected the original research because they did not believe that reducing food miles is the most important indicator of alternative food systems. Instead, they often substituted “eating locally” and/or buying directly from farmers for reducing food miles per se, as the indicators of and actions for alternative food systems (i.e., “local is not just about food miles”). However, these substitutions still assume that eating locally and buying directly from farmers ensure progress toward goals of fostering sustainable, healthy, and community-centered food systems. That is, the lack of other indicators led commentators to use indicators of localization directly related to spatial scale. This suggests that despite their criticisms of the published research findings, they implicitly saw spatial scale as the prime action and indicator for the goals of alternative food systems, for example healthier and fresher food, support for the local economy and local farmers, and community and eater self sufficiency.

However, some of the engaged public do have a deeper understanding of the relationship between spatial localization and the goals of alternative food systems, as found in a recent study of CSA members. The reasons for joining the CSA included “ecological sustainability,” “stewardship of local environment,” “support of local economies,” and “community creation/sustenance” (Schnell 2013, p. 621). Yet there is no evidence that the members attempted to assess, beyond their personal experiences, whether the CSA was achieving these goals. While the study concluded that local, “unlike food miles, is not really a spatial concept at all” but a symbol for reconnecting food with a sense of place (Schnell 2013, p. 625), if criteria like a sense of place are to be useful for actions by others, and for policies for alternative food systems, they will have to be operationalized.

Advocacy groups

There are many groups working to create profoundly alternative local food systems. Because the mainstream food system is structured to meet the goal of short-term profit, creating alternatives always involves some compromises, and measuring success as reduction in food miles

can be appealing. However, this can undermine progress toward goals unless social and environmental goals are consistently prioritized over economic ones, for example in establishing local food hubs (Cleveland et al. 2014).

To assess the relationships among goals, actions, and indicators, we surveyed the websites of fifteen advocacy groups located in the US (including four organic certifiers, five local FPCs, two local groups, three national groups, and one international group). Their mission statements and websites defined local food in terms of food miles, implicitly more often than explicitly, through statements about the spatial extent of their operations and desired impact. The Los Angeles FPC (LAFPC) and the Real Food Challenge (RFC) were the only groups explicitly defining local food in terms of miles, yet in the goals and actions of nearly all of the groups, reduced spatial scale of food systems was central.

Several groups, including the LAFPC, RFC, Center for Urban Education about Sustainable Agriculture (CUESA), Growing Power, Oregon Tilth, Slow Food International, and the Oakland FPC, outlined a broader range of explicit and/or implicit indicators beyond spatial scale, such as the quantity of food produced by farmers and other food producers certified by or affiliated with the advocacy group. While these demonstrate a vision well beyond reducing food miles, most did not articulate specific methods for measuring these other indicators, and thus assessing progress toward their goals. We focus in the rest of this section on RFC and the LAFPC as examples of organizations that have made much progress in establishing effective indicators.

Since its founding in 2008, the student-led RFC has been developing its goals and indicators for “real food,” with “local/community-based” as the first of its four-term definition, along with “fair labor” and “ecologically sound” and “humane” (RFC 2013b). Their mission is to increase the proportion of real food on college campuses, focusing on residential dining, and provide a detailed guide for students carrying out the evaluation (RFC 2014). RFC’s definition of local/community-based foods is that they can be “traced to nearby farms and businesses that are locally owned and operated,” and assumes that “sourcing these foods supports the local economy by keeping money in the community and builds community relations. The food travels fewer miles to reach eaters. The food is seasonal, and when it is fresh, it often has a higher nutrient content” (RFC 2013a). As an indicator of the spatially local goal, RFC has defined food miles in two tiers, the best being within 150 miles actually traveled, and the second best within 250 miles (RFC 2013a). For the community-based goal, the indicators are that the producer “must gross less than 1 % of the industry leader,” with “industry” referring to a specific food, such as poultry, and that all of the

“production, processing, and distribution facilities controlled by the producer, its parent or family companies, and contract farmers” must be within the food miles limit. RFC has made impressive progress in its development of and application of indicators for its alternative food system goals, yet their indicators are still based on several undocumented assumptions, including that spatially local farms and businesses are also economically and socially local, that local farms are not storing crops for long periods, and that local businesses are buying from these farmers.

