SIX

A Systems Approach to Local Food

It used to be popular to paraphrase the first two laws of ecology as "shit runs downstream, and we all live downstream." In other words, we are all connected, and we all have a stake in the actions of others. This ethic recognizes that we inevitably live in a world with others, human and not human, and we must understand the natural order and cooperate within its constraints in order to survive. Farmers' markets, CSAs, and newer trends in local food are signs of a shift in public attention to human and environmental resilience that acknowledges the interconnectedness of social and ecological systems. Local food is particularly appealing in this initiative because of its attention to relationships in a system. Selling local, it seems, is as much about learning to think in terms of systems of social and environmental factors as well as economic ones. It represents a fundamental development in how many people see the world and themselves in it, reconfiguring food from an item in a supply chain—which extracts resources like soil, air, water, and labor and moves them from one site to be used in another—to a complex package of matter and meaning tied with strands that tug on the fastenings of our world. Food is at the heart of our survival, and local food especially makes concrete the question of who survives and how. Local helps us to see the systemic nature of food and the interwoven complexities of the world within which we, mostly blithely, function every day. In this chapter we step back from the practicalities of selling locally to discuss an integrative framework that puts these many variables into a system that can help people make better-informed decisions—not just about buying and selling locally but also about environmental and human sustainability for the future. This is the turn toward local.

We propose here a new model, adapted from natural resource management, for describing the systems nature of local food. It pares away detail so that we can test our understanding and identify leverage points for new applications. Like any model, this one clarifies through "simplified abstractions."[1] Once designed, we can check it against our mental models and, in recursive process, correct our explanations for how the world works.[2] With such a model, decisions—about which farmers' market to join, how to structure CSA shares, how to increase customer numbers through a website, and so on—can be reviewed in a larger context. The more accurately our models represent the way things work, the more we can use them with intention.

Systems and Sustainability

Selling locally inevitably operates in systems of relation: actions and events affect and are affected by people, animals, materials, and processes in feedback loops. It follows that other than in the direst circumstances, and perhaps even then, feeding people requires more than getting a certain numbers of calories to them each day, because food is inseparable from a host of social, environmental, and economic interactions. Further, substances do not become food until they pass through the meaning-making machine of culture, which is also engaged with elemental and environmental systems. The systems framework we propose steps back from specifics in order to get a broader view of the actors and resources in a system. This distance allows us to identify important flows, interactions, outcomes, and points of intervention that leverage the whole system, even as elements within it change. Understanding the system and monitoring it can inform and empower policy makers, advocates, farmers, and customers who help set the conditions in which local food operates so that it includes environmental resilience, economic justice, and social and individual well-being. In this way, "community supported agriculture," the theory, can be realized in the broadest sense: agriculture that supports and, in turn, is supported by the community.

Modeling local food offers a prime opportunity for intentionally designed research for sustainability. Design-based research, also known simply as "design research," advances design, research, and practice simultaneously and is widely used in fields that integrate research and application. It differs from basic, so-called gold-standard research, which aspires to laboratory controls, blind studies, and preconceived operational protocols. Instead, it operates in the messy realities of the field, beginning from conjectures about what will work and drawing inspiration and discovery from the dynamic complexities of the real world. Design-based research is "pragmatic, grounded, interactive, iterative and flexible, integrative, and contextual"; it assumes that we can advance transferable ideas with input from practice, data gathered midstream, and revisions to operations based on many feedback loops available in the field context.[3] It also allows for a new kind of reasoning, which Jon Kolko calls abductive reasoning: the process of envisioning "what might be so."[4]

Local food is just such an imagining: an ongoing "experiment" in which plans unfold pragmatically, interactively, and flexibly. Designs are revised in midstream as information becomes available and corrections are called for. Decisions always drive toward "what might be so," but they are guided by complex social, economic, and environmental intersections. For example, a market vendor may anticipate that a new kind of cucumber will be a big hit with customers; she may find the seed, grow the squash successfully, and transport it to market in what ought to be lucrative quantities. But if people simply don't buy it (it's too new, too odd, tastes too different from old favorites), she may decide her limited truck space is better devoted to something more popular and end up composting the whole squash crop. Likewise, a food bank may be philosophically committed to growing the next generation of healthy eaters by involving schoolchildren in their community garden in small weeding and planting tasks. But late in the season, it may set aside its educational mission to swap in adult volunteer labor so that necessary farm work gets finished in light of an early frost warning. The immediacy of local food—short distances, identifiable people, visible impact, lived politics—helps us to think in terms of systems and make informed and intentional plans for the future.

A Systems Approach

The factors in a local food system are multivariable, nonlinear, cross-scale, and changing. They include complex interactions with interests, processes, and outcomes. This complexity urges us to move

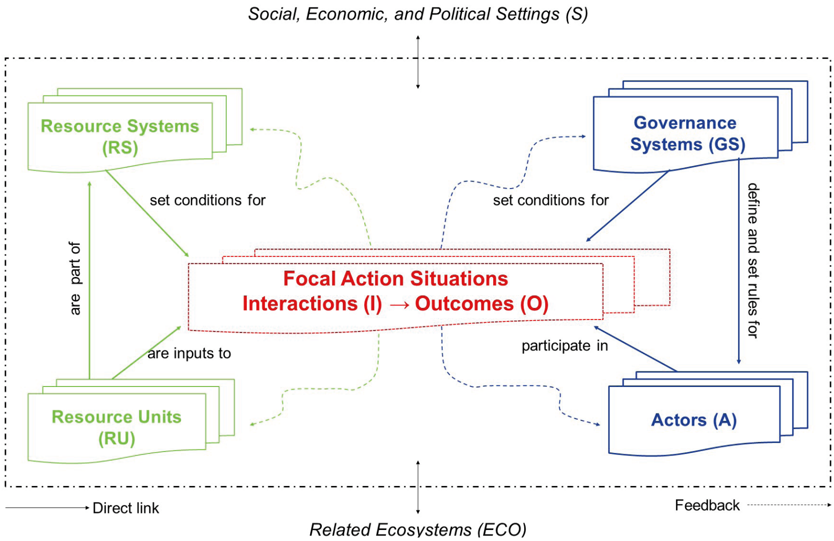

Figure 6.1. Revised social-ecological system (SES) framework with multiple first-tier components. *Michael McGinnis and Elinor Ostrom, 2014*

