A Research Design for Assessing the Possibilities of Localized Food Production

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ABSTRACT

Local food production movements have claimed a central role in proposals to mitigate some of the negative effects of economic globalization. Although not meant to be a panacea for the ills of the neoliberal order, local food production is advocated as a sustainable solution to a portion of the environmental degradation caused by global capitalism, and as a mechanism by which to rebuild community networks undermined by the globalization of commerce and culture and create the type of sustainable development necessary to restore and preserve the carrying capacity of the planet. This study seeks to develop a conceptual framework for assessing the potential for communities to create and sustain local food production by addressing three major factors that influence a community's ability to localize its food system: the physical capacity of the region or locality to produce enough food to feed its inhabitants, successful policy and trade adjustments by governments to create and enable the survival of local food production systems, and the willingness of consumers to participate in a localized food production system, which includes the community's willingness and ability to bear the costs of instituting and maintaining the local system.

§1 Introduction

§1.1 Overview

Globalization has been defined and redefined in a myriad of contexts, all of which generally emphasize the growing integration and interdependence of international markets and the decreasing significance of geographic distance. For example, David Held, a political scientist, characterizes globalization as:

> A process (or set of processes), which embodies a transformation in the spatial organization of social relations and transactions—assessed in terms of their extensity, intensity, velocity, and impact—generating transcontinental or interregional flows and networks of activity, interaction, and the exercise of power. (Held et. al 1999:16)

For critics of economic globalization, this seemingly innocuous definition neglects to characterize the forms these transformations assume and the overall impact of those transformations on those nations, communities, and cultures that undergo them. Perhaps most significantly, although Held and his colleagues acknowledge the "exercise of power" in the spread of globalization, opponents of globalization argue that they fail to identify *who* exactly exerts *what* kind of power.

Numerous critics of globalization, however, have reached a clear consensus on exactly who and at whose behest globalization occurs: As economist John Helliwell proposes, "For protestors in Seattle, Gothenberg, and Genoa, globalization represents a state of the world wherein international organizations implement the wishes of transnational corporations, ensuring the free trade rules will combine with global market pressures to eliminate the ability of local and national governments to implement policies" (2002:15). Woodin and Lucas (2004) also advocate a more critical definition: "'Economic globalization' is precisely defined within international trade theory as the ever-increasing integration of national economies into a giant one-size-fits-all global economy through trade and investment rules and privitisation, aided by technological advances, and driven by corporate power" (6). According to these perspectives, globalization is not the benign, beneficial, and inevitable process that its proponents suggest.

Its critics assert that globalization has created the greatest disparities in wealth—both between and among nations—in the history of civilization, inhibited and eroded

democracy and social justice, and proliferated unprecedented environmental degradation, possibly damaging the planet beyond its capacity to heal itself (Cavanagh and Mander 2004:17). Cavanagh and Mander argue that "the only real beneficiaries of globalization are the world's largest corporations and their top officials, and the global bureaucracies they helped to create" (2004:17).

Local food production movements have claimed a central role in proposals to mitigate some of the negative effects of economic globalization. Although not meant to be a panacea for the ills of the neoliberal order, local food production is advocated as a sustainable solution to the social devastations and environmental degradation associated with industrial farming and the globalized food system. In terms of sustainable development, the argument for localized food production is based on three principles: localized food production reduces the environmental impacts associated with transporting food long distances, it reduces the potential for degradation of the environment and exploitation of human labor, and it promotes community by building networks of local producers and consumers (Cowell & Parkinson 2003).

Local food systems are presented as inherently more sustainable than industrial agriculture: small-scale farmers are able to employ agricultural practices with conserve natural resources such as soil and water and can often recycle agricultural wastes back into the production of crops or livestock (Norberg-Hodge et. al. 2002, Cavanagh and Mander 2004). In this context, localized food production is presented as a solution to a portion of the environmental degradation caused by global capitalism, and as a mechanism by which to rebuild community networks undermined by the globalization of commerce and culture and create the type of sustainable development necessary to restore and preserve the carrying capacity of the planet.

§1.2 Topic and Purpose

Grounded in these critiques of globalization and the positive potentialities of localization, the focus of this study is on an effort to develop conceptual tools for assessing the potential for communities to create and sustain local food production systems. This assessment addresses 1) the extent to which communities are *physically* able to localize food production in terms of agricultural production, 2) whether communities are *willing* to localize food production in terms of adapting consumer habits

to local production capabilities, and 3) the institutional structures that might influence a community's legal and political ability to create a localized food production system.

The purpose of this study is to create a research design that future researchers can apply to any community within the United States to assess the potential feasibility and viability of attempting to localize that community's food production system. In other words, this study will provide a research tool to answer the question: "Can this community meet most of the caloric and nutritional needs and desires of its members with products locally grown and processed?" This methodological template is designed primarily for use by scholarly researchers, local officials, and community members familiar with both qualitative and quantitative research methods, and it is hoped that the conclusions reached through the use of this design can assist in the formulation of food policies that will benefit communities by contributing to increased food security, responsible resource use, and the strengthening of community networks.

The scope of this project necessitates an examination of the dimensions of the term "local" and the concept of "locality," as well as a clarification of the concept of "community." Merriam-Webster's Dictionary reveals the etymology of "local" as descending from the Latin *locus*, meaning "place," and lists several definitions relevant to conceptualizing local food systems:

> 1: characterized by or relating to position in space: having a definite spatial form or location.
>
> 2 a: of, relating to, or characteristic of a particular place; not general or widespread, b: of, relating to, or applicable to part of a whole.
>
> 3 a: primarily serving the needs of a particular limited district.

The concept of "the local," then, is perhaps primarily geo-spatial and linked to a specific, bounded location, the characteristics and circumstances of which are particular to that geographical area. In terms of food systems, this facet of the local would lend itself to establishing a circumscribed boundary or threshold beyond which food or agricultural products cannot be considered local. On the other hand, this may create conceptual problems, as the determinant of "primarily serving the needs of a particular limited district" implies that a product may in theory come from outside the particular spatial boundaries yet still be considered a part of the local.

Products found in the supermarket may not have been produced by "local" farmers, but can still constitute part of the locality by virtue of their availability within and their contribution to the subsistence of that community. The qualification of "primarily serving the needs of a particular limited district" can also be construed to mean that specialized organizations (particularly industrial agribusinesses) are not part of any locality at all, since their products do not primarily meet the needs of any community but rather partially meet the needs of many localities. This aspect of local also emphasizes the conceptualization that the local is "of, relating to, or applicable to part of a whole," a characteristic that will be subsequently examined.

This apparent paradox of the local is one of the consequences of globalization, which has had an undeniable effect on the constitution of "local" places. Clapp and Dauvergne conceptualize globalization as a "multidimensional process, broadly restructuring and integrating the world's economies, institutions, and civil societies. It is a dynamic, ongoing, and accelerating process that is increasing the links among actors, as well as the structures within which they operate, both within states and across borders" (2005: 20).

Globalization has had a unique effect on space, eliminating barriers and condensing space in some respects, as in between producers in Asia and consumers in North America, while creating barriers and increasing space elsewhere—for example, between neighbors who have increasingly little contact with each other, or between local producers and local consumers as food travels through a circuitous chain of processors, distributors, and finally retailers before reaching household dinner tables. Globalization has also had the effect of compressing time and enabling virtually instant communication and interaction (Clapp and Dauvergne 2005: 20). The local constituency of a single geographical location may encompass places, services, products, and people from any number of distant localities. This de-emphasizes the place-based aspect of the local and the importance of intra-community networks because residents of a community in the United States may depend on products grown or manufactured half a world away, and no longer depend on local networks to satisfy their needs.

Wendell Berry (1990) also emphasizes the expanded space imposed between people and the decreased importance of the immediate geographical, placed-based element of the local created by the effects of globalization. For Berry, the epitome of

community lies in the function of local culture that creates bonds of interaction between its members: "A good community…insures itself by trust, by good faith and good will, by mutual help. A good community, in other words, is a good local economy. It depends on itself for many of its essential needs and is thus shaped, so to speak, from the inside" (1990: 158).

Globalization has, in effect, created a reciprocally centrifugal force between rural and urban communities. Economic and human resources are extracted from rural localities into networked and globalized urban centers while urban locales return industrialized and processed goods to be consumed by those remaining part of rural communities, thereby debasing traditional communal knowledge and local tradition and at the same time crippling rural economic and local potential by stripping its capital and destroying the mode of local continuity through which communities are preserved. These centrifugal forces mold the rural community into something like "most modern populations that depend on distant purchases for almost everything and are thus shaped from the outside by the purposes and the influence of salesmen" instead of by the influences of community members (Berry 1990: 158). The end product of this process of "phenomenal modern productivity of the countryside is a debased countryside, which becomes daily less pleasant, and which will inevitably become less productive" (Berry 1990: 155).

Berry seems to take a normative stand by grounding the concept of the local in community. Shuman defines community as "a geographically contiguous area with political and legal power that is closest to its own citizens" and applies the concept to "municipalities of all sizes, including big cities, suburban towns, and rural villages" (2000: 32-33). Significantly, and similar to Berry's conceptualization, Shuman notes that "the only part of the production process that cannot move is land. Parcels of real estate where consumers live, farmers grow food, producers operates factories, and workers clock-in their time. And around these stationary islands emerge the networks of people, music, crafts, religion, and politics we call *community*" (2000: 8). Here Shuman again emphasizes the geographic, bounded nature of community and locality.

This project will utilize both Shuman's and Berry's conceptualizations of communities as geographically bounded, place-based networks of people with unique cultures, traditions, and knowledge. This project will also build on Berry's and

Shuman's grounding of the concept of local within the community: "Local" does not exclude outside resources or imply a form of rigid autarky, but entails a consideration of the unique needs of the community to be, when at all possible, fulfilled by its own members. As for Shuman, "Going local does *not* mean walling off the outside world. It means nurturing locally owned businesses which use local resources sustainably, employ local workers at decent wages, and serve primarily local consumers. It means becoming more self-sufficient, and less dependent on imports" (2000: 6). These concepts will be elaborated upon and discussed throughout the research design, but the significance of defining the concept of the local lies in its potential to provide the opportunity to encompass the promotion of community interests and the restoration and strengthening of those bonds which constitute community networks—bonds between people and place without which community would not exist.

For the purposes of local food production, it is impractical to suppose that a community could locally satisfy all of the food demands of every member. Having established the conceptual association between local and community, it is necessary to re-articulate that total withdrawal from the global economic network is neither possible nor (in most cases) desirable. Although a greater degree of self-reliance and local food production and consumption has many advantages (which will be discussed in subsequent sections), there are certain products that just cannot be grown or produced in particular locales, and the maintenance of external ties enables the community not only to market surplus goods, but also provides a forum for addressing and resolving those problems and issues—such as loss of biodiversity and climate change—of a national, international, or global nature.

Due to these considerations, each community will have to take into account the conceptual definition of local in order to create realistic guidelines for deciding which foods can be considered to have been locally produced, and also for establishing an acceptable threshold beyond which food can be imported.

For example, the population of New York City is significantly larger than that of Blacksburg, Virginia, and while a substantial proportion of the community of Blacksburg may be able to subsist on food grown and processed within a hundred miles of the town, New York City will need considerably more farmland to produce enough food to feed the same proportion of its residents. Additionally, the more temperate climate of Blacksburg

compared to New York may enable a greater variety of foods to be grown within 100 miles of the town so that Blacksburg residents may need to import a smaller percentage of foodstuffs to satisfy their demands. These guidelines must be decided upon before the application of the research design to assess the potential for localizing food production because the modifications the researcher will need to make to adapt the template will depend on the boundaries and thresholds communities create to define local food and permit agricultural imports.

§1.3 Potential Significance

The significance of this research design lies in the potential benefits to the communities and the planet as a result of rationally localizing food production. Local food production may mitigate many of the negative effects of dependence on the global food system, including food security risks, an attenuated sense of community, failing community networks, and environmental degradation. The advantages of localizing food production are global in nature: not only do local food systems benefit those communities that choose to institute them, but they also benefit communities and nation-states in terms of the world-wide environmental and ecological advantages associated with reducing emissions of carbon dioxide and other pollutants and a reduction in the unsustainable use of natural resources associated with participation in the global agricultural system.

One of the most significant benefits potentially associated with participation in local food production systems is an increase in food security. Food security is "concerned with the availability of food and access to this food; it may be limited at any level from the individual within a household up to the global level" (Cowell and Parkinson 2003: 223). Because local food production is primarily concerned with providing for and satisfying the nutritional and caloric demands of local consumers, there is an integral connection between food security and localizing food production.

Foods produced, processed, and consumed within the global food system typically travel thousands of miles between the farmer who grew the food and the consumer who eats the food (Halweil 2002, Jones, 2002, Norberg-Hodge 2002, Pfeiffer 2006). This system of global agricultural transportation depends on the availability of inexpensive sources of oil. As Pfeiffer points out, "the globalization of food production and the atrophying of localized food infrastructure are subsidized by cheap and abundant fossil fuels. As fossil fuels become less abundant and more expensive, this system will become

increasingly strained until it finally collapses, leaving local communities without the ability to feed themselves" (2006: 25). Systems of local food production and consumption could alleviate this dependence on fossil fuels, substantially increasing food security by ensuring the availability of food that does not have to travel halfway around the globe to reach consumers.

Local food production may also an impact on food safety. Cook suggests that there is a strong correlation between "the mass-scale farming and processing of meat and increases in food-borne illnesses and bacterial outbreaks" (2004: 54). The United States Center for Disease Control and Prevention (CDC) has concluded that "outbreaks of food-borne disease are more likely today because of the trend toward fewer, bigger food production facilities and longer distance distribution" (Peiffer 2006: 62).

For example, livestock raised on factory farms can pose serious risks to consumers, due to the large numbers of animals kept in close confinement that increases the risk of disease and as a result of food-borne pathogens becoming resistant to antibiotics—which in turn is attributed to the massive doses of antibiotics used to keep animals alive under those conditions. Pfeiffer states that "some 40 to 80 percent of the antibiotics used in factory farming are thought to be unnecessary even under factory conditions, as 80 percent of their use is as a preventative measure and for growth promotion" (2006: 59). Systems producing livestock on a smaller scale for local consumption could easily dispense with such overuse of growth hormones and antibiotics, thereby increasing the safety of the food supply and protecting consumers from the development of bacteria strains resistant to antibiotics.