The lack of appropriate indicators for evaluating the effectiveness of FPC policies in working toward alternative food system goals has been an issue for some time (Webb et al. 1998), and many FPCs are working to identify indicators beyond food miles. The LAFPC is exemplary in its explicit efforts to identify multiple, effective indicators for their goals. They conducted extensive research in developing their Good Food Purchasing Guidelines (GFPG) (LAFPC 2012, 2014), and are promoting a Good Food Purchasing Pledge (GFPP), which uses a tiered, points-based scoring system for specific indicators (LAFPC 2014). According to LAFPC founder Paula Daniels, their decision to use a 200-mile radius as one indicator of local was arrived at carefully and through research, and was preferred over a county-based definition in part for ease in communication. Daniels explained: “In the process of developing the definition there were arguments that I should characterize the entire state as ‘local’. However, it was important for the effort to have a regional focus, and since our state is so large with strong urban influences and cultural differences between Southern and Northern California” (Daniels 2014). She thus felt confident it would be an area that could meaningfully support the values of the GFPP, and have an environmental and economic impact on their region of influence, which in cultural and political terms is Southern California.

Daniels has emphasized that reducing food miles is not a silver bullet for assessing the goals of FPCs, and that the LAFPC invites researchers to collaborate with them, since advocacy must often “rely on existing expertise and data” (Daniels and Delwiche 2013). She stated that the five values of local, sustainable, fair, humane and healthy, which are in the GFPP, are “co-equal,” and that “it is important to look at ‘local’ not as much as solely a function of trip miles but rather as a political, social, and economic unit. Transparency in the system of distribution of food is the key. Local becomes quite meaningful when looked at in those terms, particularly when seen in the context of an effort to create shifts in the system in a way that is within reach of an urban eater” (Daniels 2014). The LAFPC has had two major area food system players sign the GFPP, The City of Los Angeles and the LA Unified School District,

and this has been a key in helping local farmers (including a 31-member local farming alliance) survive hard times (Watanabe 2014), and local food businesses to prosper (Watanabe 2013), increasing the amount of healthy food available.

The mainstream players

While eaters and advocacy groups work to find more effective actions and indicators of alternative food system goals, many mainstream players work to obfuscate the links among actions, indicators, and goals. Major retailers and food companies have picked up on the growing popularity of the “eat local” movement and have begun to brand products in stores to appeal to eaters who want to contribute to the goals of alternative food systems, but may conflate these with spatial localization. These companies arguably share few if any of the fundamental goals of alternative food system advocates, their goals are vaguely described, and they don’t explicitly define or measure the relationship between company goals and the spatial scale of food production and procurement; as a consequence, eaters have no easy way to evaluate their claims (DeLind 2011). Marketing campaigns based on “local” food thus obscure the environmental and social impact of their food supply chains. This practice of exploiting eater interest in alternative, local food to maximize profits has been termed “localwashing” (Roberts 2011).²

The restaurant chain Chipotle states that the benefits of reduced food miles are clear: “The less distance food has to travel, the better. It just makes sense. Sourcing local food reduces food miles, supports rural economies, and ensures fresh, great-tasting seasonal produce.” They plan “to serve at least 50 % of at least one produce item from local farms when it is seasonally available (more than 50 % and more than one item any time we can); those vegetables include romaine lettuce, red onions, green bell peppers, jalapeño peppers, and oregano,” but on their website where one finds this pledge, the company offers no measurable indicators for the goals of supporting “rural economies” and enhancing the “taste” of produce (Chipotle 2014). That is, Chipotle publicizes no measurable indicators other than food miles (defined as a 350 mile radius) for evaluating the extent to which their planned actions for sourcing “local” are contributing toward the stated goals, and there is no documentation of impacts even for food miles.