beyond simple descriptions in order to grapple with the complexity of food's intersecting subsystems—the local ecology; the farm; available distribution systems; rules and policies; and the people who grow, move, buy, and consume it. This complexity calls for a systems theory approach.[5] Rather than isolating variables or simplifying processes, systems thinking embraces the richness of "interlocking and interacting interests and considerations."[6] It uses an array of tools to organize findings from diverse contexts into a common framework that can be transferred to new situations. A systems approach allows us to make comparisons that project whether a local food innovation that works for one population, time, and geographical location will be successful in another.

Especially well-suited to understanding food is the social-ecological systems (SES) framework conceptualized by Nobel Laureate Elinor Ostrom. Ostrom used SES to illuminate how people collectively manage natural resources. Despite earlier theories that people using the same resource would compete with each other to its long-term detriment, her work on "common pool resources" shows that even in the absence of official policies to protect resources on which communities depend, community members do voluntarily act to further their long-term interests.[7] Garrett Hardin had theorized that unregulated pastureland would be overgrazed into economic and environmental collapse, but Ostrom identified many cases from around the world in which communities successfully self-manage common pool resources, including fisheries, pastures, woods, lakes, and groundwater basins.[8]

Ostrom's primary model for the factors impacting the commons, meaning the cultural and natural resources available to all citizens, is the SES framework. It identifies and organizes important factors in a commons system that reflects linkages, feedback loops, and other complexities that affect its operations.[9] As a model, the SES moves beyond describing any particular system "to organize findings" in ways that allow "isolated knowledge" to accumulate. Thus, we can adapt it to local food systems, which are similarly complex examples of human-ecological systems and use it to move our observations beyond particular examples to generalizable accumulations of knowledge.[10] By recursively checking theory-building with experience, and vice versa, we posit an approach that brings "Ostrom's Law" to life: "A resource arrangement that works in practice can work in theory."[11]

Ostrom and Michael McGinnis illustrate the core areas and feedback loops for analyzing any SES that includes four major subsystems (resource systems, resource units, governance, and actors (also referred to as "users" in earlier texts) that are centered on a "Focal Action Situation" (see figure 6.1).[12] This figure represents the complexity of an action situation graphically, by showing the four main subsystems. It also alludes to their relationship to external ecosystems and to social, economic, and political settings. Moreover, it suggests that secondary variables are nested within the four primary subsystems. Each of these subsystems includes certain variables, listed in detail in Ostrom's earlier work (see table 6.1). Each variable is generalized from many case studies to present a generalized factor that might pertain cattle herds as well as to alfalfa crops.[13] A local food system, for example, might include:

Table 6.1. Second-Tier Variables of a Social-Ecological System

Social, economic, and political settings (S)	
S1 Economic development. S2 Demographic trends. S3 Political stability. S4 Government resource policies. S5 Market incentives. S6 Media organization.	
Resource systems (RS)	*Governance systems (GS)*
RS1 Sector (e.g., water, forests, pasture, fish)	GS1 Government organizations
RS2 Clarity of system boundaries	GS2 Nongovernment organizations
RS3 Size of resource system*	GS3 Network structure
RS4 Human-constructed facilities	GS4 Property-rights systems
RS5 Productivity of system*	GS5 Operational rules
RS6 Equilibrium properties	GS6 Collective-choice rules*
RS7 Predictability of system dynamics*	GS7 Constitutional rules
RS8 Storage characteristics	GS8 Monitoring and sanctioning processes
RS9 Location	
Resource units (RU)	*Users (U)*
RU1 Resource unit mobility *	U1 Number of users*
RU2 Growth or replacement rate	U2 Socioeconomic attributes of users
RU3 Interaction among resource units	U3 History of use
RU4 Economic value	U4 Location
RU5 Number of units	U5 Leadership/entrepreneurship*
RU6 Distinctive markings	U6 Norms/social capital*
RU7 Spatial & temporal distribution	U7 Knowledge of SES/mental models*
	U8 Importance of resource*
	U9 Technology used
Interactions (I) → Outcomes (O)	
I1 Harvesting levels of diverse users	O1 Social performance measures (e.g., efficiency, equity, accountability, sustainability)
I2 Information sharing among users	O2 Ecological performance measures (e.g., overharvested, resilience, biodiversity, sustainability)
I3 Deliberation processes	O3 Externalities to other SES's
I4 Conflicts among users	
I5 Investment activities	
I6 Lobbying activities	
I7 Self-organizing activities	
I8 Networking activities	
Related ecosystems (ECO)	
ECO1 Climate patterns. ECO2 Pollution patterns. ECO3 Flows into and out of focal SES.	

*Subset of variables found to be associated with self-organization.

Note: We have retained Ostrom's original coding for the variables in this table but have eliminated them from the text for the sake of clarity.

Source: Elinor Ostrom, "A General Framework for Analyzing Sustainability of Social-Ecological Systems," *Science* 325, no. 5939 (2009): 421.

