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How does food localization contribute to food system sustainability?

Peer-reviewed letter

Zumkehr and Campbell (2015; *Front Ecol Environ* **13[5]**: 244–248) provided a valuable addition to our understanding of the possibilities for spatially localizing the US food system, showing that food grown within a radius of 50 or 100 miles could "scale beyond niche markets" to "satisfy the vast majority of US food demand". They also found that other commonly advocated methods for increasing sustainability (eg reducing food loss, selecting more efficient diets) "will not increase [local] food potential for cities that already have a 100% potential", which many do. These results will be welcomed by proponents of localization as key to creating sustainable food systems because of localization's "potential for synergies with agroecosystem sustainability, rural economies, and food security".

However, the implication that localization, often equated with reducing food miles, as in Zumkehr and Campbell's article, is synergetic with the components of sustainability, and could even be the main way of achieving it, can be misleading. Synergies may exist but depend on specific contexts, and sustainability goals need to be the focus if localization is to play a positive role (Bellows and Hamm 2001; Born and Purcell 2006). Although undoubtedly obvious to Zumkehr and Campbell, and other proponents of localization, the contingent nature of synergies needs to be made explicit for policy makers in order to increase the probability of achieving sustainable food system goals – healthy people, communities, economies, and ecosystems.

Because the relationship between local food and sustainability can be confusing, it is important to be aware of the different ways that the term localization is used. While spatial localization is often seen as a key step for achieving sustainable food systems, it is also used as an indicator of sustainability, or even as the goal itself (Cleveland 2014). Yet localization may be a necessary action and a good indicator for only a limited number of sustainability goals, such as increasing face-to-face contact between farmers and consumers. For most goals (eg improved soil quality or human nutrition), localization is not necessary, although it could contribute in important ways to many of them.

The need to scrutinize our use of localization to increase food system sustainability is illustrated by three examples of synergies provided by Zumkehr and Campbell. First, local food "will result in large GHG [greenhouse-gas] emissions reductions" for foods requiring refrigeration or air freight. While substituting local food for air-transported food would often reduce total emissions (Michalský and Hooda 2015), it may not do so for refrigerated food. A UK study found that if the round trip from homes to purchase organic vegetables is more than 6.7 km, CO_2 emissions would be greater than from a large-scale, long-distance system of cold storage, packing, and transport (with 15% imported food, but no air freight) to a regional hub, and then to homes (Coley *et al.* 2009). Increasing localization might also actually increase the prevalence of freezing locally produced food (eg http://locavorious.com).

Second, local food "shortens the distance" for urban organic waste recycling to farms. This can happen only if there are recycling systems in place, and if they result in a net decrease in impacts; however, research shows that composting systems have a wide range of both positive and negative environmental impacts (Morris *et al.* 2013).

Third, local food "may increase community involvement", yet it can also be co-opted by the conventional food system in ways that can reinforce inequity, unless it is part of the broader goals for improving social justice. For example, while local food systems and urban agriculture can promote community well-being and equity, they can also encourage gentrification and exclusion of local residents, and reinforce other structures that maintain inequality (McClintock 2014; Lake *et al.* 2015).

There is tremendous pressure on sustainable food advocates when scaling up local food (eg creating local food hubs) to relinquish sustainability goals in order to be able to operate within the mainstream system, where economics, infrastructure, and values do not support those goals (Cleveland *et al.* 2014). Local food is also seen as a market opportunity by the large-scale, global food industry, which uses local branding to reinforce the conflation between local and sustainable food and pays little attention to sustainability goals (eg Cantrell 2010).

While localization can be one way to further the goals of sustainable food systems, it should not be used as an indicator for these goals, or conflated with them (Cleveland 2014). The value of local food for sustainability is analogous to the value of biodiversity for ecosystem services, which "depends on the net marginal effect of the change on all ecosystem services…[as well as on the] many trade-offs among services [that] occur at very different spatial and temporal scales" (Cardinale *et al.* 2012). That is, like local food, biodiversity can be structured in many different ways, each of which will affect outcomes differently; for instance, arthropod diversity may increase or reduce pest damage (Letourneau and Bothwell 2008), the combinations of modern and traditional rice varieties may or may not decrease the level of fungal pathogen damage (Zhu *et al.* 2000), and some combinations of wheat and barley tra-

ditionally planted in Eritrea have significantly higher yield stability than pure crops while other combinations do not (Woldeamlak *et al.* 2008).

Akin to conserving biodiversity to support the provision of ecosystem services, augmenting local food to support the establishment of sustainable food systems must also address potential unintended consequences as well as broader goals in order to increase sustainability. Otherwise, localization may be a diversion or even an obstacle to improving long-term sustainability. While Zumkehr and Campbell's research is a valuable contribution to understanding the potential for increasing food system localization, policies to enhance sustainability should be based on understanding both the potential benefits and the drawbacks of localization in the context of our complex food system.

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