The National Good Food Network (NGFN) project created by the USDA and the Wallace Center at Winrock International emphasizes the concept of “value chains,” which they assume can be created within the current food

² Localwash is analogous to greenwash (GreenpeaceUSA 2011) and fairwash (Clark and Walsh 2011).

system structure by including mainstream corporate players such as the Sysco Corporation, one of the world's largest food distribution companies. Sysco's interest in the project was motivated by its loss of market share due to lack of diverse and "sustainable" products, in response to which the company has embarked on a "local" branding campaign in order to tap into increasing public interest in local foods (Cantrell 2010, p. 4). The word "local" or its derivatives occurs 99 times (an average 6.6 times per page) in the review of the first years of the project (Cantrell 2010). The report documents the success of three regional local food programs measured in terms of volume and dollars, but most of the goals of alternative food systems are absent from the report or treated very superficially.

National and multinational food retailers have made major efforts in sourcing local food primarily because "buying locally grown produce is a hot marketplace trend, with customers increasingly reaching for staples such as tomatoes and corn that grew in local soil" (Walmart 2012). Proclaiming that "Fresher is Better," the Walmart website advertises a wide selection of local produce at their more than 3,000 produce-vending locations in the US. Yet Walmart defines local produce vaguely as "fresh produce that's grown nearby by local farmers that love their work and love their land" and defines local farmers as those who live in the "local communities," (irrespective, one assumes, of their farming operations' geographical markets, labor conditions, and agricultural practices). However, in many other ways, the evidence suggests that Walmart's policies and actions actively destroy local food systems (Swanson 2013; Goetz and Swaminathan 2006; Martin and Taylor 2013; Moreton 2010). Similarly, Safeway boldly claims their commitment to local food on the company's website: "We've been buying locally for over 50 years. It is our priority to work with local growers wherever possible. So you know you're getting the freshest taste from farm to table" (Safeway 2013). The website encourages the reader to "Meet our Featured Farmers" and offers short profiles of "local" growers, from all over the US. However, despite having a map showing the location of the 150 farmers that supply the retailer, Safeway's website does not attempt to provide indicators for or data about either fresh or local food sourcing.

Whole Foods Market states that its goals for local food sourcing are to: (1) support local farmers and food artisans, and their families; (2) strengthen local economies; (3) connect to the seasons, regional varieties, and the people who grow your food; and (4) reduce the environmental impact of transporting goods to market (Whole Foods 2013). "Our stores across the nation define 'local' one community at a time. For some, 'local' means within the state, while for others it means within a certain mile radius, which may include a bordering state or two. Also, local

ownership is just one part—we look for local manufacturing and/or use of local ingredients, too" (Smith 2013). However, the actual definition of local varies from store to store, though usually meaning within the state, information on "local vendors" is minimal, and there are no measurable indicators disclosed (Whole Foods 2013). There is some evidence that in certain regions Whole Foods' buyers do work closely with producers within a defined geographic area to facilitate changes in production practices as required by the company's sourcing. For example, semi-structured interviews conducted in Hawai'i with grassroots activists and farmers ranging from a five-acre certified organic farm to a 200-acre conventional asparagus operation, suggested that the produce buyer for the two Oahu Whole Foods stores has been an important advocate and resource and has helped local producers secure stable income sources via their Whole Foods contracts.

Most mainstream players seem interested in local food as a marketing strategy, and not for promoting alternative food system goals. However, those who are interested in helping eaters who support these goals make informed choices face the same challenges as the engaged public and advocacy groups in finding effective actions and indicators.

Operationalizing local food: actions and indicators for alternative food system goals

We have seen that researchers, locavore writers, the engaged public, advocacy groups, and mainstream food system players all tend, in different ways and for different reasons, to conflate food miles as an indicator of the degree of spatially defined "localness" in food systems with the larger goals of alternative food systems. At the same time, many advocates for alternative food systems are well aware of these dangers, and are searching beyond spatial scale and food miles for more effective actions and indicators to operationalize their goals.

In this final section we describe the key role of indicators in progressing toward alternative food systems, categorize alternative food system goals in terms of the potential contribution of reducing food miles to achieving them, and suggest other actions and indicators for promoting and evaluating progress toward these goals.