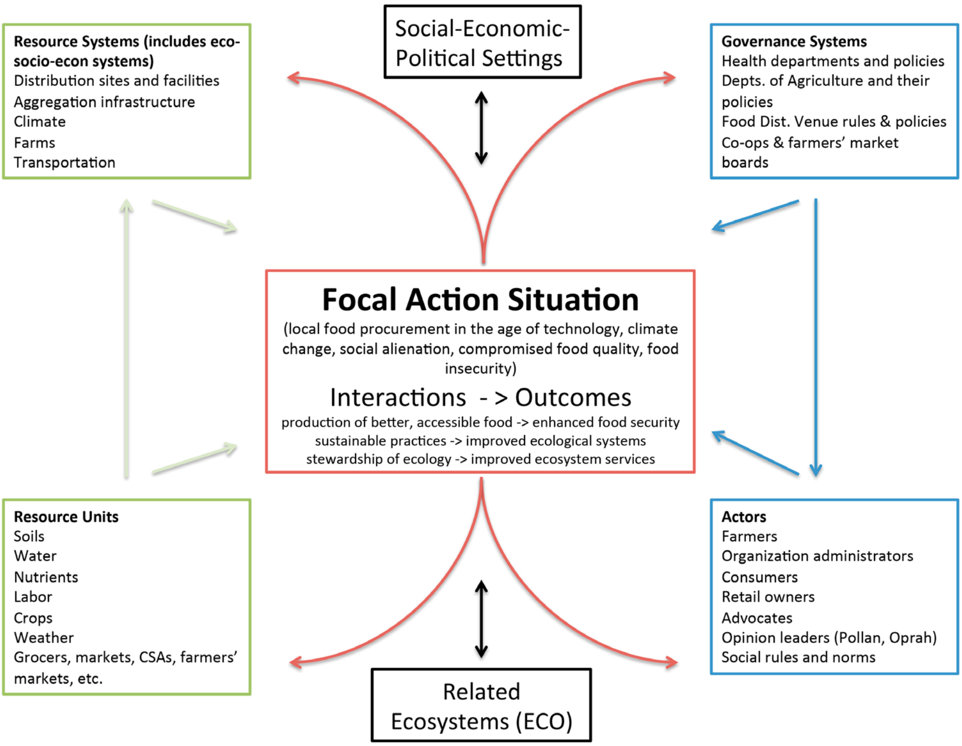

Figure 6.2. Local food systems as applied to the social-ecological systems (SES) framework. *Adapted by the authors from Michael McGinnis and Elinor Ostrom, 2014*

- a *resource system* of farms in the local foodshed of a city
- *resource units* of what is produced, what soils are available, what water supplies exist, etc.
- *actors*, such as farmers, aggregators, consumers, and restaurants
- *governance systems* of organizations and rules, such as local farmer cooperatives, a farmers' market governing board, National Organic Program guidelines, and Good Agricultural Practices (GAP) certification.

According to Ostrom, each of these subsystems can be described individually, but they also interact to produce outcomes at the SES level.

And those outcomes also affect the subsystems, their components, and other systems. In other words, a reciprocal relationship exists among elements in these subsystems: actors create governance systems and live in their context, while resource units exist within and move among resource systems. Together, they all affect the context in which action can and does occur.[14]

Small differences in how items in a system interact can mean quite different outcomes. For example, when the advisory board of a farmers' market in southern Illinois decides what "local" means there, it significantly affects not only offerings at that market but also who grows the food, what agricultural methods they use, what future fertility the soil will support, what kinds of pollution enter the air and water, the health of people in nearby communities, the vibrancy of wildlife in nearby ecosystems, the money that is spent with local businesses, the availability of heritage cuisine ingredients, types of irrigation, language training needed for public schoolchildren, cultural accommodations in nearby hospitals, jobs in organic production monitoring, and so on. Clearly, the entirety of a region's circumstances is not traceable to a single decision to make a market producer-only, in-state-only, or organic-only; however, as part of the system, it necessarily produces complex interactions and outcomes.

Using the SES to Analyze Local Food Hubs

The SES framework, as adapted to local foods, helps identify leverage points among the numerous interactions possible. Figure 6.2 teases out variables that influence the success, resilience, and robustness of the system, even though the framework we illustrate may be too abstract to recommend *particular* actions or conclusions.[15] Rather, the goal is for the framework to represent real situations in ways that provide insight and transferability. For example, an SES analysis of a successful local food system would project that positive interactions will lead to positive outcomes: the production of healthful and accessible food will result in enhanced food security; sustainable food practices will lead to improved ecological systems; ecological stewardship will lead to improved ecosystem services; accountability and the rehumanizing of food relations will remedy social alienation; and that in turn will build community and foster social justice.

But that is all very general. Working with more specificity, the SES framework allows us to pose important questions that influence the future of local food. One such question, which might aid a community as it decides where to dedicate scarce financial resources, is: when does it make sense to invest in one of the emerging trends in local food—say, aggregation through a new food hub? We know that food hubs offer greater purchasing and distribution potential. Common among their many models is aggregation: food grown by local farmers is brought together in a central place from which it can be distributed to large and small buyers. Aggregation is appealing because it presents the possibility of larger audiences for local food that small farmers cannot satisfy on their own, at least not while maintaining the social independence and the intensive ecological stewardship principles that drew many to small farming to begin with.[16] Moreover, the US and state departments of agriculture have recently emphasized hubs as the next step in the American food system—bolstering food quality and sovereignty. The increased demand means that traditional direct-to-consumer volumes are too small. Food hubs offer a way for small farms to collectively meet the greater needs, allowing the lifestyle and diversification that many farmers want while bringing small quantities together for easier access by consumers. Still, while food hubs seem to boom in some regions, in others momentum lags. How are municipalities going to decide whether their region might be a viable one for a food hub? How will they gauge whether the investment in money, time, space, human resources, and social capital necessary to develop a hub will be worth it instead of, say, adding a new farmers' market or CSA?