Additionally, local food production systems can give community members as consumers a greater degree of control over their food choices, which contributes to a heightened sense of food safety. Following the most recent 2001 Mad Cow Disease scare in the United Kingdom, consumers surveys conducted have indicated that the British public has "a strong desire to put their money directly in the hands of the farmer, due to growing concerns about food safety and growing cynicism about the motivations of agribusiness" (Bushwood 2002).

First reported in the U.K. in 1986, Mad Cow Disease (bovine spongiform encephalopathy, or BSE) jumped the species barrier when humans consumed beef from cattle that had been fed the processed remains of infected cows. In humans, BSE

manifests itself as Creutzfeld-Jakob Disease (CJD) and is believed to have a latency period of up to ten years, meaning that it is impossible to know how many people were infected through the consumption of contaminated beef in the U.K. (Norberg-Hodge 2002). As of 2004, 139 people in the United Kingdom had died from CJD (Cook 2004: 29).

Beef is not by any means the only bi-product of factory farming that poses threats to human health Rising instances of avian flu, *E. Coli 0157:H7*, carcinogenic salmon, and *Salmonella*—to name just a few—are all linked to increases in factory farming (Cook 2004: 28-9, 55-6).

Local food systems potentially enable consumers to have direct contact with the producer, providing traceability that can put consumers' minds at rest about their origins of their food and instilling a degree of trust into the community bond between local producers and local consumers. As Haweil observes, "the ability to interact with the person who knows how the crop or animal has been treated throughout its entire life has become particularly valuable, a sort of premium in an otherwise anonymous food system" (2002: 59).

Local food production can benefit communities in a holistic sense by creating stronger community networks and a heightened sense of community identity through increased interdependence among community members as local food producers and consumers. As Cavanagh and Mander points out, "it is a principle virtue of localization that it restores face-to-face, knowing relationships of trust to economic transactions" (2004: 148). Berry speaks of this rebuilding of local networks and culture as an "accumulation": "A human community…must collect leaves and stories, and turn then to account. It must build soil, and build that memory of itself—in lore and story and song—that will be its culture. These two kinds of accumulation, of local soil and local culture, are intimately related" (1990: 154).

Critics of globalization claim that participation in the global food economy robs communities and localities of local culture, of traditions and knowledge particular to those geographic places, damaging the community's ability to provide for itself and to ensure the well being of it members and exposing community residents to the exploitations of corporations only concerned with unloading manufactured goods and extracting resources (Berry 1990:155). In the process, globalization is said to erode the

local bonds between community members, and, as Berry puts it: "Because of a general distrust and suspicion, we not only lose one another's help and companionship, but we are all now living in jeopardy of being sued" (1990: 157). Local food production can afford the community the opportunity to restore those lost local connections, to innervate local life that is *aware of itself*, that is holistically cognizant of the interdependence between community members (original emphasis) (Berry 1972: 65).

Berry argues that the motive for conceptualizing this form of community as "*aware of itself*" is "the awareness that local life is intricately dependent, for its quality but also for its continuance, upon local knowledge" (1972: 65). This local awareness and local knowledge is the product of generations of community members, not necessarily generations of the same families, but of a networked and connected group of people who have resided continuously in the same place and passed on knowledge particular to and particularly of that place to ensuing generations. To illustrate this continuity of place within generations, Berry quotes a letter written by Thomas Hardy, the 19th century English novelist: "[That] there being no continuity of environment in their lives, there is no continuity of information, the names, stories, and relics of one place being speedily forgotten under the incoming facts of the next" (1972: 65). The significance of this continuity is that

> …without a complex knowledge of one's place, and without the faithfulness to one's place on which such knowledge depends, it is inevitable that the place will be used carelessly, and eventually destroyed. Without such knowledge and faithfulness, moreover, the culture of a country will be superficial and decorative, functional only insofar as it may be a symbol of prestige the affectation of an elite or "in" group. (Berry 1972: 66).

Thus, Berry sees local community networks as inherently dependent on local knowledge, which Cavanagh characterizes as part of what he broadly conceptualizes as "the commons," among which belong "the stores of human knowledge and wisdom, the informal support systems of the community, the seeds that communities use for replanting, the public square, shared languages and culture, and among indigenous peoples, communal lands that have been worked cooperatively for thousands of years" (2004: 107).

Specifically, Cavanagh and Mander refer to traditional local knowledge passed down through generations of community residents as the *intellectual commons*: "the cumulative knowledge that agricultural communities have collected and freely shared for centuries, as well as the innovations they have achieved in developing plant varieties for food and medicine" (2004: 130, original emphasis). As Cavanagh and Mander point out, "the people whose lives depended on the commons were almost always excellent caretakers of it and remained so over many centuries. In fact, it was basic to the survival and success of the commons that the entire community shared its values as well as its sustaining virtues and helped protect and preserve it" (2004: 127). Cavanagh and Mander emphasize the interdependence of the community and its culture of traditional, innovative, place-based knowledge that is vital to sustainability of community life. Community members are inherently better stewards of the commons because they act with the community's well being in mind and are far less likely to exploit the community's resources (Cavanagh and Mander 2004).

Local food production systems could potentially strengthen and build on this interdependent characteristic of community life: local food exchanges have the potential to enhance the social bonds of trust between community members as well as preserve community culture by creating a bond between people and the land on which their survival depends. As Shuman points out, "such difficult-to-quantify factors as community stability, cultural preservation, and civic pride enter business decisions along with traditional measures of profitability" (2004: 6). Local food systems additionally allow communities the opportunity to preserve and build on upon reservoirs of local knowledge by re-familiarizing producers and consumers with traditional agricultural and even cultural practices uniquely suited to their specific geo-spatial place.

Although the benefits discussed so far potentially accrue to all communities that chose to institute local food production systems, urban communities in particular can profit from producing and consuming local foods, especially when it come to food security, health benefits, and the strengthening of community bonds. The concept of food security encompasses not only the availability of food (i.e., whether there is enough food) but also access to food. Low-income urban households in particular do not have adequate access to foodstuffs. According to Cook, "access to food markets has long been a problem for lower-income communities, and now there is increasing evidence hat the

era of supermarket concentration has come particularly at the expense of the poor" (2004: 20). The trend of supermarket redlining—"analogous to bank and insurance redlining, a pattern of business' refusal to invest and locate in poor urban neighborhoods"—has been occurring since the "white flight" to the suburbs in the 1950s and 1960s (Cook 2004: 21).

The USDA's Economic Research Service admitted in a 2001 article that "various studies suggest that low income households, particularly those in rural areas and poor central cities, have less access to reasonably priced, high-quality food than other households" (Kantor). As an example, in Los Angeles, lower-income neighborhoods have almost half the ratio of people-to-supermarkets of wealthier areas of the city, meaning that a single grocery store in a lower-income areas must serve twice as many people as its counterpart located in higher-income neighborhoods (Cook 2004: 22).

One of the consequences of this lack of access is poor nutrition. Residents of low-income neighborhoods generally shop at convenience stores, which are noticeably more expensive and do not carry the selections of fresh fruits and vegetables found in supermarkets (Lane 1995). A survey conducted by the California Food Policy Advocates found that inner-city residents in San Francisco paid between 40 and 60 percent more "for the same food items at a neighborhood corner store than they would at a discount supermarket" (CPFA 1996). Additionally, Lane observes the effects of lack of fresh fruits and vegetables, and links these effects to health issues: "In general, deficiencies in essential nutrient intakes are greater among the poor, the less educated, and African-Americans, the same groups that suffer the highest rates of obesity, heart disease, cancer, and stoke… Lower-income households do obtain more calories per food dollar spent but not more essential micronutrients (the vitamins, minerals, and electrolytes) in which their diets tend to be deficient" (1995:1098).

Local food systems have the potential to provide considerable benefits to urban consumers in terms of food access and nutritional intake, especially through the development of community gardens. While urban local food systems would have to import a higher percentage of food from outside the locality due to land use and agricultural resource constraints, community garden projects initiated and perpetuated by community members can not only provide initially greater access to fruits and vegetables and help low-income areas meet nutritional their needs, but also have the capacity to develop into substantial urban networks of producers and consumers through the

development of forums for exchanges such as farmers' markets and box-subscription schemes, which in themselves facilitate the development of community bonds. Hynes emphasizes that "community garden movement[s] in the late twentieth century [are] about rebuilding neighborhood community and restoring ecology to the inner city" (1996: xi).

The local economy of those who participate in such community garden projects—which Berry believes is of paramount importance—is "predicated on traditional finance, sweat equity, barter, and non-monetary sources of wealth such as networks, good will, generosity, altruism, plant lore, and horticultural expertise" (Hynes 1996:ix). Community gardens can also enhance the knowledge of place that Berry sees as indispensable to community life: "Community gardens create relationships between city dwellers and the soil, and instill an ethic of urban environmentalism that neither parks nor wilderness—which release and free us from the industrial city—can do" (Hynes 1996: xv-xvi).

While urban local food systems might not aid in attracting supermarkets to inner city neighborhoods, they can increase food security, alleviate nutritional deficiencies and associated health issues, and facilitate the creation or strengthening of community networks in urban settings. As Shuman points out, "some 800 million people in the world who live in cities are engaged in urban agriculture" (2000: 59). It would thus seem that the potential for urban local food production systems is enormous.

In addition to the benefits that can accrue to the community itself and its individual members as a result of localizing food production systems, there are also a number of environmental and ecological advantages associated with local food systems. As previously mentioned, the ecological and environmental benefits of local food production can be beneficial both to communities that participate in local food systems and those that remain a part of the global agricultural system.

The arguably most immediate environmental impact of instituting a local food production system is the drastic reduction in the number of miles food travels between producer and consumer, which translates into a significant reduction in the amount of carbon dioxide emitted that results from burning fossil fuels to power transportation. Local food systems also have the potential to produce and consume food employing agricultural practices that are inherently more sustainable than those used in agribusiness

and factory farming. As already noted, community members are less likely to exploit community resources, and traditional local knowledge— Cavanagh's intellectual commons—may include, for example, sustainable farming practices refined over generations of communion with the land to ensure the continued availability of soil and water resources. Freed from having to compete with multinational agribusinesses on a global market, local producers farming for local consumers can apply less energy intensive farming practices, such as organic agriculture which does not depend on the use of pesticides produced from hydrocarbons, further reducing the amount of oil required to produce food and thereby lowering carbon emissions even further.

One of the detrimental effects of industrial agricultural practices that could be mitigated by local food production systems is the increasing tendency of factory farming operations towards monoculture, which represents a growing threat to the integrity of the world's food supply. While biotechnology has produced "genetically stable" seed species designed to produce larger yields of fruits and vegetables "similar in size, color, and taste" harvest after harvest, the organisms which prey on these plants have not stopped evolving, and, as Shuman warns, "every superspecies meets its superpredator" (2000: 62). In other words, "as a farm's diversity declines, it becomes much less stable and resilient. Insect pests and blights that favor particular plants can quickly spread from one to another, making monocultures much more susceptible to devastation (Norberg-Hodge 2002: 38).

In order to counter this possibility, monoculture farmers tend to saturate their crops with pesticides, herbicides, and other chemicals, which not only create new threats when their targeted pests or blights develop resistant, but also damage surround ecosystems by killing more than their targets—and most of the chemicals introduced to combat these threats are lost in the environment before they can even affect their targets (Norberg-Hodge 2002: 39).

Local food systems, however, are inherently more diverse: "Local foods tend to differ from place to place, in direct relation to differences in climate, geography, and natural resources. Similarly, local food production involved a wide range of cultivation methods, as each locale's unique ecological and cultural conditions are allowed to determine appropriate farming practices" (Norberg-Hodge 37). This again reflects the value of the intellectual commons that Cavanagh emphasizes.

Local food systems also provide strong incentives for farmers to diversify their crops, not only because community members will require and create a market for an assortment of agricultural products, but because of the previously mentioned risks associated with monoculture. When all crops are subject to a narrow range of seasonal weather and pests—as they would be if grown locally in a relatively small geographic area—diversification is the best way to ensure an adequate yield under unpredictable ecological conditions. If one type of crop succumbs to pestilence or poor weather, another crop might survive.

§1.4 Framework and General Research Questions

In light of the foregoing concerns about relying on a system of global food production and consumption, communities may be inclined to consider the possibility of localizing their food system. The possibility and success of localized food production systems depend on three major factors: the physical capacity of the region or locality to produce enough food to feed its inhabitants, successful policy and trade adjustments by governments to create and enable the survival of local food production systems, and the willingness of consumers to participate in a localized food production system, which includes the community's willingness and ability to bear the costs of instituting and maintaining the local system. A community's willingness to participate in local food systems includes both a community's willingness and ability to bear the financial and economic costs of instituting a local food system and individual consumers' and producers' willingness to participate in the exchange of local products—more a matter of social preferences and culture.

To develop an instrument to assess the possibilities of local food production, this thesis will address each of these three factors. This effort will be guided by four sets of research questions. Each set of research questions is designed to address an aspect of these factors affecting the potential for local food production: the physical/ecological aspect, the political/institutional aspect, the economic/financial aspect, and the social/cultural aspect. In order to begin conceptualizing these considerations, this design will pose the following research questions:

- Is it physically possible for a community to localize a significant portion of its food production within the ecological constraints posed by its natural

environment? In other words, to what extent is localized food production agriculturally feasible within a given community?

• Is it politically possible for a community to significantly localize food production? What structural and institutional constraints influence a community's decision to institute a system of local food production? What political and policy decisions might have an effect on communities abilities to create a localized food system?

• To what extent is it economically possible to localize food production in a given community? How would localization affect the costs of food? Can members of the community afford to pay the costs of localizing food production? Addressing these questions will also entail an assessment of what external and/or opportunity costs might be associated with localizing food production.