The key role of indicators

Indicators play a key role in the process of creating alternative food systems (Fig. 1, a–d). Choosing appropriate indicators of goals is often necessary to identify the best actions and policies to reach those goals, since goals themselves are often difficult or even impossible to address directly, and measuring those indicators is the only way to

know the extent to which our actions and policies are effective in reaching stated goals (Cleveland 2014, pp. 86–96). The best indicators are those closest to the goal, feasible to measure given available time and other resources, culturally appropriate to the local situation, and that can be shown to be causally linked to the actions taken to achieve goals (Fig. 1, x). For example, if improved nutritional status is a goal of alternative food systems, it might be difficult to implement actions and policies that directly affect the types of foods a target population eats, but much easier to implement actions and policies affecting the availability of fresh fruits and vegetables in target communities. While individual nutritional status based on laboratory analysis of biological samples, such as blood, or measurements, such as weight and height, could be considered the most direct indicators of success in reaching this goal, they would often be unfeasible and culturally inappropriate, so more distal indicators could be chosen, such as change in the types of foods eaten by individuals, or more distally, the number of stores in the community selling healthy foods such as fresh fruits and vegetables.

No matter what indicators are chosen, it is important to establish that any changes measured are causally related to the actions and policies implemented, in order to assess the effectiveness of those actions and policies in producing measured changes in indicators (Fig. 1, y). In the previous example, if financial incentives for local farmers to sell produce to local corner stores is a policy implemented to increase the availability of fresh fruits and vegetables in target communities, and a project evaluation found a correlation between the increase in financial incentives and the increase in of fresh fruits and vegetables in those stores, it would be necessary to evaluate to what extent the former contributed to the observed increase in the latter.

Finally, in order to assess the significance of measured changes in indicators, it is important to determine to what extent those changes are causally related to the advancement of particular goals (Fig. 1, z). This brings the process full circle, to evaluating the efficacy of indicators, chosen because of their predicted effectiveness in measuring goals (Fig. 1, x). Continuing with the previous example, if there is an increase in the number of stores in the community selling healthy foods such as fresh fruits and vegetables, is this causally related to improved nutritional status of community members? Such an evaluation might involve selecting a small sample of stores, and tracing the connections between the increase in sales of fresh fruits and vegetables, with the number of families in the community purchasing and preparing them, family members eating them, and perhaps even changes in the nutritional status of family members.

To apply this approach to specific goals for alternative food systems, and to place spatial localization within this

framework of goals, actions and indicators, we identified four questions as starting points (Table 2): *What are the goals of alternative food systems? What actions and policies will most effectively achieve those goals? What is the potential contribution of reducing food miles as an action and a policy for achieving goals? What are the best indicators for measuring progress toward goals?* Answering these questions can help make research on alternative local food systems more relevant, enrich the narratives of writers and others who build public support, empower individual eaters' choices, increase the efficacy and efficiency of actions and policies of groups working for alternatives, and help to reveal the extent to which "local" is being used for localwash. Table 2 proposes answers to these questions for 17 goals of alternative food systems we identified, divided into four groups according to the role of food miles reduction in promoting them: (A) necessary and sufficient; (B) necessary but not sufficient; (C) potentially important; and (D) potentially supportive. Our list includes many of the most popular goals for alternative food systems, but is not meant to be exhaustive, as many more goals exist, and many advocates do not share all of the goals we list. We hope our suggestions can help further discussion, research, and collaboration for operationalizing local food as an indicator, action, and goal for alternative food systems.