The SES framework helps with that decision. It identifies the variables that are critical for a food hub, which are different from those encountered with farmers' markets and CSAs. For example, while farmers' markets, CSAs, and front porch drop-off sites provide great autonomy to farmers, leaving largely to their discretion the varieties and quantities to grow, along with the timing of deliveries, the duration of the season, and the setting of prices, a food hub requires an initial cooperation among a group of farmers to create an infrastructure

Figure 6.3. Farmer Tim Alexander of Henderson, Kentucky, poses early one September morning as he prepares for the annual freshwater shrimp harvest. *Photograph by James R. Farmer*

and then ongoing coordination with that group to accumulate and distribute saleable quantities of marketable products. An articulation of the challenge of starting a food hub, then, might be that "actors" (for example, farmers) will choose to join a food hub, or start their own, once its benefits outweigh those of alternatives (such as direct markets). Checked against experience, though, we can see that numerous "second level" variables come into play, each with its own impact on the system and the choices people make.[17] Ten of those variables are especially significant in whether people will willingly organize themselves through collective action in a given situation, and nine of them are especially significant for a food hub. We will talk through the importance of these nine variables first and then show how they can be used to compare two real-life food hub situations.

1. Size of the Resource System

The resource system identified for a food hub has to be amenable to collective action. For example, an area the size of the twelve states making up the US Midwest would likely be too big in geography, scope, and actors for collective action. Similarly, a resource system that encompassed the smaller geographic area of south-central Appalachia would probably be too diverse culturally, politically, and climatologically to provide much basis for collective action around a food hub. On the other hand, a very small resource system, say only a small block of residents, might not adequately "generate substantial flows of valuable products."[18] Thus, a food hub would probably be better supported by a moderately sized resource system, say the local foodshed of a midsize city—such as Bloomington, Indiana, or Huntington, West Virginia.

2. Productivity of the Resource System

By this logic, people in a particular region, with similar characteristics and appropriate buying populations, as with Bloomington and Huntington, would be much more likely to act cooperatively to create a food hub than a larger or more heterogeneous group dispersed around the country with little to activate their collective interests. The optimal situation for collective action, according to Ostrom, balances the size and productivity of a resource system. That sweet spot exists at the intersection of two continuums: one describing availability (ranging from super saturated to extensively exhausted resources) and the other describing development (from very abundant to hardly developed resources). If adequate options for local food already exist, then a community will not need to add a hub; if too few farmers with too few products supply an area, then similarly the community will not need a hub.

3. Resource Unit Mobility

According to common natural resource models, we should see less collective action when resource units are more mobile. For example, food became more mobile in the late 1800s. Trains started carrying cattle from the fields of Iowa, Nebraska, and Kansas to the stockyards of Chicago. Apples were shipped from Washington state to Washington, DC. And milk that was pasteurized and then ultra-pasteurized had enhanced shelf life and thus greater mobility. At this scale of mobility, the USDA, representing Americans, could enforce certain standards or cut certain deals with industry, but meaningful collective choices by people were not possible. Local food, on the other hand, builds in some limits to mobility because it prioritizes freshness, proximity, and social connections. An interesting caveat, however, is that as the local movement grows, the ubiquity of the food and the mobility of the consumers may diminish the need for collectivity. In other words, when buyers can acquire "local" goods practically anywhere (farmers' markets, farm stands, CSAs, restaurants, wholesalers, grocers, co-ops, etc.), that ubiquity may actually undermine the whole idea that food can connect one to place and community.

4. The Number of Actors

With too many individuals involved, it is often a challenge to reach collective decisions. On the other hand, involving too few individuals makes delegating and completing responsibilities improbable. Because food hubs often affect a broad group of stakeholders (farmers, individual customers, institutional customers, merchants, commercial distributors, town administrators, parks personnel, urban planners, educators, food security nonprofits, neighborhood associations, land conservation groups, water managers, and so on), the leadership team needs to be kept to a workable number while farmers may need to be actively recruited to keep up supply.

5. Leadership and Entrepreneurship

Leaders always matter in establishing grassroots organizations.[19] According to Ostrom, a group is apt to be successful when its leaders have "entrepreneurial skills and are respected as local leaders as a result of prior organization."[20]

6. Norms/Social Capital

Leaders are likely to be successful when they have the skills and associations that the local society tends to respect, including sharing "moral and ethical standards regarding how to behave in groups they form."[21] While individuals involved in starting a food hub may not have prior experience in that exact task, the skills and social capital they have accrued through farming and direct marketing are likely to garner the respect and following they need to recruit other growers. On the other hand, farmers tend to be solitary workers and may have limited patience for the coalition building and evening committee meetings necessary to establish a food hub. So a hub may need a team of entrepreneurial types to carry such a complex goal to fruition.

7. Collective Choice Rules

Ostrom argues that change is most possible when people have the autonomy to develop, monitor, and enforce some or all of their own rules. For creating a food hub, this might mean that farmers are able to craft rules that will support both a well-functioning hub and their own interests. For example, farmers might decide that the optimal delivery and pickup days for a hub should complement but not compete with the local farmers' market day. That sort of decision would expand the number of days local food is accessible in a community and spread harvesting out over the course of a week. Without farmer input, however, a hub could organize for the convenience of the customers, perhaps establishing pickup hours that accommodate standard school or work schedules but conflict with Saturday markets. Successful collective choice rules should mean lower expenses—in terms of time, money, and other significant factors—for participants as they develop and manage the hub.

8. Knowledge of SES/Mental Models

A shared understanding of the elements of the social and ecological system makes a difference in how people negotiate them.[22] For example, if people share an understanding that a full, grocery store-like selection of food must be on hand before opening a food hub, then their mental model may conflict with the ecological and economic realities of farming, which require months or even years of lead time. On the other hand, if a hub does not open quickly enough, failing to match growth in demand, then actors may come to believe that a hub cannot address their needs and gravitate to alternatives, leaving a shortfall when it actually opens.