• Is it culturally/socially possible for communities to localize food production? For example, would consumers be willing to substitute locally produced, seasonal foodstuffs for agricultural products which cannot be produced due to the ecological limitations of their geographical location? Are there culturally significant foods that cannot be produced locally and for which no local substitute exists?

The first set of research questions addresses the agricultural production capacity of a community. This physical capability of a region to produce enough food to feed its inhabitants is perhaps the most basic concern in attempting to institute local food production. Measuring the potential productive capacity of localities involves (1) an appraisal of the nutritional and caloric needs of community members and (2) an assessment of the agricultural productivity of the land within a given distance of the community. There are three variables representing the theoretical concept of physical production capacity: the nutritional and caloric needs of the community and the ability of community to satisfy these needs through participation in a local food system.

This research instrument defines the food requirements of a community in terms of the national domestic food policy. This policy is defined according to the recommendations of the Food and Nutrition Board of the National Academy of Science's National Research Council. Lane defines food as "nutritive material entering the body of

an organism which serves for the purposes of activity, growth or repair, or for the maintenance of vital processes" (1995: 1096). Human food intake is "generally derived from plant or animal products to which, in many cases, various chemical compounds have been added, and which, for the most part, have undergone some processing" (Lane 1995: 1096).

The Food and Nutrition Board has established various sets of nutrient reference values, collectively known as the Dietary Reference Intake (DRI), to establish nutritional guidelines for groups and individuals. The DRIs also include Estimated Energy Requirements (EER) that can be used to calculate estimates of caloric intake needs of males and females at almost any age according to level of physical activity. For the purposes of this instrument, EER, and DRI for Acceptable Macronutrient Distribution Ranges will likely prove to be the most useful caloric and nutrient value reference guides in researchers' effort to assess the caloric and nutritional needs of communities.

The second set of research questions addresses the potential structural and institutional obstacles to localizing food production by examining the political institutions and policies that can influence a community's decision and ability to create a local food system. The purpose of this set of research questions is to examine the political and legal structures that limit a community's ability to create a local food system. Because of the qualitative nature of this stage of the research, these structural influences are less easily identified and measured, and the researcher must make every effort to thoroughly identify address all potential institutional and political influences on the community. Some of institutions and organizations and trade and agricultural policies relevant to each community can necessarily only be specifically defined by the researcher after the site and population selection has taken place. Because the specific political and institutional actors influencing each community will vary by location, this research design identifies those international and national institutions and policies that will generally influence all domestic local food systems and provides a method for assessing regional, state, and local institutions and policies.

The viability of a local food systems depends on its ability to provide agricultural products that can compete in price, quality, and convenience with those produced by globalized agricultural system; a community will be far less likely to institute a local food

system if it cannot provide reasonably-priced alternatives to imported products. Norberg-Hodge et al. argue that "we need to think in terms of institutions and structural changes that will promote "small scale on a large scale," but allowing space for more community based initiatives to flourish and spread" (2002: 105). As Halweil points out, "local food often costs less than the equivalent food bought on the international market or from a supermarket, because transportation costs are lower and there are fewer middlemen," but global institutional rules such as those created by the WTO often disadvantage small farmers—and in particular farmers in developing nations—by favoring larger multinational agribusiness corporations (2002).

Global agribusinesses also have the advantage of externalizing production costs and larger economies of scale over smaller-scale farmers. The increasingly larger economies of scale associated with industrial agriculture and the global food system have made it nearly impossible for local operations to compete with global competitors. Cook points out that "nearly 20,000 [American] farmers go under each year—more than 300 farm closures a week, about 50 every day" (2004: 6). This is because small farms cannot compete with the artificially low prices of products sold in corporate supermarket chains. Norberg-Hodge et al. argue that "if large scale corporate producers and marketers sell goods at lower prices than their smaller competitors, it is largely because of hidden subsidies and ignored environmental costs, both of which are ultimately paid by the consumers these trends supposedly benefit" (2002: 71).

Local farmers, Norberg-Hodge et al. argue, are rarely the beneficiaries of government farm subsidies: "In 2000, the U.S. government ear-marked $27 billion dollars worth of tax money for farm subsidies, "most of which went to large industrial farms" (Norberg-Hodge et al. 2002: 71). Additionally, "roughly $500 billion in public funds went to food exporters, thereby lowering the price of U.S. commodities in the world marketplace" (Norberg-Hodge et al. 2002: 71). As Halweil argues, "Proponents of the current system argue that it has succeeded because it is better and more efficient, but this is only true to the extent that many of the costs are not accounted for—from food safety threats to wasteful burning of fossil fuels to a loss of economic life in farm communities" (2002: 25).

The third set of research questions addresses the financial and economic costs to a community as a result of instituting a local food system. These questions measure both the potential for a community to institute a local food system and its potential to sustain that system. This concept represents a community's willingness to participate in a local food system both in terms of a community's willingness and ability to bear the financial costs of creating a local system. Like the second set of questions, all the variables to be addressed by these questions cannot be generalized to all communities; this section of the research design will require the researcher to identify and operationalize additional variables particular to the community to which the research design is applied.

This research design will, however, identify those economic and financial costs—such as production costs included in the price of local foods and the infrastructure costs of creating a local food system—common to most communities in the United States, and will additionally identify agencies and institutions that may aid in a community's economic and financial transition to a local food production system. In addition, this concept has some overlap with both the concept of physical production capacity and concept of political and institutional influences, because a community's capacity for agricultural produce will influence the prices and availability of local food and the political and institutional structures within a community will in part dictate the success of a community's attempt to create a local food system—in other words, the fewer structure obstacles there are to creating a local food system, the more likely the community will be to initiate that process and to bear the costs of doing so.

Farmers' markets and community supported agricultural (CSA) are two of the most successful types of direct marketing exchange forums for local producers and consumers. Farmers' markets directly connect farmers with local consumers (Norberg-Hodge et al. 2002: 107). In the United States, the number farmers' markets has grown from around 300 in the mid-1970s to 1,755 in 1994—and as of 2002, there were more than 3,100 (Halweil 2002: 38). Farmers' markets increase farmers' incomes and potentially decrease the cost of food for the consumer by eliminating the middlemen associated with processing and transporting food (Halweil 2002: 39, Norberg-Hodge et al. 2002: 107).

In community supported agriculture, "consumers pay the farmer in advance and

receive a certain share of the produce in return" (Norberg-Hodge et al. 2002: 23). Norberg-Hodge et al. specifically identify three forms of community supported agriculture:

> In subscription farming, consumers buy a share of the harvest at the beginning of the season. A budget for the farm is drawn up and the value of each share is estimated. In this way, consumers share in the risks of farming, but in return are allowed some influence over what produce they receive. Community farms operate on the same principle…but the farm is owned by everyone in the community, with farmers as equal partners. [With] box schemes…consumers pay for a certain number of weekly food deliveries; the boxes of produce can be picked up at the farm or a central pick-up point, or they can e delivered directly to the consumers' homes. The content of each box is standard, rather than made-to-order, and is determined by what produce is ready for harvest in any particular week. (Norberg-Hodge 2002: 23).

Shuman points out that "some CSAs add farm products like eggs, milk, honey, spices, flowers, and firewood" in addition to fresh produce (2000: 61). CSA benefit farmers by providing a "guaranteed outlet for in-season crops and unexpectedly big yields," while consumers benefit not only from produce and other products that are "likely fresher, tastier, harvested at the peak of ripeness, and yet not fumigated refrigerated, or packaged" (Halweil 2002: 39-40). Both CSAs and farmers markets help consumers reconnect with the land and the farmers who cultivate it, as well as raise awareness and interest in local food systems (Halweil 2002, Norberg 2002).

Farmers' and local food cooperatives are another option to facilitate the creation of a local food economy. Farmers' cooperatives help small-scale farmers more efficiently market and distribute their products, and also give them more leverage to compete with global agribusinesses in local markets (Halweil 2002: 44). Despite these advantages, Norberg-Hodge et al. argue that local food cooperatives are preferable because these "small retail outlets" embody the broader goal of bringing "together local farmers, producers, and consumers seeking to revive the local food economy" instead of attempting create a niche in the global food system (2002: 108).

Halweil notes that "in many communities, the local packing house,

slaughterhouse, dairy, cannery and commercial kitchen are gone," and acknowledges that because "the food processing sectors are among the most intensely consolidated links in the [global] food chain…recapturing these sectors will not be easy" for local communities (2002: 7). An integral part of localizing food production is reestablishing these kinds of food production infrastructures: "Farmer and communities hoping to take back some of the food economy from distant multinationals will need to provide more of the processing, packaging, and marketing services that have moved off the farm and out of sight" (Halweil 2002: 37). While CSAs, farmers' markets, and other direct-to-consumer marketing forums generally provide fresh, unprocessed products, local access to food processing is generally lacking. Halweil argues that the void between large-scale agribusinesses and direct marketing provides the "greatest money-making opportunity for communities, allowing larger farms and food companies to tap into the interest in local foods and making it possible for a broader range of consumers to buy local foods" (2002: 41).

The fourth set of research questions is designed to assess consumers' willingness to participate in local food systems based on their dietary preferences and cultural values. While this concept also overlaps with the concept of economic/financial, the economic/financial concept identifies consumers' willingness to bear the costs of localizing food production as an indicator of willingness to participate in local food systems, while the social/cultural concept is operationalized as the potential influence the social and cultural characteristics of consumers can have on their willingness to participate in local food systems. This involves determining how people make food choices--i.e. identifying what factors influence what foods consumers purchase and where they purchase those foods—and fostering local food alternatives that will conform to standards that encourage consumers to choose the local options over those provided by the global agricultural system.

Lane identifies budget constraint and tastes and preferences as the two most influential factors affecting food choice. Budget constraint consists of household income and food prices, which together limit how much and what kind kinds of food households are able to purchase (Lane 1995: 1097). Tastes and preferences are defined by acceptability and suitability:

> Acceptability is influenced by cultural edicts concerning what can and cannot be consumed, and often govern when, where and how a particular food may be eaten. Ants are a delicacy in Namibia, but that is not the case in the United States…. Suitability refers both to edibility by household members (the one-year-old and the eighty-year-old frequently cannot chew rigorously) household food preparation capability, and feasibility, which includes having required tools, appliances, and storage space, as well as the food item being of a size and form that can be handled. (Lane 1995: 1097).

Lane additionally acknowledge that physical constraints--including distance to the nearest food source, availability of transportation and means to transport food, and time constraints on shopping and food preparation—also have an effect on food choices, though not as significant effect as budget constraints and tastes and preferences (1995: 1097). Consequentially, Lane argues, "changing food purchasers' choices requires that purchasers be provided with (*i*) understandable information that they do not already have about nutritional requirements, and (*ii*) reasons that they consider important enough so that they will make the change" (1005: 1099).

§1.5 Limitations

The most significant challenge faced in this study is the need to balance methodological detail—which ensures the usefulness of the template as a research tool—with the requirement of generalizability to permit the adaptation of the research design to any community within the United States. While it may not be possible to tailor this template to apply to every aspect of every domestic community, an effort has been made to design this project so as to accommodate as many variable characteristics (such as population size, geographical location, uniqueness of culture, and ecological constraints) as possible. Therefore, the general goal of this study necessarily limits the comprehensiveness and amount of detail that can be included in the template. The qualitative nature of this work is well suited to the complex and unique characteristics of each community that might be considering local food production. However, this requires that the template created here be specific enough to enable the researcher to actually conduct the assessment while at the same time remaining general enough to be tailored to a particular community. Thus, there exists a fine line between providing guidance that is too general and guidance that is too detailed, and this project will make every effort to

establish a template that is both sufficiently general and sufficiently detailed to permit the researcher to recognize when adaptation is required and to allowed him or her to adequately adapt the design to suit the needs and circumstances of the community that he or she is assessing.

The qualitative nature of some parts of this research design also limits the amount of detail within the template. Part of the advantage of a qualitative research design is that qualitative methods allow the data collection and data analysis to inform the design as research progresses. This advantage is to some extent negated by the objectives of this study; because research assessing the possibilities of localized food production will not actually be conducted, there will be no opportunity to adapt the research design in consideration of data collection and analysis. However, the instrument developed in this study can be designed so that it can be adapted to unforeseen circumstance or findings without significantly altering the goal and nature of the methodological template, allowing the data collection and analysis performed by researchers employing the template to inform the ways this research design can be adapted to better assess the specific characteristics of individual communities.

The quantitative section of this design is limited by the availability and/or cost of obtaining aggregate data on variables such as amount, cost, and type of crop production; household income; and information on climates and production potential. In order to increase the manageability and generalizability of the instrument, the scope of this design—as previously noted—is limited to communities within United States and the assessment of domestic local food production systems.

§2 Review of Related Literature

§2.1 Hazards of Globalization: An Unsustainable Economic Model

While moderate United Nations projections estimate that humanity will be consuming twice the current amount of the earth's bioproductivity by 2040, the WWF (2006) conjectures that the planet's resources will be depleted even before human consumption can reach those levels. Cavanagh and Mander (2004) argue that the neoliberal model of economic globalization is an inherently unsustainable endeavor:

> The failures of the entire neoliberal project are built right into its underlying economic model because it requires certain unachievable conditions. In order to sustain itself, a globalized economy on the neoliberal model requires (1) a never-

> ending, always-expanding supply of inexpensive resources; (2) an ever-expanding supply of accessible new markets; and (3) a stead supply of cheap labor to exploit. It also requires a multitude of compliant governments to collaborate on the project. (8)

These underlying foundations of the globalization process, they argue, can be achieved in the short-term, but inevitably run into resource availability issues as globalization saps the natural and human capital of a finite planet to fuel its own expansion (Cavanagh and Mander 2004:9). Globalization in the form of liberal trade can thus be construed to represent a significant threat to the overall health and stability of the earth in terms of its extractive economy: as international trade expands, more and more resources will be extracted from a planet already stretched beyond its capacity for renewal, and more and more non-recyclable waste will be introduced into the environment (Hawken 1993). Opponents of globalization argue that its expansion is driving "the overconsumption of natural resources and the filling of waste sinks," and economic growth—contrary to the assertions of proponents of globalization—is "not enough to ensure well being in a society (Clapp and Dauvergne 32). These opponents view globalization as contributing to increased poverty, widening income disparities between the rich and poor, and unemployment around the world. These circumstances have forced even the IMF to admit that "globalization is clearly not progressing evenly"—although the IMF still maintains that this unequal progress is due to poor and developing nations' inability or unwillingness to fully integrate into the world economy (IMF 2000). With the exception of India and China, levels of absolute poverty have increased throughout the 1990s: "Of the world's 6 billion people, 2.8 billion—almost half—live on less than $2 a day, and more than 1.2 billion—a fifth—live on less than $1 a day" (World Bank 2000, UNDP 2003).