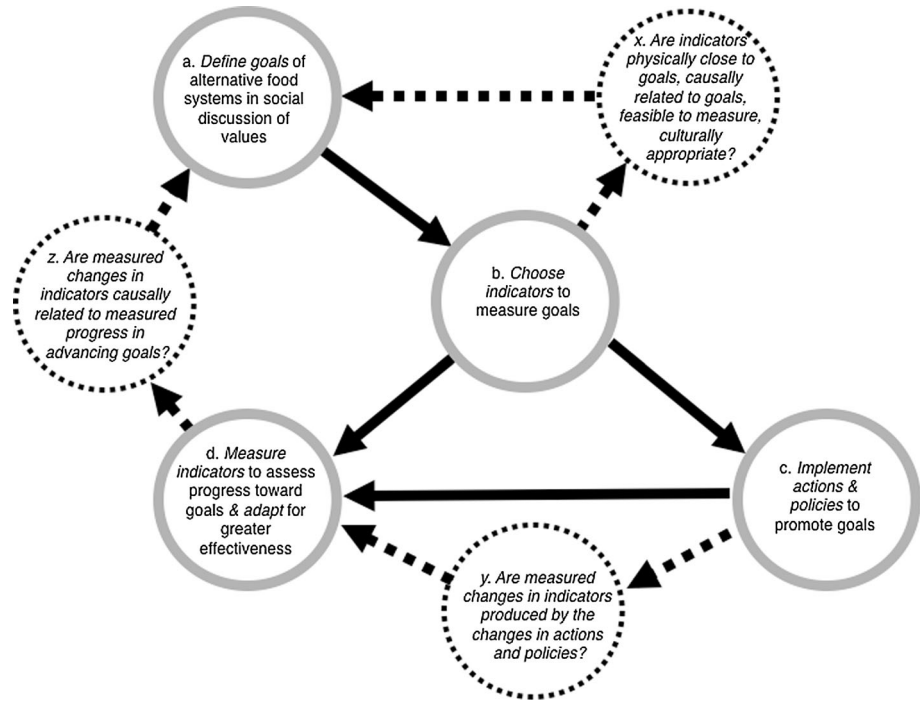
Goals for which reducing food miles is necessary and sufficient

Reducing the distance food travels from the place it is grown to where it is sold or eaten is the only goal of alternative food systems for which reducing food miles is both necessary and sufficient (Table 2, row 1), and food miles are obviously the best indicator.

The data needed to measure food miles for locations within the US differ in ease of access. Data on the amount and market value of food grown in specific locations is routinely collected by governments and other organizations, while data on where food grown in a given place is eaten, and where food eaten in a given place is grown, are not routinely collected—if at all. A local food system assessment can collect and analyze these data and thus provide a great opportunity to organize interested advocacy groups and engaged members of the public in investigating their community food system. One of the easiest places to begin is calculating the proportion of locally eaten produce that is grown locally—fruits and vegetables are crucial nutritionally, lacking in many individuals' diets, have good nutritional value and taste when eaten fresh, and are the most common locally grown foods that are also sold and eaten locally.

In the US, the county is often a good unit to demarcate "local" because county-level demographic information and agricultural production data are readily available from the

Fig. 1 The process of creating alternative food systems: the critical role of indicators. *Solid line circles and arrows* the basic process; *dashed line circles and arrows* questions often not asked, but critical for making progress. Based on Cleveland 2014, © 2013 David A. Cleveland, used with permission



state agricultural commissioners (county commissioners in California and Texas) or from the national census of agriculture (USDA NASS 2009, 2014). An obvious disadvantage of this approach is that selling across county boundaries may minimize food miles for locations near those boundaries. The total amount of produce eaten from all sources can be estimated based on USDA food disappearance data (USDA ERS 2014). Data on the produce grown in the county that is sold directly in the county (i.e., not exported and re-imported) will need to be estimated by interviewing store and produce managers, institutional food purchasers, farmers market managers, and CSA operators, many of whom may not know where food they did not grow themselves was grown without doing some research of their own. Most data on locally grown produce sold locally will be in terms of value (dollars), and will need to be converted to total weight of the produce sold based on sample measurements, and then to produce harvested using USDA estimates of food wasted between harvest and retail sale (Buzby et al. 2014; USDA ERS 2014). This kind of research provides a great opportunity for citizens and students to collaboratively investigate their local food system, and a basis for moving beyond food miles toward other indicators (for an example see Cleveland et al. 2011a, b).

Goals for which reducing food miles is necessary but not sufficient

For reducing the spatial scale of the food system in general, and for increasing personal (i.e., face-to-face) interactions

between farmers and eaters, reducing food miles is necessary, but not sufficient, and food miles is best used as one indicator among several (Table 2, rows 2–3). There are many components of the conventional food system for which reducing the distance traveled could be a goal, including production inputs (e.g., water, compost, fertilizers, plastic mulch, fertilizers such as ammonium nitrate or bat guano), packaging and processing materials (e.g., cooling and storage units, wrapping materials), and resources used by eaters in preparing locally grown foods (e.g., refrigerators, stoves, utensils). Reducing these distances is often assumed to support many of the other alternatives goals, most directly reducing environmental impacts from transport and storage. Labor is a distinctive and critical category of input often overlooked in evaluating the spatial scale of food systems, yet the distance farmworkers travel, or *labor miles*, has many important environmental and social effects (see below).