9. Importance of the Resource

Ostrom explains that many successful examples of self-organization occurred when actors were "dependent on the resource system for a substantial portion of their livelihoods or attach[ed] high value to the sustainability of the resource."[23] In the food hub scenario, greater importance (high dependence and high value) would suggest greater viability. On the other hand, if farmers or buyers need no further distribution outlets or do not value them, then that locale will be less likely to generate an initiative for a new hub.

The nine variables discussed here, among ten identified by Ostrom as *significant*, become even more useful when we add *predictability of system dynamics* and *number of units*. Together, these eleven variables help explain why local food hubs occur unevenly across the United States. Seen in realistic contexts, the variables help us discern what works and what matters in local food systems. The two following case studies bring these variables to life. Each case is inseparable from the rich detail of its context, yet when we position them in the "simplified abstraction" of the SES framework, we can compare them with fewer distractions. Thinking in terms of systems like this also allows us to consider how to transfer the lessons of Bloomington and Huntington to other contexts (action situations).

Case 1: Bloomington, Indiana

At first Bloomington seems primed for a food hub. The town is a regional economic powerhouse and thus a center for food distribution of many types (chain groceries, discount stores, restaurants, specialty food trucks, multiple farmers' markets, university cafeterias, and so on). But it is not home to a formal aggregation point for locally grown products, what we are calling a local food hub. Analysis using the SES variables that are vital to collective action suggests that despite indicators to the contrary, Bloomington is *not* as viable a location for a local food hub as it might appear.

Bloomington is home to several hopping farmers' markets, an assortment of nearby small farms, and high-profile popularity of local food throughout the community—attributes that one might expect would make it a promising location for a local food hub. The city was among the first wave of farmers' markets in the mid-1970s, which run today on Tuesdays, Wednesdays, and Saturdays. It also supports at least seventeen CSAs and a Local Growers' Guild of about one hundred members.[24] Local food can be found regularly at the local cooperative and several chain grocery stores as well as in restaurants around town.

The community has a long-standing interest in local food, supported by many farmers who have relationships with steadfast customers and sales venues. The culture of the community includes significant knowledge about local food—its value, its cultivation, its preparation—and this knowledge is passed on through such educational sites as family-farmer organizations, permaculture workshops, volunteer opportunities, media coverage, and city infrastructure. Taken together, all of these indicators seem to support a stable level of "predictability of system dynamics" and a positive scenario for the development of a food hub.

The number of potential actors in a food hub—such as farmers, consumers, restaurants, and food banks—represents a significant proportion of the area's population. The city sponsors two weekly markets during the growing season, including a Saturday market that features 119 stands contracted for the eight-month season and attracts over ten thousand customers at its height, about 12 percent of the city's eighty thousand residents.[25] Several private markets and regular truck stands also operate around town. Approximately 163 farms serve the "local" needs of the surrounding county (43 in the immediate county alone).[26] In addition, large institutions—such as restaurants, hotels, university food services, and hospitals—seek more stable supplies of food at greater quantities than are generally accommodated by current sources.

Currently, several instances of leadership and entrepreneurship for cooperative action around local food exist, including within the membership of the Local Growers' Guild, a regional family farming cooperative begun in 2004; the staff and advisory boards of the five regular farmers' markets; the organizers behind locally focused bakeries, nurseries, restaurants, and distilleries/breweries; and community members who sit on local and statewide boards setting food policy, such as the Bloomington Food Policy Council and the Indiana Locally Grown initiative. Radio programs on green and sustainable eating air weekly on the public and community stations, multiple food summits and councils meet regularly, and the city-sponsored farmers' market is the most popular event in town. The state university in town hosts an annual showcase of ways to "eat green," and a farm market sets up weekly near the Starbucks in the student union. Such intensive involvement by a large portion of the community suggests that the social norms/capital and mental models of many in the Bloomington area view local food positively and that there is capacity to expand leadership and entrepreneurship in this area. Furthermore, the popularity, expertise, and history of local food in the area suggest that this resource is considered important. In short, local food matters here, and more, via a food hub, might be even better.

Do potential leaders in Bloomington have the autonomy to develop, monitor, and enforce rules that support collective action around a hub (collective choice rules)? Existing organizations suggest they do. The Bloomington Community Market is managed by the city of Bloomington but governed by an elected advisory board that includes farmers, customers, and city employees who guide the development of rules and policies. Similarly, the Local Growers' Guild is governed by elected farmers, community members, and advocates who advise and approve the development of rules and policies. The Bloomington Winter Farmers' Market is an especially good example of autonomy and depth of leadership. A farmer with financial support from the local Slow Foods chapter founded it. Then, guided by an advisory council of producer and customer representatives, it acquired administrative support from the Local Growers' Guild, and most recently it moved under the umbrella of the Center for Sustainable Living.[27] Moreover, a Wednesday market organized by farmers and hosted on private property adjacent to the city's largest shopping mall has been in operation some twenty years. This extensive participation by individuals and collaboration among community organizations suggests that a collectively organized food hub would likewise be able to develop people-centered frameworks of governance.

In the case of Bloomington, the size of the resource system, or foodshed, provisioning the town can be described by the vast majority of farms serving its farmers' markets—most found within sixty miles of town and many much closer. Farms (or gardens) close to the center of Bloomington tend to be small, even niche or micro (specialized or very small), in both acreage and production. Such constraints mean that direct-to-consumer sales with their higher prices are the most viable option for growers. Larger farms with greater production capacity tend to be located farther away in the surrounding counties, which means they can diversify their customer base by selling in other nearby counties and multiple marketplaces.