Globalization is also problematic for it opponents in terms of relative poverty: they argue that although trade liberalization may induce the same percentage rate of growth in both rich and poor countries, this can still "leave the poor feeling even more disempowered and deprived in relation to the rich" (Woodin and Lucas 2004:51). Additionally, the "poorest 10 per cent [of households around the globe] have only 1.6 per cent of the spending power of the richest 10 per cent" (Wooden and Lucas 2004:46). The increased mobility of capital enabled by globalization and the consequent scramble by

developing nations to compete for foreign direct investment (FDI) have moreover contributed to rising wage inequalities and rising unemployment rates. In 1999, there were "150 million people unemployed worldwide and up to 1 billion under-employed—up to a third of the world's work force…[and] by 2003 the global unemployment total has reach 180 million" (ILO 2003).

Although advocates of globalization are of the opinion that the "rising tide lifts all boats," as the UN Conference on Trade and Development has concluded, the dramatic increase in inequality and the concurrent liberalization of international trade is not a coincidence but the result of economic globalization (UNCTAD 1997). Proponents of the neoliberal model cite rising GDP or GNP and income levels as evidence that globalization really does benefit the poor (Woodin and Lucas 2004:49-50). The problem anti-globalization advocates have with these conclusions is that neither GDP nor higher incomes are accurate indicators of social well being. GDP and GNP measure economic growth, but growth does not necessarily translate into well-being; in fact, economic growth is a contributor to significant environmental degradation no matter the level of income (Clapp and Dauvergne 2005:100).

Additionally, GDP and GNP only measure goods and services exchanged through markets; "for a large numbers of the world's poorest peoples, particularly women, only a relatively small portion of the household economy will take place within the formal economy" (Woodin and Lucas 2004:50). Women are distinctly disadvantaged by this measurement: "There is growing evidence that women tend to suffer more from the impact of low income, precarious labor conditions and long hours, and that their unpaid work in both the informal economy and in social reproduction is unrecognized and undervalued" (Woodin and Lucas 2004:48). Income level is also a misleading indicator of social well-being, as Woodin and Lucas illustrate:

> ...Migrant shanty town dwellers, cast off the land by 'development' of their county's agriculture, now must buy all their food and fuel rather than producing it for themselves; they must also pay rent and fares for the first time. Although they might receive higher incomes from their sweatshop jobs then they did as subsistence farmers in their villages, they might easily be much worse off. (2004:50).

These considerations are exacerbated by the cuts in public spending on education, healthcare, housing, welfare, and public transportation necessitated by governments' efforts to meet the requirements of the Bretton Woods institutions and the effort to attract private foreign investments, which, as has been shown, does not alleviate poverty but rather increases it (Woodin and Lucas 2004:56).

The dangers and negative impacts of globalization are exemplified by the rise of industrial agriculture. Growing corporate control over and monopolization of the world food system has devastated local agriculture and posed serious threats to world food and environmental security: "While global trade and TNC's [transnational corporations] have been nurtured and supported, local economies and the food systems embedded in them have been seen as little more than anachronistic impediments to economic progress, and have been systematically dismantled" (Norberg-Hodge et al 2002:13). Not only are farmers displaced by factory farming, but jobs are lost as industrial agriculture eliminates the need for agricultural labor through the use of machine-intensive production methods (Norberg-Hodge et. al 2004:13, Cavanagh and Mander 41). The corporate trend towards monoculture threatens the biodiversity of local agriculture, jeopardizing world food supplies with the potential for large-scale blights and crop failure (Shuman 2000:62, Norberg-Hodge et al. 2002:38).

The environmental and ecological effects of the globalized food system are equally as devastating. In addition to the significant amount of carbon dioxide emissions produced by the cultivation, processing, storing, and transporting agricultural products intended for sale on the global market (Jones 2001, Norberg-Hodge 2002), factory farms introduce into the environment millions of tons of pollutants each year in the form of pesticides, herbicides, chemicals, and waste—mostly in the form of manure from livestock production operations) (Cook 2004:157). These pollutants damage not only surrounding ecosystems but also enter into the human food supply, causing concern regarding the effects of these practices on the health of populations who consume these products (Cook 2004:5).

The current success of globalization largely depends on low transport costs for moving inputs, capital, and products within international networks, which in turn depends on the continued availability of cheap sources of energy—namely, oil (Jones 2001). Currently, the main uses of oil worldwide are for the production of food, transportation,

and heating (Jones 2001: 35). The three forms of transportation most commonly used in international trade are ocean shipping, airfreight, and trucking (Cavanagh and Mander 2004: 179). Cavanagh and Mander note that 90% of international trade in goods is shipped by ocean freight, consuming more than 140 million tons of fuel each year (2004: 180). The type of fuel used in this form of transportation is "a mixture of diesel and low-quality oil known as "Bunker C," which is particularly polluting because of high levels of carbon and sulfur," and "if not consumed by ships…would otherwise be considered a waste product" (2004: 43). Land freight or trucking is the next most common form of commodity transport and has grown exponentially over the past few decades with rising levels of international trade. Transborder truck traffic in Europe tripled between 1970 and 1997, from four hundred billion ton-kilometers to twelve billion, and in 994 trucks in the United States traveled 182 billion miles (Cavanagh and Mander 2004: 181). Although not as frequently utilized as ocean or land freight, air transport is the fastest growing sector of the international transport industry. World airfreight had reached 100 billion tons-kilometers as of 1998, a significant increase over recent decades (Simms and Robbins 2000). Boeing "forecasts a tripling of air cargo activity by 2017" (Cavanagh and Mander 2004:180). Since airfreight is also the least efficient form of transportation—"each ton of freight moved by plane uses forty-nine time as much energy per kilometer as when it's moved by ship"—the continued growth of air transportation is a cause for concern in terms of the future availability of oil (Cavanagh and Mander 2004: 43).

The system of economic globalization depends on transportation, which in turn, as mentioned above, depends on the availability of cheap and abundant sources of oil. Jones (2001) points out that "trade-related transportation has been estimated to account for one-eighth of world oil consumption, which means that international air, sea, and road freight transport are a significant source of greenhouse gases," (37) and forty percent of road freight in the U.K. is accounted for by trucks moving food products (Halweil 2002). Because fossil fuels are non-renewable resources, the current tend towards globalization is an unsustainable endeavor. Although the issue is hotly contested, the peak in oil production could occur—if it has not already—as soon as 2035. Roberts (2005) summarizes the current range of opinions on the timeframe for peaking oil production:

> Optimists like the U.S. government believe that a peak in oil production cannot occur before 2035…Pessimists, by contrast, a groups whose members include geologists, industry analysis, and a surprising number of government officials, believe that a peak may come much sooner…Indeed, a small but vocal minority believes that the peak has already happened. (13)

Roberts also points out that the "amount of *new* oil that is discovered each year is declining; the peak year was 1960, and it has been downhill ever since" (2005: 13). This indicates that, at some point, production must eventually begin to decline as well, which creates "less than ideal circumstance for a global economy that depends on cheap oil for about 40% of its energy needs (not to mention 90% of its transportation fuel) and is nowhere even close to having alternative energy sources" (Roberts 2005:13).

More importantly, Roberts argues, "the important oil—that is, the oil outside the control of the eleven-country OPEC oil cartel—will in all likelihood peak somewhere between 2015 and 2020" (2005: 13-14). Roberts characterizes non-OPEC oil as "important" because once production levels begin to decline, "the free world will have to rely more each year on oil controlled by the likes of Saudi Arabia, Venezuela, and Iran—governments that cannot be counted on to bear the best interests of the West in mind when setting pricing policy" (2005: 14). The dependency globalization and in turn of the world food system on the availability of cheap oil makes it subject to the instability of the international oil market, and the impending peak in oil production will have potentially disastrous implications as food prices skyrocket all over the world in reaction to dwindling supplies of fuel for transportation (Jones 2001, Tertzakian 2006, Roberts 2005).

§2.2 Defining Food Security

Cowell and Parkinson characterize the concept of food security as "concerned with availability of food and access to this food; it may be limited at any level from the individual within a household up to the global level" (2003: 223). Molnar emphasizes the important influences of culture and social organization on food security in contending that is a "utopian concept" that "reflects an ideal or value-laden state of well-being in a society and its human population" (1999: 490). Phillips and Taylor contend that a state of food *in*security (emphasis added) exists "when members of a household have an inadequate diet for part or all of the year or face the possibility of an inadequate diet in

the future" (1990: 1305). This juxtaposition is perhaps a more useful characterization of Cowell and Parkinson's concept of "availability of food and access to this food." While Molnar's explanation of food security as idealist casts doubt on the measurability of the concept and therefore its utility as an indicator, food security is still an important consideration in conceptualizing local food production, especially in terms of assessing a community's potential for localizing its food system.

As these interpretations illustrate, the definition of food security encompasses a range of significant factors. While food security in terms of localized food production is primarily concerned with the availability of food and the access consumers have to it, consumers' individual perceptions of their own nutritional needs and dietary preferences determine their food choices and their willingness to participate in localized food production systems. Thus culture represents the crucial link between food security and local food production.

Molnar argues that food security in a society depends heavily on cultural characteristics: because it is a normative concept, and social norms and values are heavily influenced—if not wholly determined—by culture, culture itself is an important component of food security. According to Molnar, "culture is connected to food security through the individual's access to formal education and other forms of human capital" (1999: 490). Cultural capital, then,

> …is reflected in a broader matrix of values, attitudes, and personalities that enhance the value of education…including the ability to organize and sustain cooperative endeavors, to attend to detail, to innovate, and to sustain attention to task. Cultural capital may amplify the benefits of formal education and other forms of human capital for food security. (Molnar 1999: 490)

Culture, for example, creates patterns of behavior that sustain inequalities between men and women in terms of food access. While women "play a fundamental role in the provision of food security in the family and community," a disproportionate number of women suffer from food insecurity as a result of cultural values and attitudes that effect the distribution of wealth and food in a household. In other words, norms regarding "who eats first, who eats most, and who gets what is left within a household" are all cultural factors that shape access to food and hence food security. Additionally, many cultural patterns are tied to religious beliefs that reinforce low investment in schooling for

women, early age of marriage, and male dominance of relationships (Molnar 1999: 490-1).

Molnar also emphasizes the importance of social organization in assessing food security. Although culture is an important factor in framing conceptualizations of food security, Molnar argues that culture plays a secondary role to considerations of "social political organization and resource endowment" (1999: 489). By social organization, Molnar means "the connectedness and functioning of institutional resources in a nation state" (1999: 492). Lack of income and chronic poverty are generally cited as sources of food insecurity, and Molnar points to "organizational and policy changes that lead to cultural shifts" as necessary for the reduction of poverty and the increase of long-term food security (1999: 493).

Similar to Cowell and Parkinson's characterization of food security, Molnar connects food and nutritional security to "the ability of people to acquire the necessary material or economic resources" (1999: 493). In this sense, state policies that perpetuate power inequalities and unequal access to cultural capital and human and material resources also create instances of food insecurity. Conversely, "policies that broaden access to opportunity and long-term resilience of livelihoods are central to food security and the reduction of hunger" (Devereux, Maxwell, cited in Molnar 1999).

Molnar points out multiple facets of the potential impact the condition of social organization—and in turn, culture—within a nation-state on food security: corruption, regulation and markets, technical capacity, and infrastructure. Corruption represents a defective state of social organization, the symptom of "anomie, weak social bonds, and a poorly functioning state" in the form of "bribery, extortion, insider dealing, and cronyism" (Molnar 1999: 493). These corrupt practices inhibit what might be otherwise sound national policy concerning the alleviation of hunger and the promotion of food security.

Thus, within his conceptualization of food security, Molnar seems to find in culture and social organization in a reciprocal relationship: culture tends to influence forms of social organization, especially at the household levels, while social organization also influences culture in terms of access to opportunity. Each of these concepts, then, is an important aspect in characterizing food security.

Food security is dependent on the sustainability of systems of food production and consumption. Global trade and its dependence on cheap oil consequently represent major considerations in the assessment localized food production. While oil remains abundant and affordable, local food producers will have to compete with international food producers whose economies of scale are rewarded with artificially low production costs due to the externalization of environmental costs (Jones 2001: 8-9). As oil reserves are depleted and prices rise as demand for oil significantly outpaces its supply (Roberts 2005), localized food production will become the most sustainable and viable alternative to globalized food systems.

The costs of transporting food long distances will also increase significantly, and transportation costs will then be passed on to consumers, who may or may not be willing or able to pay more for their food. Rising production and transportation costs can be viewed as the consequence of formerly externalized environmental costs; the mechanism by which producers externalized environmentally irresponsible practices to achieve economies of scale—cheap oil—will no longer be available to translate into inexpensive production and transportation (Roberts 2005: 2). Thus, food security becomes important not only in recognizing that crude oil reserves could be exhausted as soon as 2040 (Jones 2001), but also in terms of the reduction of the massive strain on the environment created by the current trend toward the globalization of food production and consumption.

§2.3 Creating Sustainable Systems

Globalization, as demonstrated by the example of industrial agriculture, is an unsustainable endeavor that depletes natural resources, overextends the capacity of the planet to absorb waste, and exploits the human labor that makes the process possible. Agricultural globalization may have arguably proven beneficial to international food production systems by encouraging competition and thereby driving down prices and increasing consumer choices.