Increasing face-to-face interactions between farmers and eaters is often singled out as a key spatial variable in localization, for example by the *Huffington Post* commentators discussed in our section on the engaged public. While there is arguably inherent value to these interactions, they are also assumed to support “food’s embeddedness in specific configurations of people and other living things” and thus reinforce the assumption that communities in which there are close connections between food producers and eaters and between community members and the local agricultural landscape are more likely to be economically and culturally robust (O’Brien 2010, p. 229). Food system

Table 2 Some goals, actions, and indicators for alternative food systems: the role of food miles

	What are the goals of alternative food systems? ^a	What actions and policies will most effectively achieve those goals?	What is the potential contribution of reducing food miles ^b as an action and a policy for achieving goals?	What are the best indicators for measuring progress toward goals?
<i>A. Goals for which reducing food miles is a necessary and sufficient action and policy</i>				
1	Reduced distance food travels from farm to eater	Encourage direct marketing, local food hubs, home and community gardens	Reduce distance food travels between farm and retail or eaters	Food miles
<i>B. Goals for which reducing food miles is a necessary but not sufficient action and policy</i>				
2	Reduced spatial scale of the food system	Encourage local: marketing, production inputs, processing, packaging	Reduce spatial distance for one component of the food system	Distance all components of the system travel, including food miles
3	Greater face-to-face interaction of eaters and farmers	Encourage more farmers markets, CSAs, agritourism	Reduce spatial distance between eaters and farmers	Numbers of eaters and farmers interacting; food miles
<i>C. Goals for which reducing food miles is a potentially important action and policy</i>				
4	Food-system-knowledgeable community members	Farm and food education programs, farm-to-school programs, school garden programs	Increase access of schools and general public to local farmers, processors etc.	Increased knowledge of agrifood systems evidenced on exams and surveys
5	Conserved local farming and farm land	Establish land trusts, mitigation zones	Increase support from local eaters for farmers and farmland conservation	Area of land actively farmed, farmland in trusts
6	Economically strong small-scale farmers	Encourage local sales; establish incubator and mentoring for new farmers	Improve match between production and sales via contracts, local hubs	Number of small-scale farmers and farmer co-ops economically viable
7	Economically strong communities	Encourage local purchasing by institutions, governments	Increase local food sales and purchases	Number of economically viable small businesses; proportion of food system revenues that stay in the community
8	Socially strong communities	Establish food-based social networks, FPCs and other community organizations	Increase social interaction among all people in food system	Frequency of interaction among range of people representative of community diversity
9	Increase food sovereignty	Encourage policies on right to food and production resources, participation of minority and low income people in food system policy making, home and community gardens, farmers to grow culturally appropriate crops	Increase proximity of eaters to growing of food	Number of minority and low income people active in food system policy making; legal status and implementation of right to food and production resources; subjective satisfaction via community surveys
<i>D. Goals for which reducing food miles is a potentially supportive action and policy</i>				
10	Reduced GHGE	Minimize production inputs; transport, storage, and packaging of food	Reduce time and distance between harvest and eating	Greenhouse gas emissions, e.g. via life cycle assessments
11	Reduced water pollution	Improved nutrient management, cover cropping	Provide feedback to farmers from downstream, downwind neighbors	Water quality
12	Reduced soil degradation and erosion	Use more organic amendments, cover crops, rotations	Provide feedback to farmers from downstream, downwind neighbors	Soil quality, stream sediment loads
13	Reduced loss of biodiversity	Use more hedgerows	Provide feedback to farmers from neighbors	Biodiversity levels on farm and off farm