In the greater Bloomington area, the productivity of the resource system is affected by such variables as farm size, topography, soils, and soil fertility. In terms of topography, much of the area is characterized by both unglaciated ridges and glacial valleys created by meltwaters. Unlike farther north, in what is now flatter, more fertile terrain, the Bloomington area did not receive mineral and topsoil deposits at the end of the last ice age. These ecological and environmental conditions have in large part defined the farming options possible in the area. Consistently here, farmers who serve national markets by growing conventional crops (corn, soy beans, wheat) and using conventional production and distribution methods work the prime farmland (which is minimal). In contrast, new and beginning farmers (and even those who started some thirty or forty years ago) are often limited to marginal parcels by finances or land availability. Often they set up on old farms or abandoned homesteads, perched on a ridgetop without consistent access to a good water source, in a deep holler without full sun, or on clay-heavy, thin, or Borden siltstone soils. All of this means that probably only small areas of a farm are conducive to good growing. Thus, many farms around Bloomington are suited for direct-to-consumer outlets that allow higher prices for smaller quantities.[28] From the 1920s to the 1980s, farms in this area may have grown twenty-fiveacre apple orchards or ten-acre green bean fields, but today farms of that capacity are rare.[29]

Finally, much of what is being produced for local distribution in Bloomington falls into the "mobile" or shippable category: fruits, vegetables, eggs, and frozen meats (resource unit mobility). Less mobile, highly perishable products—such as dairy, fish, fresh meat, and live animal sales—are uncommon in the area. At the same time, customers themselves can also be considered very mobile, with plenty of local food outlets in the area so that they can choose when and where to shop. This extensive number of units for distribution includes the community's five farmers' markets, the local cooperative grocery, Lucky's Market (a natural foods chain), a planned 365 by Whole Foods Market store, several restaurants, CSAs, farm stands, and front-porch preorder sites.

The limited productivity taken together with the saturation of current venues and mobility of customers suggests that, appearances to the contrary, Bloomington is *not*, in fact, a likely candidate for a new food hub.

Case 2: Huntington, West Virginia

One type of food hub that successfully supplements farmers' markets, CSAs, and other direct-to-consumer methods operates in Huntington. Selling to both retailers and individuals, the Wild Ramp market offers quality produce, dairy, eggs, and meats, as well as value-added products and artisan crafts from the immediate area, such as creative art, wearables, and personal care products. Not just a warehouse for product aggregation, the Wild Ramp adds an innovative twist to the conventional hub, blending wholesale and retail distribution. It offers group marketing, cold storage, and value-added facilities in a health department-certified kitchen and adds a retail storefront that allows farmers to charge direct-to-consumer prices. Such value-added opportunities help them recover from the lower wholesale prices of an ordinary hub: farmers selling at the Wild Ramp receive 90 percent of the value of their products instead of the 50–60 percent typical of a hub. Moreover, instead of imitating the one-size-fits-all wholesale warehouse model common in the industry by aggregating similar products from many farms, Wild Ramp allows the name of the farm to follow its produce. In this way, farmers can maintain a connection between their identity and values and the quality of their work.

Huntington is not generally known as a mecca of trendy food. In fact, in 2008 it was named the least healthy city in America by the Centers for Disease Control, in no small part due to food insecurity, poor eating habits, and epidemic-level obesity. The city's rating was reported widely enough that chef and media personality Jamie Oliver pledged that his "food revolution" would overhaul school lunches, and clergy preached the benefits of healthy eating from pulpits across the city. On the surface, Huntington seems less likely than Bloomington to sponsor a healthy-eating food hub; however, the SES framework shows that significantly different secondary variables do in fact make it a viable location. Thus, the success of the Wild Ramp is no surprise.

Huntington's resource system can be considered about the same geographic size as Bloomington's, about one hundred miles from the center. The population of potential consumers is similar, too, with about 140,000 individuals living in Monroe County, Indiana, and 100,000 living in Cabell County, West Virginia. At first glance, Huntington's mountainous topography and resulting fragmented rural road network suggest lower agricultural productivity levels like Bloomington's. But in fact the Ohio River, with its back-and-forth meanderings over millennia, has created a flat, fertile valley with excellent sites for produce farming. Not only that, but the rolling and steep hills alongside the valley offer ideal lands for grazing and orchards.

The topography of Huntington's resource system also provides predictability in system dynamics, through stable microclimates and weather patterns. Farms tucked into the Ohio River Valley have warmth from the river to help maintain moderate temperatures in the late fall. Meanwhile, orchards planted on the ridgetops receive the benefit of the cold rolling down into the valleys, which protects them from extreme temperature swings that would kill the spring blossoms of apple, pear, and peach trees or freeze fruit in a late fall cold snap.

In fact, West Virginia has the highest frequency of small farms in the United States, a vibrant small farm program through West Virginia

University, and a history of "small scale" or specialty-crop agriculture since about 1775. All of these factors contribute to substantial institutionalized knowledge of the area's social and environmental systems.

So while it is similar in appearance to southern Indiana's wooded hillsides, Huntington has the advantage of large tillable tracts that support enough agriculture for direct and indirect distribution. These productivity levels support Huntington's greater consumer potential. The city is well positioned at a lengthy driving distance from other distribution centers. Besides Charleston, West Virginia, 53 miles away and with only fifty thousand inhabitants, the nearest large cities are Lexington, Kentucky, and Columbus, Ohio, at 125 and 138 miles away, respectively. This buffer gives Huntington room to cultivate local food buyers. Compare its location to Bloomington's, which is 50 miles from the greater Indianapolis metropolitan area of six million people, putting huge food industry networks just an hour's drive away—an easy distribution distance for trucking companies. Indeed, the divided state highway between Indianapolis and Bloomington is currently being upgraded to interstate specifications, underwriting industrial shipping while disrupting local routes.