However, critics of globalization have also cited its negative impacts on food production. Agricultural globalization, in addition to raising concerns regarding human exploitation and food security issues, has contributed to a multitude of negative environmental impacts, including rising levels of pollutants from transportation-related activities (Cowell & Parkinson 2003). As Hawken puts it,

> Because we have globalized our capacity to draw from an expanded environment, our world appears to be more secure and stable. While, for example, food surpluses from one region can be shipped to drought-stricken areas, preventing starvation and disease, such succor can be maintained only if the overall impact of humans is less than the overall carrying capacity [of the planet]. This, in fact, is the opposite of what is occurring. (1993: 26)

Globalized capitalism has, in fact, become the method by which the human race is exploiting the planet's resources faster than they can be regenerated (Blanchard 2006, WWF 2006).

Lester Brown (1981) defines a sustainable society as "one that is able to satisfy its needs without diminishing the chances of future generations" (Cavanagh and Mander 2004: 190). The United Nations' World Commission on Environment and Development—commonly known as the Brundtland Commission after its chair Gro Harlem Brundtland—built on this definition and conceptualized sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNWCED 1987). Practically, however, these definitions prove to be rather abstract. For example, how can the needs of future generations be measured? How far into the future do we need to project our measurements? And, perhaps most critically, by what standards can we set a threshold beyond which future needs cannot be met? It seems easier to address these questions in terms of finite resources such as oil and other fossil fuels, but the tendency to take for granted the presence of common renewable resources--such as water, soil, and air—makes estimating the answers to these questions a more problematic and less certain endeavor.

Paul Hawken has a more concrete conceptualization of implications of sustainability: "The word "sustainability" can be defined in terms of carrying capacity of the ecosystem, and described with input-output models of energy and resource consumption" (1993: 139). Similarly, Jackson conceives of sustainability as "a spatial-temporal concept" based on the model of the American prairie, which "maintains its own fertility, runs on sunlight, and actually accumulates its own ecological capital—accumulates soil" (1994: 51, 43). This spatial-temporal model of sustainability is especially informed by:

> …The law or rules ecologists have elucidated on how ecosystems have worked over the eons. On the one hand, ecologists are accountants who measure what passes across, or through, the boundary of an ecosystem. On the other hand, they also study the dynamics within the boundary, for how material cycle and how energy flows determine whether, and when, there is a net loss or gain. (Jackson 1994: 50-51)

Pfeiffer also conceptualizes sustainability as a cyclical system. In natural ecosystems, nutrients are cycled from the physical environment through plants and animals before returning to the physical environment as plant and animal waste and dead organisms when broken down by microbes and fungi (Pfeiffer 2006: 69). While Pfeiffer acknowledges that some nutrients are lost during the process, in natural ecosystems "the amount of these losses is small and is usually replaced by the process of breaking down bedrocks and soil formation" (Pfeiffer 2006: 69). In the language of Brown and Brundtland, then, sustainable systems mimic natural ecosystems and sustainability becomes "an economic state where the demands placed on the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations" (Hawken 1993: 139).

One of the biggest challenges to creating sustainable societies is the rising global population. More people require more food, and despite the innovations of the Green Revolution, the 70% increase in population since its inception has been met with only a 17% increase in calories available per person (Pfeiffer 2006: 10). We have, in effect, reached the point of diminishing returns in terms of agricultural production: since 1994, "energy input in agriculture has continued to increase without a corresponding increase in crop yield" (Pfeiffer 2006: 9). This creates an unsustainable situation in terms of agricultural production and consumption (current levels of unequal food distribution notwithstanding). Pfeiffer (2006) offers the example of the United States:

> Assuming a growth rate of 1.1 percent per year, US population is projected to double by 2050. As the population expands, an estimated one acre of land will be lost for every additional person. Currently, 1.8 acres of farmland are available to grow food for each US citizen. By 2050, this will decrease to 0.6 acres. However, 1.2 acres per person is required to maintain current nutritional standards. (Pimentel and Giampietro 1994)

The United States and Canada are currently the only two net exporters of grain, and by 2025 the U.S. is expected to discontinue its net food exportation in order to meet rising domestic demands (Pfeiffer 2006: 40). Without U.S. food exports, Pfeiffer argues, millions of people around the world could starve to death (2006: 40). The current input-intensive system of global agriculture will be unable to marshal the resources, particularly oil and other fossil fuels, in order produce and transport enough food to feed the planet.

Pfeiffer argues that conventional agriculture is unsustainable because of its linear rather than cyclical nature: "Conventional agriculture is a gigantic through system that depletes our resources, exhausts our farmlands, and results in overwhelming mountains of garbage" (Pfeiffer 2006: 69). Because of the diminishing returns of agricultural inputs in industrial farming, sustainable agriculture, "for all intents and purposes, means a return to small-scale farming" (Pfeiffer 2006: 69). Jackson also advocates agriculture on a small scale, urging us to "imagine our continent with thousands of plants and animal breeders practicing their art (and their science) to meet the *regional* necessities of farmers across a less homogenized landscape" (1994: 49).

Kindell and Pimentel (1994) have shown that organic agricultural practices can increase yields over conventional agriculture an average of 93 percent per food hectare, yet, "this increase diminishes as the size of the farm increases. At some unknown critical scale, industrial farming becomes more efficient" (Pfeiffer 2006: 68). However, since organic farming requires only half as much energy input as conventionally grown crops, comparing the energy input per unit of output rather than per unit of area reveals that the potentially lower yields of organic large-scale farming reduce the energy ratio of input to output compared to industrial agriculture (Pfeiffer 2006: 68-9). This comparison reveals that organic agricultural practices use energy more efficiently than factory farm operations, and thus are more sustainable.

The implementation of sustainable agricultural techniques must necessarily vary from place to place depending on local ecology. Pfeiffer advocates the modern technique of organic farming as "the most practical method of reducing fossil fuel input at the level of production," (2006: 68), but local knowledge, especially that preserved as part of indigenous peoples' cultural traditions, already provides guidelines for applying sustainable and therefore environmentally sound practices to best suit the particular

ecological characteristics of an area. These practices also drastically reduce the need for fossil fuel-based inputs (Pfeiffer 2006: 68). Again, Jackson prompts us to "imagine…men and women breeding crops and livestock for their neighbors, "developing elegant solutions predicated on the uniqueness of place"" (1994: 49). Cavanagh and Mander cite one United Nations Environmental Program report that praises indigenous farming practices whose "procedures are "based on ecological knowledge and understanding" and are "highly efficient and productive and inherently sustainable. They have successfully adapted to difficult environments with innovative techniques for irrigation, drainage, soil fertility, frost control, and disease management"" (2004: 210). Building on local practices, Pfeiffer also proposes a number of sustainable farming techniques applicable to all ecologies, including crop rotation, cover crops, no-till or low-till farming, soil management, water management, crop diversity, nutrient management, integrated pest management, and rotational grazing (2006: 68).

One of the obstacles that impedes the potential implementation of alternative energy technologies is that these new technologies must compete with the entrenched establishment of the hydrocarbon (fossil fuel-based) energy economy. Alternative energy advocates argue that "the industries that profit from hydrocarbons (and the politicians who profit from those industries) have zero interest in seeing the emergence of competing technologies or the new, more decentralized energy system these new technologies may make possible" (Roberts 2005: 191). Additionally, the "existing fossil fuel infrastructure is worth around ten trillion dollars, and it components—from power plants and supertankers to oil furnaces and SUVs—must be operated for ten to fifty years before their capital costs can be paid off" (Roberts 2005: 131). This only strengthens the resistance of those invested in the hydrocarbon economy to the implementation of alternative energies; to "prematurely retire" the hydrocarbon infrastructure would cost the owners of these assets hundreds of billions of dollars in lost value (Roberts 2005: 131-132). As Tertzakian argues, "introducing an alternative [to hydrocarbon energy] is about replacing an entrenched set of compelling standards up and down a complex supply chain" (2006:165).

Tertzakian also argues that the historical record sets a slow precedent for the adoption of new energy economies, and the hope for a rapid switch from hydrocarbon energy to a sustainable alternative is slim:

> Consider how many new large-scale energy sources (platforms) have been introduced over the past 100 years. The answer is one: nuclear power, which was introduced almost 50 years ago in 1957. How many have there been in the entire history of energy consumption? Eight, if you add whale oil and animal fat (candles) to wood, coal, oil, natural gas, water, and uranium…Finding the next major energy supply chain that is based on a completely new fuel source is much more difficult today than in times past. (2006:170)

Although Tertzakian admits that renewable sources—such as solar, wind, geothermal, and wave power—can be added to his list, the "lack of scalability" for these energies inhibits their potential to make "fast, large-scale contributions to an industrialized nation's energy mix" (2006: 170).

Another problem with alternative technologies is, as Roberts plainly states, that they "really aren't ready for prime time. Despite decades of research and development—and despite recent growth rates that rival that of computers and cell phones—nearly every major energy technology still suffers from serious engineering or economic drawbacks" (2005: 191). One of the biggest drawbacks of both solar and wind power is that both these sources of energy suffer from intermittency: "they are not available twenty-four hours a day nor do they always deliver their maximum power" (Roberts 2005: 202). Because a 1-megawatt wind turbine only produces that much energy in a high wind, its average production will be lower in direct relationship with lower average wind speeds (Roberts 2005:202). This variability means that average wind farm production is generally only about 33% of its full capacity, or, comparatively, only "about a third [of] the capacity of a gas-fired power plant" (Roberts 2005:202). The same circumstances apply to solar energy, whose actual capacity is about 20 percent. This means that the installation of 500 megawatts of PV cells will only produce about 100 megawatts of dependable energy (Roberts 2005:202).

§2.4 Localization through Subsidiarity

In opposition to the forces of globalization and its organizers and beneficiaries stands a growing movement advocating economic localization and a "new democratic" revolution to reinvigorate civil society to restore decision-making power to national and local governments (Cavanagh and Mander 25, 79). Although its members are diverse and disparate, they are all "unified by a deep commitment to universal values of

democracy, justice, and respect for life[;] this alliance functions with growing effectiveness without a central organization, leadership or defining ideology" (Cavanagh and Mander 2004:29). Central to the spirit of this movement is the concept of "*economic* democracy, which involves the equitable participation of all people in the ownership of the productive assets on which their livelihood depends" (Cavanagh and Mander 2004:25). These critics of the global order advocate localization rather than globalization and envision an economic order with enables rather than disables local communities to determine their own destinies.

Cavanagh and Mander argue that "healthy, sustainable societies vest power in institutions that measure their performance by the contribution to the long-term well-being of people, community, and nature and distribute power equitably among all of society's stakeholders" (2004: 79). Vital to this definition of sustainability is the concept of new democracy, which Cavanagh and Mander specify as referring to "the dynamic processes initiated by civil society organization around the world to instill new energy and meaning into democratic movements" (Cavanagh and Mander 2004: 79). Engaging in new democracy entails "creating governance systems that give a vote to those who will bear the costs when decisions are being made [and] limiting the rights and powers of absentee owners and ensuring that those who hold decision-making power are liable for the harms they bring to others" (Cavanagh and Mander 2004: 80).

A key element to new democracy is the favoring of the local over the global, or the reestablishment of decision-making authority at the local level. Cavanagh and Mander conceptualize this return to local authority as subsidiarity. The principle of subsidiarity advocates "that all decisions should be made at the lowest levels of governing authority competent to deal with them" (Cavanagh and Mander 2004: 149).

In the process of restoring power to local institutions, subsidiarity increases the community's participation in the democratic policy process and offers the opportunity to capitalize on the ingenuity of individuals who might otherwise not be involved in local decision-making (Shuman 2000: 129). Although some problems, such as global warming, are international in nature and should therefore be dealt with through international cooperation, "most economic, cultural, and political decisions are not international and can be made at the national, regional, and local levels" (Cavanagh and Mander 2004:

149). In other words, "power should be encouraged to evolve downward, not upward" (Cavanagh and Mander 2004: 149).

Supporters of local movements and proponents of subsidiarity reason that restoring power to local authorities can help mitigate some of the negative economic effects of globalization's tendency toward capital mobility. Shuman maintains that capital mobility poses four basic threats to communities in the United States: first, "it guarantees that U.S. communities will continue to experience declines in both the quantity and the quality of jobs;" second, the "sudden departures [of TNCs] impose huge costs on *all* levels of government;" third, mobile corporations gradually erode local culture; and fourth, mobile corporations "undermine the capacities of communities to plan for the future" (Shuman 2000: 12-14). Despite these negative effects of mobile capital, Shuman argues that local public authorities "have convinced themselves that modest investments in new firms will generate huge benefits in the form of greater consumer expenditures, new ancillary business, and increased tax revenues" (2006: 9).

This economic derivative of globalization has resulted in a race-to-the-bottom contest between local governments as they compete to lower wages, decrease benefits, ease environmental regulations, and increase tax breaks for corporations in order to lure them into their communities (Shuman 2006: 9). These types of incentive packages, rather than benefiting the community as a whole, disproportionately benefit the corporations who demand them. Cavanagh and Mander argue that this form of competition between localities for mobile capital is, in effect, accelerating the shift of "economic and political power away from national, state, and local governments and communities toward unprecedented centralization of power for global corporations, bankers, and the global bureaucracies they helped create, at the expense of national sovereignty, community control, democracy, diversity, and the natural world" (2004: 34). Subsidiarity and localization represent an alternative to the increasing impact of global corporations on local decision-making processes.

Shuman explains that subsidiarity "implies a pragmatic relationship between different levels of government" (2000: 125). For Shuman, subsidiarity implies that "power should always be exercised at the level closest to the people affected by a decision" (2000: 125). This implies only a preference—not a mandate—for community-level decision-making. This form of subsidiarity allows decisions to be tailored to the

specific needs and circumstances of the community, and, Shuman argues, "if mistakes are made, they can usually be corrected easily"—especially since local policy failures tend to be "smaller, less disastrous, and easier to fix" than those made at the national level (2000: 125, 128). This local power also eliminates unnecessary levels of bureaucracy that can distort information and complicate decision-making processes, which tend to subvert the principle of subsidiarity and remove power from those most affected by the decisions (Shuman 2000:126).