Table 2 continued

	What are the goals of alternative food systems? ^a	What actions and policies will most effectively achieve those goals?	What is the potential contribution of reducing food miles ^b as an action and a policy for achieving goals?	What are the best indicators for measuring progress toward goals?
14	Healthy foods readily available to all	Encourage healthy corner stores, more nutritious food in food assistance, EBT use at farmers markets, home and community gardens	Increase quantity and availability of fresh, nutritious food	Amount of fresh fruits and vegetables sold locally in communities with poor nutrition, served in local schools and institutions
15	Good nutritional status of community members	Reduce fast food outlets; establish classes in growing, buying, and cooking healthy foods; improve food assistance components	Improve food choice by involving people in school gardens, farm visits, farmers markets	Nutritional status measured in surveys and clinical screenings
16	Just and equitable farm worker working conditions	Support CRLA, UFW and other advocacy organizations	Increase interaction between eaters and farmworkers	Farmworker legal rights; equitable wages and benefits
17	Healthy alternative food systems in migrant home communities	Advocate reform of NAFTA, and of agriculture and food policies in migrant sending countries	Help local migrant communities educate the larger community	Migration rates, food systems of sending communities, national and international policies

^a The goals listed are some of the most common for alternative food systems, but there are many more not included

^b Food miles in this table refers to the distance food travels between farm gate and retail or eaters

scholars often relate this assumption to the concept of “place,” which is tied to that of spatial scale, although space (spatial scale) and place are also seen as potentially in conflict (DeLind 2011). To evaluate progress toward the goal of connecting members of a community through local food, other indicators, such as the quantity and quality of farmer-eater interactions, measured for example via interviews, will also be necessary, and will be related to many other goals, to the extent that such interactions shape community support for and economic investment in local food and agriculture.

Goals for which reducing food miles is potentially important

For those goals of alternative food systems that are linked indirectly to spatial scale, reducing food miles is neither a necessary or sufficient part of the actions and policies needed to achieve the goal, but nonetheless can be important in increasing the probability of critical social interactions (Table 2, rows 4–9). Food miles can therefore be an effective indicator if used along with other indicators. For example, progress in increasing community members’ knowledge of food systems could be directly measured by surveys, while the goal of conserving local farming and farmland could be assessed by tracking data on acreage actively farmed or in agricultural trusts.

The goals of economically strong small-scale farmers and communities could be achieved in part by increasing the local

sales of inputs for production, processing, and transport. Another indicator for this goal is reduced *money miles*, which requires gathering data on where money spent “locally” goes next, and the percentage of the money spent locally on food that gets reinvested in the local community. For example, a study in Washington State found that that “locally directed spending” in the food system more than doubled “the number of dollars circulating among businesses in the community” (Sonntag 2008, p. 102). In her memoir *Farm City* about farming and community gardening in Oakland, California, Carpenter (2009) suggests as additional indicators the presence of bartering for and sharing food as well as agricultural and culinary knowledges within a community.

The goal of socially strong communities can be promoted through actions and policies to promote food-based social networks, FPCs, and other community organizations. Indicators include the frequency of social interactions, which can be encouraged by reduced food miles. For example, Carpenter’s (2009) capacity to cultivate food in inner-city West Oakland depends on the gifts of neighbors as well as the knowledge of gardeners, farmers, ranchers, and chefs within her immediate region, but also from much farther away. Another indicator is the number of *social networks* through which individuals and groups in a community access know-how and tools for producing food themselves. This indicator is in line with Granovetter’s (1973) seminal argument that strong social networks are those in which there are many participants connected via weak ties rather than those in which there are few

participants connected via strong ties: a phenomenon that he terms “the cohesive power of weak ties.”

Food sovereignty is perhaps the most fundamental social goal of alternative food systems, based on the precepts of social equity and justice. To measure community food sovereignty, a survey could pose questions about the edible plants and prepared foods that community members value and why (e.g., asking about childhood memories and current uses in gardening or cooking), the availability and sources of those foods within a certain distance of their home (e.g., at supermarkets, corner stores, garden plots, and farmers markets), the affordability and feasibility of procuring them, or the ratio desired foods/available foods. Carpenter (2009) implicitly posits such indicators for food justice by discussing the ratio of vacant lots to community gardens in an urban area.

Goals for which reducing food miles is potentially supportive

For the goals of localization not tied directly or indirectly to spatial scale, food miles are neither a necessary nor a sufficient part of the actions and policies needed, but could in all cases play a contributing role given supporting conditions. These include both environmental (Table 2, rows 10–13) and social goals (Table 2, rows 14–17). However, food miles should not be used as an indicator for these goals.