In addition, the Bloomington and Huntington scenarios diverge most importantly in resource unit mobility, leadership and entrepreneurship, number of actors, norms/social capital, importance of resource variables, collective choice rules, and number of units. Food is mostly a mobile product, given appropriate infrastructure (resource unit mobility). But the more mobile resources are, the more challenging it becomes to organize collective action. Local foods produced in and around the relatively isolated Appalachian city of Huntington have decreased mobility: West Virginia's arduous transportation networks make it difficult to get goods to market.[30] Another factor to consider is that distances between metropolitan areas decrease trucking traffic. So even though Huntington has improved its technology and infrastructure to be comparable to other cities its size (or larger), we suggest that local food produced in and around that city remains less mobile.

Moreover, the saturation of local food distribution venues (number of units) varies dramatically between Huntington and Bloomington. While Bloomington offers a plethora of options, choices are more limited in Huntington. Apart from its single farmers' market, the local meat market (which may or may not always have locally sourced meats), underground distribution networks, and a single CSA, not many other options existed in Huntington before the Wild Ramp. Thus, this food hub was able to meet a community need.

While Bloomington had long ago developed social and cultural outlets for its progressive politics, in the early 2000s Huntington had a lot of room and energy to grow. An intimate group of Huntington residents, mostly transplants and returning residents, began to adapt initiatives they were familiar with elsewhere to this new locale. They, in turn, tapped more potential "actors" from groups active in many other contemporaneous initiatives (leadership and entrepreneurship). Students at Marshall University investigated the initial capacity (number of actors; productivity of resource system) in the region to organize and supply a new hub:

> They measured access to local foods in the tri-state area and identified opportunities to increase that access. They joined forces with Unlimited Future Incorporated and Create Huntington to open up a discussion regarding the creation of a local foods market. The first meeting dedicated to the concept of a local foods market was held in January 2012. A core group of citizens quickly came together and some of those citizens visited Local Roots Market & Cafe, a local foods store located in Wooster, OH. Tri-State Local Foods, a non-profit organization, was formed and the search for a location began.[31]

Today, the majority of farmers or artisans (about eighty-nine) supplying Huntington's Wild Ramp hub are located within 50 miles of the central city, with eleven others within 100 miles. Just a handful (about five) are located 100–150 miles away, with more farms breaking ground annually.[32] Currently, over one hundred farms sell their farm products through the Wild Ramp, which is staffed by more than thirty regular monthly volunteers and two paid employees.

Unlike in Bloomington, Huntington's norms and social capital do not prominently feature healthy and environmentally sound food choices. Local is pervasive enough in the larger Bloomington culture that highly regarded restaurants are founded on the principles of "local, seasonal and organic ingredients" that create a "unique Indiana cuisine" and feature "dinner menus and daily specials that change with the availability of local ingredients and the bounty of both Southern Indiana and the world."[33] In Huntington, on the other hand, local was mostly an underground movement, with clandestine egg drops on porches and raw milk shares crossing the Ohio River hidden away in private cars like sought-after contraband. However, the Wild Ramp now provides a public face for the local movement. It gathers all of these individuals and more, over thirty volunteers per month, to sort farmer drop-offs, stock shelves, clean prep space, work cash registers, and much more. No longer under the radar, local is becoming a norm through the Wild Ramp.

The norms in Huntington that support the success of the Wild Ramp include community solidarity and resilience. Marshall University, a local university of fourteen thousand students, draws 80 percent of the student body from within ninety miles of Huntington. The community was galvanized when a plane crash in 1970 took the lives of Marshall University's football team and several community members. All of the seventy-five people on board the plane were killed, including thirty-seven members of the Thundering Herd, twenty-five boosters, eight coaches, and five flight crewmembers. In short, everyone from Huntington who was alive in the 1970s knew someone on that plane. The scale of the tragedy meant people relied on each other for support and learned the value of community. The intensely regional pull of the university and the tragedy-inspired solidarity means that a cap-and-gown divide seems absent here, and the community's resilience seems palpable. People know they are connected to one another.

Local food demonstrates these connections and thus becomes elevated in importance. The national scrutiny of Huntington's obesity problem, the isolating nature of the rugged topography, the long history of small farms, all contribute to local food as an important articulation of the area's culture. This dynamic appears to culminate with the Wild Ramp—the local nonprofit that has become a beloved demonstration of pro-environment, self-reliant, good-food solidarity. Its grassroots origins allow key stakeholders—food activists, consumers, and farmers—the autonomy to develop collective choice rules that reflect their culture and respect their community members.

The SES framework illuminates critical variables that affect collective action. Taken together, they can explain the viability of a food hub in Huntington, which has one, and the failure of plans to create one in Bloomington. It is possible to discern that Bloomington, with its high visibility and myriad outlets for local food (even if sometimes availability is not sufficient), already provides an informal, distributed, agile, hub-like situation that supplants the need for something more formal, singular, and slow that caters to retail distribution—like the Wild Ramp. In fact, the ubiquity of local food in Bloomington, from truly local sources to superficial corporate labeling, suggests that "local" itself may be in danger of jumping the shark—it may be so prevalent that it no longer serves to tie people to place and community in meaningful ways. SES shows that Huntington, on the other hand, may never see the number of CSAs or farmers' market attendees that Bloomington does. But it has the right mix of abundance and scarcity, resources and capacities, to make a local food hub work.

Both towns foster robust local food systems that look quite different. It seems, as is fitting, that what works and what matters in local food is context-sensitive, involving many mechanisms and unique intersections. Of course, because food systems are so complex, we must exercise care in extending the Bloomington and Huntington lessons to new places. Still, the SES framework can help decipher these kinds of dense systems, helping us understand why similar locales might, in practice, operate quite differently. Beginning to think in terms of systems like this represents a major shift from the simple production-line thinking that remains an influential remnant of the industrial age. As the world begins to grapple with the myriad ramifications of climate change, we see how important it is to be able to visualize the far-reaching implications of even simple decisions so that we can intervene early. If we realize that we are all both downstream and upstream from somewhere else, then we can understand anew that our decisions carry a weight of responsibility. Using SES to match theory and practice promises, especially comparatively, can help us make informed decisions about food for the future.