For Shuman as well as Cavanagh and Mander, the principle of subsidiarity involves not only restoring local decision-making authority but also ensuring the communities remain in control of their own destinies: subsidiarity entails a "reinvigoration of the conditions by which local communities regain the power to determine and control their preferred economic and political paths" (Cavanagh and Mander 2004: 149). This aspect of subsidiarity implies the opposite of economic globalization: economic localization and a degree of community self-sufficiency, rather than dependence on the global economic system. To this effect, Cavanagh and Mander promote economic systems "emphasize local production and consumption rather than be deliberately designed to serve long-distance trade" (2004:149). Policies that promote localization restore authority to local governments, and work to enable local authority in achieving "maximum self-reliance nationally and regionally in a way that ensures more sustainable forms of development" (Cavanagh and Mander 2004:152). Shuman argues that "communities should increase their self-reliance on local resources, workers, and capital, fully-appreciating that they cannot unplug from the global economy altogether" (2000: 27).

Since neoliberal globalization is geared toward export-oriented trade and investment models (Cavanagh and Mander 2004: 38), one of the primary methods for communities to increase subsidiarity and localization is through import substitution and local investment. Shuman points out that import-substituting growth has the potential to "facilitate the diversification of the local economy and the accumulation of its own capital, skills, and experience," thus decreasing a community's dependence on the global economy for some—but not all—of its needs (2000: 54). Shuman also cautions against economies of scale that require corporate dependence on exports:

> Whenever the economy of the scale of production is large and plant needs a very high output to operate competitively, it must export to consumers outside the community. Any good or service for which this is true, by definition, can facilitate import substitution only in a limited number of communities. (2000: 57)

This emphasizes that communities cannot fulfill all their needs locally, but some industries, such as car manufacturers, can respond to the requirements of larger economies of scale while still operating within regional boundaries to avoid the diseconomies of scale and the negative impacts of mobile capital associated with global production and consumption. Policies that provide benefits to local investors, such as tax cuts for local companies and local labor and trade policies that favor local import-substitution can help motivate long-term commitments by corporations and businesses to community investment (Cavanagh and Mander 2004, Shuman 2000). Encouraging consumers to purchase local rather than imported goods can help to "expand jobs, enlarge the tax base, and strengthen the economy" (Shuman 2000: 132). Shuman points out that "every dollar spent on local goods and services provides income to local owners, local workers, and local suppliers," (2000: 132).

When local profits are reinvested in the local economy, the local economic multiplier expands and the community benefits from local economic growth (Shuman 2000: 132). However, encouraging local direct investment does not preclude foreign direct investment. Cavanagh and Mander stipulate that any foreign investment needs to "redirect all benefits to the local community, including jobs, local livelihoods, services, local urban community development, small-scale energy, manufacturing for domestic and local markets rather than export, and the like" (2004: 158). Communities need to enact policies that mitigate the negative effects of capital mobility discussed previously.

Shuman counsels that local governments rethink the benefits packages offered to global corporations as investment enticements in favor of policies that curb corporations' influence over local decisions and encourage long-term commitments to community well-being, such as requiring global firms to commit to operating within a community for a specified amount of time—for example, for the duration of the promised tax abatements—or providing community support and compensation or alternative options when considering closing down factories, (Shuman 2000: 130-131). These policies increase local control over corporate activity and at the same time encourage

communities to develop local alternatives to global imports, thereby aiding in the development of local self-sufficiency and economic growth.

§3 Design and Methodology

§3.1 Overall Approach and Rationale

This research design is based on the general assumption that, a) if the community is physically capable of producing the amount of food necessary to meet a reasonable percentage of its own needs, b) if the political and institutional climate is such that the local government can create and sustain a local food system, c) if the members of the community are willing to participate in and support a local food system, and d) if the community members individually and together are willing to bear the costs of instituting a local food system, then instituting a local food system is possible.

Each of the four concepts mentioned above represents a factor of local food production. Each of these four factors is, in turn, defined and operationalized according to the variables discussed in the following sections. While there is some covariation between the four variables in terms of causal analysis, hypothesizing and testing a causal relationship between these four factors and the concept of local food production is not the goal of this research design. To that effect, the grounding of this instrument in causal theory is for descriptive purposes only.

As outlined, at the theoretical level the concept of local food production is influenced by three factors: the physical production capacity of the community, the institutional and trade policies governing the community's economic policy and hence its ability to institute a local food system, and the degree to which a community is willing to participate in and support a local food system. The concept of community participation and support is further divided into two sub-concepts: a community's willingness to bear the costs of localizing food production, and the community's willingness to sustain a local food system through consumer and producer support. Each of these four concepts corresponds to a set of research questions as described in §1.4.

One of the advantages of qualitative research is that the researcher can use data gathering and data analysis results to inform the design as research progresses. Because dietary habits and food production methods vary by place, some of the variables and corresponding indicators discussed in the following sections can only be identified after the site selection has taken place. This research instrument is not meant to provide a

step-by-step process for assessing local food production capabilities; for example, the researcher will need to use data gathered on the social and cultural variables to inform his or her assessments of the physical production capacity variables and vice versa. Therefore, it is essential that the researcher revisit previously collected data as data analysis progresses, and, if warranted, the researcher must be prepared to engage in additional collection and analysis beyond the initial phases presented here.

§3.1.1 The Concept of Physical Production Capacity

The concept of a community's physical production capacity has been operationalized in terms the interaction between three variables: the caloric needs of the community, the nutritional needs of the community, and the agricultural production capacity of the community. For the scope of these calculations, the researcher can assume that imported foodstuffs will be replaced with local alternatives. The willingness of the consumer to make these substitutions is explored in subsequent data gathering and analysis sections.

In order to operationalize the nutritional and caloric needs of the community members as variables, the researcher must first determine the size and certain characteristics--such as gender and age--of the population within the local boundary (See Appendix A). The DRIs vary across age, gender, and activity level, so these characteristics must be reflected in the researcher's calculations if at all possible (this will depend on the data available to the researcher). The wide variety of ages and levels of physical activity among community members limits the researcher to an approximate rather than a precise measurement of its caloric and nutritional needs, so this instrument recommends that the researcher first calculate average EER and macronutrient needs according to predetermined age groups, and then base his estimate of the complete caloric and nutritional needs of the entire community on those averages (see Appendices B and C). The researcher may use the age groups already used in the DRIs or may collapse these age groups together, depending on the level of detail reflected in his or her population data. Although any number of average nutritional intake recommendations are available as DRIs, this instrument recommends that he or she choose several nutrients--for example, macronutrients, which includes protein, fats, and carbohydrates--and then calculate the total nutritional requirements for the community for only those selected nutrients. Thus, the caloric needs of the community can be calculated according

to the following four indicators: population size, population composition, and caloric needs. The nutritional variable likewise depends on the same two population indicators as caloric needs, but with the nutritional needs indicator substituted for its caloric indicator counterpart.

The second part of measuring the productive capacity within a community involves determining whether the ecological conditions of the local geography are such that enough food can be produced to meet the caloric and nutritional needs of the community members. In order to accomplish this, the researcher must calculate how much food the community can produce, and then compare the nutritional and caloric content of this food to the nutritional and caloric needs of the community. This will require some initial exploratory inquiry into the dietary habits of community members and the kinds of foods that can be produced locally so that the researcher will have some idea of what kinds of foods to include in his or her analysis.

The researcher must then compare these results with his measurements of the community's agricultural production capacity to make an initial determination about whether local food production is physically possible in a locale given the dietary needs of community members and the production capacity of the community's geographical area. The agricultural production capacity variable is measured in terms of four indicators the amount of land available for agriculture, the amount of labor available for agriculture, the caloric content of the foods produced, and the nutritional content of the foods produced. Although not included as an indicator, the method of farming will in part affect how much food a community can produce. This instrument assumes that community farmers will employ sustainable farming practices to maximize their crop yields over time in order to satisfy market demands.

§3.1.2 The Concept of the Political/Institutional

Any number of variables can represent the theoretical concept of political and institutional barriers, depending on the number of institutions and trade policies that the researcher deems to have significant effects on the community's potential to implement a local food system. Indicators of these potential variables can be measured at the nominal level as the negative or positive influence of these institutions and trade policies on a community's decision.

The researcher's first task in this assessment is to identify those institutions that might act as structural influences a community's agricultural production. Internationally, these institutions include the World Trade Organization and the North American Free Trade Agreement, while policies such as the U.S. Farm Bill and the USDA's National Organic Program represent national institutions. This analysis should also include those interest groups and lobbying organizations that can influence the creation of local food systems, such as consumer advocacy groups and industry-funded organizations. The indicators associated with political and institutional will vary according to the specific institutional variable, but generally the researcher will be able to examine trade policy originating from these political and institutional actors and determine whether this particular policy has a beneficial or negative effect on a community's ability to create a local food system. This second task accomplished through either content or legislative analysis of the institution's or group's laws or policies relating for local food production. For example, a national policy that subsidizes large-scale corporate farming will not facilitate the creation of local food systems, because small scale farmers will have to compete with artificially low prices. On the other hand, local government policy the provides tax incentives to farmers that sell their products in local market forums would encourage producers to locally market their foods, thereby facilitating the creation of a local food system. On a global scale, some of the policies promoted by institutions such as the WTO can exert restraining influences on a community's trade policy.

§ 3.1.3 The Concept of the Economic/Financial

The economic/financial costs concept is operationalized as two variables: the cost of creating production capacity and the costs of creating local food markets. The researcher will need to identify—though not necessarily quantify—these potential financial and economic obstacles to creating local food systems. This can be achieved through, for example, observations regarding both producers and consumers willingness to participate in farmers' markets and CSAs, and also observations regarding a community's local economic infrastructure and the potential for the production, processing and distribution of local agricultural products. Because each community will incur different costs, the researcher must choose which indicators will define these variables according to the particular characteristics and circumstances of the community that he has chosen as his or her subject. The indicators for the production capacity

variable will include the cost of converting land to agricultural use and the costs of creating food processing and transportation infrastructures. The indicators for the local food market variable will include the costs of establishing forums of exchange for local producers and consumers and the costs of advertising and marketing local foods.

§3.1.4 The Concept of the Social/Cultural

The social/cultural concept is operationalized as the willingness and ability of consumers to choose local foods. This results in three variables: budget constraint, tastes and preferences, and access to food. A pilot study conducted to inform this research design concluded that four factors generally influence a consumers' decision regarding where to shop and what foods to purchase: price, quality, convenience, and local/family values. Although based on unstructured interviews with a limited and unrepresentative sample, these four factors generally reflect Lane's observations, and therefore can provide a starting point for identifying and evaluating additional factors that might influences consumers' food choices. Price is an indicator of the variable budget constraint; quality, convenience, suitability, and acceptability are indicators of the variable tastes and preferences; and convenience is an indicator of the variable access. In order to measure these indicators, researchers will need to familiarize themselves with local culture and social values.

§3.3 Site and Population Selection

The application of this research instrument requires that the researcher define a community as a geographically-bounded space. Foods produced and processed within the physical of the community are considered local foods; all other foods consumed but not produced and processed within the boundaries of the community are imported. The boundaries of the community need to correspond to the data available on population and agricultural production within those boundaries. Since population and agricultural data are available at the state and county levels, this instrument recommends defining community in terms of states and counties.

§3.2 Data Gathering Methods

§3.2.1. Caloric and Nutritional Requirements and Agricultural Production Capacity

In order to calculate the caloric and nutritional needs variables, the researcher will first have to determine the size and composition of the population of the community to which he or she is applying this instrument. Population and demographic data is

available from the United States Bureau of the Census, which conducts and publishes a national census every ten years, at the national, state, county, and city or town levels. The most recently completed census was for the year 2000, although more recent demographic data is available for some states. The goal of this analysis is to create a general profile of the population that can be used to determine the caloric and nutritional needs of the community. Since the DRIs for caloric and nutritional requirements are based on age groups and gender, this instrument recommends first determining the size of the population as a whole, then determining the gender composition of the population, and finally categorizing percentages of the population according to age. This will require some degree of estimation on the part of the researcher since data may not be available for each of these characteristics.

The DRIs for Estimated Energy Requirements are determined according age, gender, height, body mass index, and physical activity level. Data on these population characteristics is not readily available, and calculating EER for each of these categories would be unnecessarily time-consuming for the purposes of this research. Therefore, this instrument recommends collapsing these categories into age groups according to gender for adults over the age of 19. Census data is available on the total population, percentages of populations under age 5, under age 18, over age 65, male percentage of the population, and female percentage of the population. This results in six possible population categories: children under the age of five, children ages 6 to 18, female adults ages 19 to 64, males adults ages 19 to 64, elderly females sixty-five and older, and elderly males sixty-five and older (See Appendix A).

EER data can be calculated according to these categories by averaging the recommended EER for the range of ages, heights, and physical activity levels for both genders (See Appendix B). Using these values and the population categories discussed above, the researcher can calculate the mean caloric requirements for the community as a whole. Likewise, the DRIs for macronutrients can also be calculated for a range of age groups (See Appendix C) and paired with the established population categories to calculate the nutritional requirements of the community.

The indicators for the variable of agricultural production capacity are the amount of land available for agriculture, the amount of labor available for agriculture, and the

amount of food that can be produced with the available land and labor. Data on farm acreage and the total amount of land devoted to farming is available from the United States' Department of Agriculture National Agricultural Statistics Service at the national, state, and county levels as part of the Census of Agriculture conducted every five years, and most recently conducted in 2002. Data is also available at the same levels on numbers of acres harvested and quantity of yields by crop, which permits the researcher to estimate the yield per acre for those crops for which data is available. Mean yield per acre for commodity crops is also available at the national level. Both the Census of Agriculture and the Bureau of Labor Statistics provide data on farm labor and farm operators. Data on the caloric and nutritional content of foods is available from the USDA's Food and Nutrient Database for Dietary studies.

§3.2.2 Institutional Influences and Trade Policies

Although specific institutional influences and trade policies will vary by community, international and multilateral trade institutions of which the United States is a part will affect all communities to which this instrument may be applied. The major international institutions influencing trade policy within the United States is the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Each policy regulation that potentially affects local food systems can be identified as a variable representing the political/institution factor affecting a community's ability to localize food production. The value of the indicator associated with each variable is a measure of how the policy can influence local food systems; in other words, whether the policy represents and obstacle or an aid to a community's efforts to localize its food system.