Reduced GHGE is often a goal of alternative food systems because anthropogenic climate change is widely perceived as the greatest environmental challenge for the food system, and the food system is one of the largest contributors to climate change. As discussed above, however, food miles are a poor indicator of GHGE, and more efficient indicators are required (e.g., by performing LCAs).

There are also environmental goals for which reducing food miles can serve mainly to encourage more awareness of local community members of the environmental effects of food production, including reduced water pollution, soil degradation and erosion, and biodiversity. The best indicators will be those that require measuring changes in these variables.

The goals of healthy foods readily available to all and good nutritional status of community members could be achieved without localizing the food system, and localizing the food system may not support these goals. These goals require focused actions and policies, and progress would need to be measured by appropriate indicators, such as the amounts of fresh fruits and vegetables purchased in targeted communities, and the nutritional status and well being of individuals.

Improving working conditions for farmworkers involves increasing wages and providing healthcare and other benefits, which would likely require working with advocacy

organizations such as the United Farm Workers (UFW) and state organizations like California Rural Legal Assistance (CRLA). The best indicators for these goals could include enactment and enforcement of legal rights and minimum wages, and changes in working and living conditions, again gathered via interviews.

However, simply improving working conditions for farmworkers in the places they work ignores the global dimensions of migrant labor within food systems, a key issue for food system localization that is often ignored. For example, many farmworkers in the US are current or recent migrants, especially from southern Mexico and Central America, and their contribution of knowledge and labor to local food systems in the US is likely to undermine local food systems in their home communities, because there is an integrated transnational agricultural labor market in North and Central America (Cavigelli et al. 2013). Neo-liberal economic policies have driven immigration to the US by making it increasingly difficult for small-scale farmers to survive; for example, NAFTA has dramatically driven down the price of maize in Mexico (Wise 2009). Therefore, indicators of progress toward improving farmworker well-being will need to include changes in national and international policies, improved local food systems in sending communities, and reduced migration rates. These complex issues mean that there can be a conflict between supporting local food production in economically privileged communities such as those in California, which depend on migrant labor, and supporting local food systems in poor communities, such as those of southern Mexico.

Conclusions

Interest in creating alternatives to the mainstream, globalized industrial food system has focused increasingly on spatial localization, especially in industrialized countries such as the US, with food miles often the primary indicator. Food miles is an attractive indicator because it is a concrete measure that is intuitively appealing, and simple versions can be easy to measure compared with other indicators for alternative food system goals. While reducing food miles is not a necessary or sufficient means of achieving most of the goals of alternative food systems, neither is it inherently an obstacle, and in fact may be able to support those goals. However, reducing food miles can become an obstacle when it becomes a goal of alternative food systems under the broader assumption that spatially local food systems embody many of the fundamental changes in the dominant global system needed to achieve socially, environmentally, and economically sustainable alternative systems. Researchers and locavore writers have contributed

unintentionally this conflation of the diverse goals of alternative food systems with the indicator of food miles, which in turn can contribute to the difficulty of concerned eaters and activists, and enable localwashing by mainstream food system players.

The challenge of operationalizing local food is to find ways of localization that advance the wide range of goals for alternative food systems, and to identify and measure indicators of those goals that are close to goals, feasible to measure, culturally appropriate, and causally related to goals. We have addressed this challenge by describing a process for defining alternative food system goals, choosing indicators to measure them, directing actions and policies to change those indicators and reach the underlying goals, and then using those indicators to evaluate the effectiveness of our actions and policies (Fig. 1; Table 2). We hope that this can contribute to operationalizing local food, including placing spatial scale and food miles into their most useful role in research on and action for alternative food systems.

For food system scholars this means we need to use caution around the concept of local food, and to examine our own assumptions, making them as transparent as possible. We need to look beyond food miles for better indicators of alternative food systems, and apply these in our research with eaters, activists, and mainstream players. And we need to acknowledge the complexity of the issue, cognitively and behaviorally and institutionally, and participate more in the public dialog about alternative local food to help move the discussion toward enabling change.

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