Notes

1. Amanda Sorensen et al., "Model-Based Reasoning to Foster Environmental and Socio-scientific Literacy in Higher Education," *Journal of Environmental Studies and Sciences* 6, no. 2 (2015): 287–94.

2. Ibid.

3. Feng Wang and Michael Hannafin, "Design-Based Research and Technology-Enhanced Learning Environments," *Educational Technology Research and Development* 53, no. 4 (2005): 7.

4. Jon Kolko, "Abductive Thinking and Sensemaking: The Drivers of Design Synthesis," *Design Issues* 26, no. 1 (2010): 15–28.

5. Elinor Ostrom, "Sustainable Social-Ecological Systems: An Impossibility?," paper presented at the meeting of the American Association for the Advancement of Science, San Francisco, February 15–19, 2007, http://www.mcleveland.org/Class_reading/Ostrom_Sustainable_Socio-Economic_Systems.pdf.

6. *Pushpanathan v. Canada* (Minister of Citizenship and Immigration), [1998] 1 S.C.R. 982, para. 36; Elinor Ostrom, "A General Framework for Analyzing Sustainability of Social-Ecological Systems," *Science* 325, no. 5939 (2009): 419.

7. Ostrom, "General Framework," 419.

8. Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge, UK: Cambridge University Press, 1990); Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (1968): 1243–48.

9. Ostrom, "General Framework."

10. Xavier Basurto and Elinor Ostrom, "Beyond the Tragedy of the Commons," *Economia delle fonti di energia e dell'ambiente* 52, no. 1 (2009): 35–60; Ostrom, "General Framework."

11. Lee Anne Fennell, "Ostrom's Law: Property Rights in the Commons," *International Journal of the Commons* 5, no. 1 (2011): 9–27.

12. Michael McGinnis and Elinor Ostrom, "Social-Ecological System Framework: Initial Changes and Continuing Challenges," *Ecology and Society* 19, no. 2 (2014): 30.

13. Ostrom, "General Framework."Note that the secondary-level variables in table 6.1 are not listed in order of importance, as not all variables have equal weight in or even pertain to every SES situation.

14. Ibid, 420.

15. For instance, in the Actors (A) subsystem, secondary-level variables include farmers, organization administrators, consumers, retail owners (restaurants, small grocers, etc.), and local food advocates. Governance Systems (GS), which set rules, policies, and guidelines for the actors, pertain not only to offi-

cial government but also to other systems in which rules and policies are constructed. Governance Systems, then, may be as formal as Good Agricultural Practices (GAP) certification or National Organic Program (NOP) policies, as participant-defined as farmers' market boards, or as implicit as the social norms that bring women disproportionately into the ranks of food security volunteers. The Resource Systems subsystem includes entities or cycles affecting local foods in a given area, such as infrastructure for moving food, refrigerating it, and shipping it. But it also includes items that are vastly complex in their own right, such as climate and the viability of farming. Finally, those resource systems are comprised by variables at the level of Resource Units, such as number of cattle, individual trees, yield of tomatoes, and rainfall.

16. This is not to say that only small and micro-farmers want to be or can be ecological stewards or environmentally sustainable; rather, small farmers are often drawn to that scale of agriculture that allows for hands-on, labor-intensive methods. For example, some small farmers we have interviewed say that they prefer plowing with animals or walk-behind tractors because they feel a connection to the soil and surroundings that large-scale methods do not allow. They feel that to trade in intensive methods for greater income would compromise their social independence and ecological stewardship. Jennifer Meta Robinson and J. A. Hartenfeld, *The Farmers' Market Book: Growing Food, Cultivating Community* (Bloomington: Indiana University Press, 2007); Jennifer Meta Robinson, "Making the Land Connection: Local Food Farms and Sustainability of Place," in *The Greening of Everyday Life: Challenging Practices, Imaging Possibilities*, edited by Jens Kersten and John M. Meyer, 198–210 (Oxford: Oxford University Press, 2016).

17. A thorough description of all second-level variables can be found in Ostrom, "General Framework."

18. Ibid., 420.

19. Ruth Meinzen-Dick, "Beyond Panaceas in Water Institutions," *Proceedings of the National Academy of Sciences* 104, no. 39 (2007).

20. Ostrom, "General Framework," 421.

21. Ibid.

22. Ibid.

23. Ibid.

24. Local Growers Guild, http://www.localgrowers.org.

25. City of Bloomington, Farm Market Directory, http://bloomington.in.gov/documents/viewDocument.php?document_id=8920.

26. Angela Babb et al., "Accessing Local Foods: The Role of Financial Incentives at Farmers' Markets," *Journal of Agriculture and Human Values* (In Review).

27. Bloomington Winter Farmers' Market, "About," http://www.bloomingtonwinterfarmersmarket.com/about.

28. Babb et al., "Accessing Local Foods."

29. Everett Kerr, personal correspondence with James Farmer, August 22, 2015.

30. Ronald Lewis, *Transforming the Appalachian Countryside* (Morgantown: West Virginia University Press, 1998).

31. Christa Galvin, Kelly Cox, and Lauren Kemp were three students at Marshall University. See The Wild Ramp, "About Us," http://wildramp.org/about-us.

32. The Wild Ramp, "Producer Information," http://wildramp.org/producers/meet-the-producers. Accessed November 28, 2016, https://web.archive.org/web/20151128122508/http://wildramp.org/producers/meet-the-producers/.

33. Restaurant Tallent, "About Restaurant Tallent," http://restauranttallent.com/about-restaurant-tallent.php (site discontinued); Farm Bloomington, http://www.farm-bloomington.com.