NAFTA is a regional trade agreement between the United States, Canada, and Mexico that has been the subject of intense political and academic debate. Although its supporters claimed that "the effects of NAFTA would be positive but small for the United States, and positive and large for Mexico" (Burfisher et al. 2001: 126), critics of the trade agreement have argued that despite rising labor productivity in the mid-1990's in both the United States and Mexico, "workers, communities, and the environment in all three countries [Mexico, the United States, and Canada] have suffered from the agreement's flaws" (Cavanagh et al. 2002: 58). Most of critical research conducted on the impacts of NAFTA focuses on the Mexican manufacturing and agricultural sectors; however,

NAFTA potentially presents a significant institutional obstacle to U.S. communities seeking to localize their food systems through promoting better environmental policies and avoiding dependence on TNCs. As Cavanagh et al. note:

> When officials in any of the NAFTA countries attempt to tackle environmental problems through regulation, they face the threat of expensive lawsuits, thanks to NAFTA rules allowing foreign investors to sue governments directly over any act that might diminish the value of their investment. (2002: 59)

Prior actions under NAFTA suggest that government efforts to encourage local food production or purchasing through subsidies might be construed as interfering with free trade among the NAFTA nations. Accordingly, community officials and researchers seeking to assess the possibility of a local food system must be aware of and comply with all relevant NAFTA regulations to ensure that they do not become a barrier to localizing the food supply system.

Various articles of the WTO's General Agreement of Trade and Tariffs (GATT) can have an effect on local food systems. The GATT Agreement on Agriculture (AOA) establishes a number of regulations relating to member nations' agricultural trade policies, mostly in the areas of market access, domestic support, and export competition (WTO). The AOA specifically prohibits any non-tariff border measures, including "quantitative import restrictions, variable import levies, minimum import prices, discretionary import licensing procedures, voluntary export restraint agreements and non-tariff measures maintained through state-trading enterprises"—measures which can be implemented by states in order to protect developing agricultural industries (WTO 1994).

In terms of domestic support, the objective of the AOA has been to "reduce and discipline" domestic agricultural support measures. The AOA divides potential domestic support policies into three categories: Green Box measures, Blue Box measures, and Amber Box measures. Domestic supports that fall under the categories of Green and Blue Box measures are considered exempt from member states' commitment to "reduce and discipline" domestic support measures. Green Box measures are measures that have no trade distorting effects and are therefore permissible as long as they are provided through publicly funded government programs. Direct payment to producers can qualify as permissible Green Box measures so long as these payments are decoupled from "the type or volume of agricultural production" (WTO 1994). Blue Box measures are also a

form of direct payment, but unlike decoupled Green Box payments, the payments may be made according to "fixed areas and yield or a fixed number of livestock" (WTO 1994). In other words, while under Green Box measures producers may still receive payments regardless of production yields, Blue Box domestic support payments require some unspecified amount of production (WTO 1994). Amber Box domestic support measures are those that distort trade and are prohibited (WTO 1994).

The AOA also prohibits export subsidies—except in specific circumstances—in an effort to ensure that imported products can compete with their domestic counterparts in international markets. The AOA permits the following forms of export subsidies:

(i) export subsidies subject to product-specific reduction commitments within the limits specified in the schedule of the WTO Member concerned;

(ii) any excess of budgetary outlays for export subsidies or subsidized export volume over the limits specified in the schedule which is covered by the "downstream flexibility" provision of Article 9.2(b) of the Agreement on Agriculture;

(iii) export subsidies consistent with the special and differential treatment provision for developing country Members (Article 9.4 of the Agreement); and[,]

(iv) export subsidies other than those subject to reduction commitments provided that they are in conformity with the anti-circumvention disciplines of Article 10 of the Agreement on Agriculture. (WTO 1994)

Nations that currently practice prohibited forms of subsidies not falling under the above guidelines are required to commit to reducing these subsidies by specific percentages established by the AOA (WTO 1995).

Woodin and Lucas identify a number of GATT articles and WTO agreements that may affect local agriculture: GATT Article III, GATT Article XX, the Agreement on Technical Barriers to Trade (TBT), and the Agreement on Sanitary and Phytosanitary Standards (SPS). Among the regulatory topics covered in GATT Article III are national treatment and process and production methods. According to Article III, the National Treatment rule "requires that imported and locally produced goods be treated equally" (Woodin and Lucas 2004: 78). This prevents governments from taking measures that

might privilege local products over imported substitutes and thereby encourage consumers to purchase locally produced goods.

The Process and Production Methods rule "makes it unlawful to discriminate against goods because of concerns about the damaging or unethical processes that may have been used to produce them" (Woodin and Lucas 2004: 78). This rule could potentially disadvantage local producers whose input costs are higher because of more sustainable agricultural production practices by making them unable to compete with the artificially low prices of imported products.

Article XX covers general exceptions to WTO including, "in theory…the adoption or enforcement of measures to protect public morals, to protect human, animal, and plant life or health, or the conservation of finite natural resources that would otherwise contravene WTO rules, provided they are not arbitrary or unjustifiably restrictive" (Woodin and Lucas 2004: 79). This Article potentially prohibits measures designed to encourage sustainable agricultural practices by not allowing local governments to enact policies that favor products produced through these methods.

The TBT "tries to ensure that regulations, standards, testing and certification procedures do not create unnecessary obstacles" (WTO 1994). Woodin and Lucas argue that TBT regulations establish "an international regime for harmonizing environmental standards that effectively creates a ceiling—but no floor—for environmental regulation" (Woodin and Lucas 204: 79). The TBT does not allow nations to create policies that restrict market access for goods produced using non-sustainable or environmentally harmful practices.

Similar to the TBT, the SPS establishes regulations accord to which nations can establish standards for food safety and plant and animal health. Although the SPS allows nations to set their own standards regarding these issues, the SPS encourages member nations "to use international standards, guidelines, and recommendations where they exist," and only allows nations to create higher standards where there is "scientific justification" and based on "appropriate assessment of risks so long as the approach is consistent, not arbitrary" (WTO 1994). The SPS only permits temporary application of the precautionary principle, codified in the 1992 Declaration of Rio in response to environmental concerns but applicable in regards to human health and safety as well: That "where there are threats of serious or irreversible damage, lack of full scientific

certainty shall not be used as a reason for postponing cost-effective measures to prevent…damage" (Cavanagh and Mander 2004: 101). The precautionary principle requires that products be proved to pose no danger to human, plants, animals, and the environment before they are introduced and widely distributed. As in the case of the WTO ruling to strike down Europe's ban on the importation of beef produced with growth hormones, the SPS does not permit government action restricting imports "even in the face of scientific uncertainty about the extent and nature of potential impacts" (Woodin and Lucas 2004: 81).

Each of the trade policies discussed above can be defined as a variable representing the institutional and trade policy influences affecting a community's ability to localize food production. Elite interviewing of local government officials and local farmers provides the best opportunity for the researcher to identify those institutions and policies that the community feels most directly influences their decision-making processes. It is necessary to interview both local officials and farmers, because each group possesses a unique form of expert knowledge: local officials are familiar with local policy and its formulation and implementation, and farmers' experience in the agricultural industry will allow them to easily identify those political and economic policy influences which they feel might affect a community's local food system. As the goal of these interviews is to identify structural influences particular to the community, an semi-structured interview format would be most suitable: such an approach would allow the researcher to gain information about the interviewee's perceptions of those structural influences he or she has identified beforehand as well as providing the interviewee with the opportunity to bring up influences that the researcher may not have already identified.

§3.2.3 Economic and Financial Costs

The two variables associated with a community's willingness to bear the economic and financial costs of instituting a local food system are the costs of creating production capacity and the costs of creating local food markets.

In order to assign indicators to the costs of instituting a local food system, the researcher must first identify those economic infrastructures necessary for the production, processing, and distribution of food products that a community lacks; in other words, the facilities necessary in order to make a sufficient range of local products available to local

consumers. This includes facilities such as mills for the grinding of grains into flour, for pressing vegetables to make oils, and slaughterhouses for the processing of livestock. What new infrastructure facilities are needed will depend on the import thresholds the community has set and the facilities already established within community boundaries.

The researcher will need to first conduct an exploratory investigation of the products the community can produce and distribute locally and then decide what additional, if any, infrastructures are necessary to accomplish this. This assessment will require working closely with both local government officials and agricultural producers themselves to identify the needs of producers and the ways in which the community can work to fulfill those needs. Building or establishing local infrastructure for the use of local producers may require the financial assistance of local governments, community banks, and local loan funds in order to increase the capital available to local producers and distributors in order to establish the infrastructure necessary to support a local market economy. The availability of these sorts of local capital is an example of an indicator of the willingness of the community to invest in a local food system infrastructure and create local production capacity.

Defining indicators for the second variable, the costs of creating local food markets, will depend on the initiatives a community takes to encourage local producers and consumers to participate in local food markets. One of the indicators of this variable will be the costs of creating farmers' markets, CSAs and other forums where producers can market their goods to local consumers. Communities may have to provide subsidies or tax breaks to foster participation in these kinds of forums. Since supermarkets often charge large slotting fees to producers for stocking their goods, oftentimes small-scale, local producers cannot afford to sell their products in supermarkets. Local governments can help subsidize these costs, or create alternative markets for local goods. In addition, local producers can form co-operatives to help defray some of the costs of marketing their products alongside those of global agribusinesses. Other indicators of the costs of creating local markets will include advertising and education costs to inform consumers about the benefits of purchasing local foods and encouraging them to do so.

Researchers will need to interview and survey local officials, producers, and consumers in order to gather information to define and measure these variables. Part of this assessment will require that researchers work with producers to identify the obstacles

they perceive in their efforts to produce and market their products locally. The producers themselves will be able to most accurately identify those infrastructures necessary to local food systems that a community is lacking. Likewise, surveys of randomly sampled consumers can aid in the researchers' assessment of a consumer's initial likelihood of participating in local market exchanges. Encouraging results may influence producers' decisions to market their goods locally rather than as exports. In order to assess community's willingness bear the costs of creating local food infrastructures, the researcher can conduct focus groups including both producers and government officials. A focus group setting will allow the researcher to observe the interactions between officials and producers as they discuss the needs of the producers and the policies a community can enact to meet these needs.

§3.2.4 Budget Constraints, Taste and Preferences, and Access to Local Foods

The three variables representing influences on food choices—and therefore factors associated with consumers' willingness to participate in local food systems—are budget constraints, tastes and preferences, and access. The pilot study previously mentioned identified price, quality, convenience, and local or community values as additional factors. For purposes of this instrument, these for additional factors can be viewed as indicators of the three variables: food price and household income are indicators of budget constraint; quality, local or community values, suitability, and acceptability are indicators of tastes and preferences; and convenience is an indicator of access.

Based on conclusions drawn from the pilot study, consumers place a higher value on local and organic products but are unlikely to go out of their way to obtain local products. This partially reflects in Lane's previously mentioned argument that "changing food purchasers' choices requires that purchasers be provided with (*i*) understandable information that they do not already have about nutritional requirements, and (*ii*) reasons that they consider important enough so that they will make the change" (1005: 1099). Consumers are more likely to participate in local food systems if local products are within a household's budget constraints, if those products are compatible with consumers' tastes and preferences, and if consumers have adequate access to local products.

The researcher should begin gathering data to assign measurements to these indicators by conducting semi-structured interviews with a wide variety of randomly sampled consumers within the community. These initial interviews will allow the researcher to gain familiarity with consumer purchasing habits and may also identify additional variables or indicators unique to that particular community. Once the researcher has identified and defined any additional variables or indicators, he or she may conduct consumer surveys to gain more detailed and standardized observations regarding consumer food choices. These surveys should be distributed to as wide a range of consumers as possible, and should contain both closed and open-ended questions constructed based on the observations gathered during the semi-structured interviews.

§3.3 Data Analysis Procedures

§3.3.1 Physical Production Capacity Variables

The analysis of the aggregate data gathered on population, caloric and nutritional requirement, and on agricultural production levels will allow the researcher to estimate whether a community can physically produce enough food to meet the needs of its members.

§3.3.2 Political/Institutonal Variables

The goal of the analysis of the data gathered through these elite interviews is to assess the structural impact of institutions and trade policies on a community's decision to localize its food production system. After data gathering, the researcher must engage in data reduction. First, the interviews must be transcribed. In order to ensure accuracy and validity, interviewees should be allowed the opportunity to review the transcriptions of their interviews. The researcher must then code the data within the transcriptions. Data should first be coded descriptively according to the occupation (farmer or local official) and then by the specific topics covered in each interview. Relevant topics for this particular set of interviews will include the various institutions that the interviewees' indicate have some influence over their decision-making processes, whether in their capacities as individuals or in their roles as members of the community. For example, in her study of organic farmers, Duram found her subjects perceived the following political structures:

- Organic certification

• Agricultural policy, including government policy, farm programs, and agricultural agencies,

• Information sources, including university research and on-farm experiments. (1999)

Although the topics coded through this instrument should be relatively more precise than Duram's (for example, state policy, national policy, and international policy rather than agricultural policy), the researcher must adapt his or her topics to those illustrated by the data. This type of coding will aid the researcher in defining as variables institutions and policies that exert structural influences. After coding according to topic, the researcher must then engage in analytical coding. This type of coding requires interpreting what was said about the coded topics. For this set of data, the researcher must assess whether, according to the transcribed statements, the interviewee perceives the coded institution to positively or negative influence his or her decisions regarding local food systems.

Using the institutions identified by local officials and farmers in during the interviews and the categories and observations recorded during the coding process, the researcher must assign a positive or negative value to the indicator by assessing whether the structural impact of each institution is an obstacle or an aid to local food production.

An ordinal-level value scale can be used to determine the relative impact of institutions or policies. Institutions or policies that aid in local food production can be assigned a positive value of 1; institutions or policies that present obstacles to local food production can be assigned negative value of -1. If necessary or desired, the research may assign a neutral value of zero to institutions or policies identified by interviewees as impacting their decision-making process but that do not specifically affect decisions related to local food production. Each individual variable will then have a value of -1,0, or 1; the variables can then be summed to create a structural influence scale value that indicates the relative impact of structural influences on a community's decision to localize its food system. It can be concluded that communities with positive structural scale influence values will face fewer structural institutional constraints in attempting to localize food production than communities with negative structural influence scale values and therefore are more likely to undertake the creation of a local food system.

§3.3.3 Economic/Financial Variables

The goal of analysis of this set of data is to identify the potential costs to the community and assess the community's willingness to bear those costs. The potential costs to the community can be identified through an evaluation of the unmet needs of producers in terms of creating production capacity and through an evaluation of the initiatives a community needs to undertake in order to create local markets.

As with the elite interviews, the first task of the researcher is to transcribe the interviews and focus groups he or she has conducted and to verify their accuracy and validity with interviewees and participants. Descriptive codes must be assigned to the data sets in order to categorize interviewees and participants according to gender, ethnicity, age, level of education, and occupation. Coding this information will enable the researcher to compare responses across these categories. Data must then be coded according to topic. Duram identifies a number of economic topics that can be correlated with potential economic and financial costs to localizing food production:

- Markets, including diversification and market instability,
- Agribusiness,
- Production costs, including net income, labor, and debts and loans. (1995)

The topic categories represent variables of economic and financial costs. After defining these variables, the researcher must then analytically code by interpreting what was said about each variable in order to gauge an individual's (or, in the case of the focus groups, the entire group's) willingness to bear these potential costs. This stage of data analysis will depend heavily on the researcher's interpretation of statements made during the interviews or focus group session. For example, a producer may during the course of an interview discuss both farmers' market and CSA programs as potential outlets for his or her products. The researcher must interpret the statements pertaining to these topics in order to determine the producer's preference for each of these marketing schemes.

The data analysis of these variables must also include any consumer surveys the researcher chooses to conduct. Responses to closed-ended survey questions can be coded either positively or negatively depending on whether the response indicates a willingness to participate in local food exchange forums, and responses to open-ended questions can be coded in the same ways as interview and focus group surveys. This will allow the

researcher to reach an initial conclusion about whether community consumers would be willing to support the institution of a local food system.

§3.3.4 Social/Cultural Variables

The purpose of this stage of data analysis is to determine the willingness and ability of consumers to participate in and sustain local food systems based on their dietary preferences and cultural values. The initial semi-structured interviews conducted to familiarize the researcher with the habits of local consumers should first be coded descriptively by subject according to gender, age, ethnicity, income, and address. Coding according to these categories allows the researcher to compare the responses of individual consumers across these categories and enables the researcher to identify any significant trends in consumer habits. The researcher must then code by topic (budget constraint, tastes and preferences, and access) to determine potential factors that influence food choices. The statements categorized by topic can then by further categorized by indicators: food price, household income, quality, local or community values, suitability, acceptability, and convenience. The researcher may need to create additional indicator subtopics for statements that do not correspond to any of the above indicators.

The variables and indicators identified in the semi-structured interviews can then be used to create a survey instrument to assess the relative significant of these variables in determining consumer food choices. Although the researcher may include open-ended questions, the majority of the survey should consist of closed-ended questions in order to facilitate the nominal-level coding of the responses. The researcher will have to tailor the coding scale to the particular questions posed on the survey, but the responses should be coded in a manner that allows the researcher to determine which indicators and hence variables a consumer considers most important when making food choices. The relative ranking of these variables will give the researcher an indication of whether a local food system can satisfy the preferences and demands of consumers.

§4 Conclusions

The data gathering and data analysis methods described in the above sections provide the researcher with a conceptual framework with which to assess a community's potential for localizing food production. In particular, this instrument represents the beginning of an alternative to economic globalization for those communities who accept the arguments against the neoliberal order and want to explore the possibility of reducing

their own dependence on the global agricultural system. In summary, the application of this instrument results in the following conclusions:

- A preliminary finding regarding a community's ability to produce enough food to meet the caloric and nutritional needs of its members.
- Identification of institutions and policies that potentially influence a community's decision to localize food production and an evaluation of the possible negative or positive influence of those institutions and policies.
- Identification of the potential costs to the community of localizing food production and an indication of the community's willingness to bear those costs as evidenced by individuals' willingness to participate in a local food system.
- Identification of the dietary preferences of consumers and the ability of a local food system to satisfy these preferences.

Taken individually, each of these sets of conclusions drawn from the data analysis procedures represents the influence of one factor of local food production. Separately, each of these conclusions defines, respectively, a community's agricultural production potential, the political obstacles the community must navigate in order to create a local food system, the costs to the community of localizing food production, and the local dietary demands and preferences of community members.

Together, the results of data analysis can be used to inform local government decisions regarding the creation of a local food system. The results of the analysis of the physical production capacity variables will give researchers and community officials an estimate regarding whether the institution of a local system is theoretically possible given the ecological characteristics of the community's location.

Since any system of local food production and consumption will need to be tailored to the political circumstances of the community, the conclusions drawn from the political/institutional factor data analysis will help shape local government officials policy decisions regarding the creation and maintenance of the local food system. These decisions will also be informed by the results derived from the analysis of economic/financial factors. These conclusions will help the community tailor the process of creating a food system to meet the expectations of both producers and consumers in terms of allocating costs to be paid by community groups. These conclusions will also identify those components of a local food system, such as food processing facilities and a

local marketing scheme, which the community lacks and must develop or create. Conclusions drawn from the analysis of the social/cultural factor can help inform farmers' decisions about what crops to grow in terms of satisfying consumer tastes and preferences.

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Appendix A: Population Categories

1. Children under the age of five (N_C)
2. Children ages 6 to 18 (N_{C2})
3. Female adults ages 19 to 64 (N_{fa})
4. Males adults ages 19 to 64 (N_{ma})
5. Elderly females sixty-five and older (N_{fe})
6. Elderly males sixty-five and older (N_{me})

Where N = total population, and,

P_f = Female percentage of population,

P_m = Male percentage of population,

C = Percentage of children under 5,

C_1 = Percentage of children under 18,

P_e = Percentage of adults ages 65+,

N_C = total number of children ages 0-5,

N_{C1} = total number of children 0-18,

N_{C2}= total number of children ages 6 through 18,

N_a = total number of adults 19-64,

N_{fa} = total number of female adults ages 19 through 64,

N_{ma} = total number of male adults ages 19 through 64,

N_e = total number of adults ages 65+,

N_{fe} = total number of female adults ages 65+,

N_{me} = total number of male adults ages 65+,

Then,

$C_1(N) = N_{C1}$

$C(N) = N_C$

$N_{C1} – N_C = N_{C2}$

$$N - [P_{65+}(N) + C_{0-18}(N)] = N_a$$

$$N_a(P_f) = N_{fa}$$
$$N_a(P_m) = N_{ma}$$

$$P_e(N) = N_e$$
$$P_f(N_e) = N_{fe}$$
$$N_e - N_{fe} = N_{me}$$

Appendix B: Table 1, Mean Estimated Energy Requirements According to Age Group and Gender

	Male (kcal/day)	Female (kcal/day)
Children ages 0-5	**2653**	**2653**
Children ages 6-18	**2579**	**2579**
Adults ages 19-64	**2485**	**2188**
Adults ages 65+	**2190**	**1974**

Notes: The Food and Nutrition Board issues DRIs for EERs for men and women 30 years of age, along with the following instructions for calculating EERs for various ages: "For each year below 30, add 7 kcal/day for women and 10 k/cal for day for men. For each year above 30, subtract 7kcal/day for women and 10 kcal/day for men." (National Academy of Sciences 2002). EERs for individuals are calculated according to gender, height, physical activity level (PAL), and weight for body mass index (BMI). To simplify these categories, the EERs presented here represent average heights, PALs, and BMIs.

Based on the data given in the DRIs for EER, the following conclusions can be drawn about individuals aged 30 years:
If PAL = total energy expenditure ÷ basal energy expenditure, and
PA = 1.0 if PAL ^{3} 1.0 < 1.4 (sedentary)
PA = 1.12 if PAL ^{3} 1.4 < 1.6 (low active)
PA = 1.27 if PAL ^{3} 1.6 < 1.9 (active)
PA = 1.45 if PAL ^{3} 1.9 < 2.5 (very active),
Then the mean PA = 1.21.

Mean height (ht) = 1.65 meters

Mean weight for range of BMI of 18.5 kg/m^2 to 24.99 kg/m^2 = 59.3 kg

Using the following EER regression equations,
Adult man: EER = 662 – 9.53 × age (y) + PA × (15.91 × wt [kg] + 539.6 × ht [m])
Adult woman: EER = 354 – 6.91 × age (y) + PA × (9.36 × wt [kg] + 726 × ht [m])
The mean EER for adult men aged 30 years is 2595 kcal/day and the mean EER for women aged 30 is 2268 kcal/day.

The same mean height and mean weight for range of BMI were used to calculate mean EER for the male and female age groups 19-64. Mean EERs for adults ages 65 and older—using the same mean height and mean weight for range of BMI—have been calculated up to age 80 based on the 2004 U.S. life expectancy of 77.9 years (National Center for Health Statistics 2007).

Mean EERs for children were calculated according to the same formula using the mean height and mean weight for range of BMI. The values included in the table are mean EERs for male and female children; these age categories correspond to those available in the previously mentioned data available from the U.S. Census. Since these values were calculated using standard mean heights and mean weights for BMI which do not necessarily reflect the actual heights and weights for BMI of children, this instrument recommends that the researcher conduct a survey of the children in the community to which this design is being applied in order to validate the measure of central tendency used here (the mean). If the measure of dispersion among the cases included in the survey is such that the mean used in these calculations is not a meaningful measure of central tendency, it may be more appropriate for the researcher to recalculate the mean based on his or her own data or to choose another measure of central tendency.

Appendix C: Table 2, Mean Recommended Daily Allowances for Selected Macronutrients by Age Group and Gender

	Carbohydrates (g/day)		Proteins (g/day)	
Age Group	Male	Female	Male	Female
Children 0-18	130	130	46	44
Adults 19-70	130	130	56	46
Adults 70+	130	130	56	46

Note: Values for Adults 19-70 and Adults 70+ are excerpted from the "Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Macronutrients." Values for Children 0-18 are the means of values also excerpted from "Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Macronutrients" (National Academy of Sciences 2002).

Although these categories do not exactly correspond with the population grouping in Appendix A, the Adults 70+ category in this table may be taken to correspond to the Adults 65+ value in the population profile as there is no variation between Adults 19-70 and Adults 70+. (If he or she wishes, the researcher may collapse the separate adult age categories together for the purposes of calculating nutritional requirements.)

Appendix D: Conceptual and Methodological Outlines

Conceptual Outline

A. Theoretical Concept: Local Food Production
B. Local Food Production influenced by three factors:
    1. Physical production capacity
    2. Trade/institutional policy
    3. Community participation
C. Concept: Physical production capacity
    1. Variables representing Physical Production Capacity:
        a. Caloric/nutritional needs of communities
        b. Agricultural production capacity
D. Concept: Trade/Institutional Policy
    1. Variables Representing Trade and Institutional Policy:
        a. Policies/Institutions that influence food system
E. Concept: Community Participation/Support (Multidimensional)
    1. Community's willingness to bear costs of localizing food (economic/financial dimension)
    2. Community's willingness to participate in/sustain local food (social/cultural dimension)
    3. Economic/Financial Variables (Cost of Localizing Food Production):
        a. Willingness to bear costs of creating production capability
            i. Indicator: costs/benefits of converting land to agriculture. Use
            ii. Indicator: costs of creating food infrastructure
        b. Willingness to bear costs of creating food market:
            i. Indicators: Costs of creating forums of exchange
            ii. Indicators: Costs of advertising/marketing local foods

4. Social/Cultural Variables (Costs of Participation in Local Food Production System)
    a. Willingness of consumers to choose local foods
        i. Budget constraint
        ii. Tastes and preferences
            - acceptability
            - suitability
        iii. Access

Methodological Outline

A. Theoretical Introduction
    1. Theoretical Concept: Local Food Production
    2. Empirically Observed Variables:
        a. Physical Production Capacity
        b. Trade Policy/Institutional Adjustments
            i. Enables creation of local food production system
            ii. Provides incentives for participation in local food system
        c. Community Participation
            i. Forums for producer/consumer interaction
                - Farmers' markets
                - CSAs
            ii. Costs to community
                - Costs of creating infrastructure
B. Physical/Ecological
    1. Indicators:
        a. Caloric/nutritional requirements of community
        b. Agricultural production capacity of community
            i. land area available for agriculture
            ii. labor available for agriculture
            iii. methods of agricultural production

C. Political/Institutional
    1. Indicators:
        a. Policy influence on local food production system
D. Economic/Financial
    1. Indicators
        a. Costs of creating local food production
            i. Food Processing/distributing/marketing infrastructure
        b. Viability/Maintenance of local food system
            i. Consumer/producer willingness to participate in local food system
E. Social/Cultural
    1. Indicators: Participation in local food system
        a. Viability/Maintenance of local food production: Consumer/producer willingness to participate in local food system

Vita

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Education:

Master of Arts, Political Science, May 2007

Bachelor of Arts, International Studies, World Politics & Policy Concentration, May 2005

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Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA

Minors: Spanish and English Literature

Center for European Studies and Architecture, Riva San Vitale, Switzerland, Spring 2004

• Studied Italian, European politics and literature, and race and ethnicity in Europe.

• Traveled to Italy, Germany, Austria, the Czech Republic, England, and the Netherlands studying art, history, and culture.

Virginia Tech in Spain, Summer 2004, El Puerto de Santa Maria and Madrid, Spain

• Studied Spanish language and culture in El Puerto de Santa Maria and Madrid, Spain

• Traveled throughout Spain and to Portugal studying culture, art, architecture, and history.

Professional Experience:

Graduate Teaching Assistant, PSCI 1004: Nations and Nationalities, Dr. Edward Weisband, Fall 2005 and 2006.

• Undergraduate political science course for freshman and sophomores that draws on anthropology, sociology, psychology, ethnic studies, and philosophy to trace the history of society from primordial kinship communities to the modern concepts of nation-state and national identity, exploring the concepts of race,

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Graduate Teaching Assistant, PSCI 3016: Political Theory II, Dr. Scott Nelson, Spring 2006

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