COMMUNITY GARDENS FOR SOCIAL CAPITAL:

A SITE SUITABILITY ANALYSIS IN AKRON, OHIO

by

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Abstract

Community gardens foster many potential benefits, including food security, environmental stability, neighborhood beautification, and community cohesion (Wakefield, Yeudall, Taron, Reynolds, & Skinner, 2007). Social capital, commonly recognized as the sense of community, is an intangible asset fostered through civic engagement and correlated to increased quality of life (Putnam, 1993). This model tested the viability of social capital as a measurable indicator for community garden planning in conjunction with traditional agricultural criteria modified for urban agriculture in Akron, Ohio. The study identified vacant parcels in areas with fewer hubs of civic engagement in which to place community gardens as a tool for fostering social capital.

In an adapted methodology, this study introduces spatial components to social capital at the neighborhood scale, drawing from the theory behind Putnam's work to measure community involvement through membership counts at individual hubs of civic engagement. Sites with greater need for social capital were identified. The principal hubs of civic engagement identified were churches, which appeared to be a limitation to the study. Further field work to identify site-specific social hubs will be required for this method of measurement to be applied in Akron and other cities. However, the basic methodology is an effective tool in site suitability analyses for community gardens and social capital.

Chapter One: Introduction

Urban centers with vacant lands are indicative of the economic shift away from major industrial manufacturing cities. This is evident in Akron, Ohio, which was previously the rubber capital of the world (Ledebur, & Taylor, 2008). Utilizing these vacant lands for community gardens may provide many benefits to the city and communities, namely local food security, local economic support, environmental stability, neighborhood aesthetics, and building of social capital. Using a methodological framework adapted from the *Re-imagining a More Sustainable Cleveland* project, a site suitability analysis in Akron was performed to determine optimal plots for community gardens in areas fitting physical and social criteria to create such benefits from urban agriculture (Cleveland Urban Design Collaborative, 2008). Sites were selected with regard to areas lacking social capital. The sites identified provide opportunities to build social capital and increase food security for Akron, furthering the effort to rebuild sustainable cities in America.

Motivation

Like other industrial communities, Akron has faced the economic challenges and social consequences presented by declining trends in manufacturing. As the former rubber capital of the world, the city benefited from cheap coal and labor, abundant water resources, and an advantageous transportation infrastructure, including railroads, several major highways, and the Ohio Canal (Ledebur & Taylor, 2008). While Akron retains

these physical resources, the faltering manufacturing sector and national trend toward suburbanization have created lasting damage to the health of the city. Between 1970 and 1980, 38,000 residents left the city of Akron, a population loss of 14%—the decline slowed in the1990's, but continued into the first decade of the 21st century (Ledebur & Taylor, 2008). This exodus resulted in many neglected and vacant parcels of land, presenting both a need and opportunity for revitalization.

Community gardens foster many potential benefits, including food security, local economic support, environmental stability, neighborhood beautification, and community building. The value of urban gardening has been increasingly recognized by the Federal Government and city leaders, and subsequently incorporated into planning and policy initiatives (Nord & Andrews, 2002). Larger cities have already adopted these policies in order to rebuild sustainable urban communities. Notable among these are efforts in Seattle, WA and Cleveland, OH, the latter of which experienced hardships similar to those in Akron due to their shared history as Rust Belt cities (CUDC, 2008; City of Seattle, 2005). These successful analyses for policy implementation provide solid motivation for the proposed research. Identifying sites through a spatial analysis will potentially foster sustainability efforts in Akron.

The City of Cleveland recently developed a proposed solution to both the spatial and social deficiencies of neglected urban neighborhoods. Through the practical repurposing of vacant lands for green space networks and agriculture, the *Re-imagining a More Sustainable Cleveland* project intends to not only provide tangible benefits in the

form of locally sourced food, it aims to improve quality of life for residents (CUDC, 2008). Previous findings have suggested that natural features and open spaces in residential neighborhoods play an important role in civic attitudes, with particular emphasis on the effect of community gardens—these have been well documented as a valuable source of social cohesion within communities, and have been especially successful in neighborhoods suffering from poverty (Armstrong, 2000; Grootaert & van Bastelaer, 2002a; Kim & Kaplan, 2004; Townsend, 2006; Wakefield et al., 2007; Schilling & Logan, 2008). As a hub for community participation, community gardens inherently cultivate social capital, an asset rooted in the strong correlation between trust and civic engagement (Putnam, 1995).

GIS is a valuable tool that can be used to analyze social capital distribution. Social capital is viewed as a valuable intangible asset, the geography of which can be mapped by the various associational activities that contribute to its formation (Mohan & Mohan, 2002; Putnam, 2001). Through the identification of existing hubs of civic engagement—such as churches, fitness centers, community centers, and existing community gardens—a profile of the levels of social capital in Akron was mapped. The areas that lack social capital were addressed with a further site suitability analysis to identify parcels for community gardens where the garden itself could contribute to increasing social capital in the neighborhoods.

Chapter Two: Background

Understanding the history and current trends of Akron is essential to identifying ways in which the city may be improved. The various potential benefits of community gardens may help to remedy these specific challenges. Previous successful models offer the background to the developed methodology.

Akron

The Metropolitan Policy Program sponsored by the Brookings Institution examined cities facing the steepest economic challenges in the United States (Vey, 2007). Results of this study indicated that most underperforming cities were older industrial communities in the Northeast and Midwest. The analysis considered eight indicators of economic health and vitality, including changes in city employment, payroll, and establishments, as well as residential statistics on income, unemployment, and poverty rates (p. 11). Data reflected that Akron was lacking prosperity, but had experienced an increase in "economic and/or residential well-being" between 1990 and 2000. It was removed from the list of most challenged cities (p. 48). These findings led to an in-depth case study on Akron to determine the driving factors behind the progress that has been made and what the city needs in order to restore prosperity (Ledebur & Taylor, 2008).

Ledebur and Taylor (2008) document the economic and social history of Akron, identifying factors contributing to upward trends. Initiatives that began in the 1990s have set the stage for restoring the health of the city. Particularly important to the revitalization

efforts, the city invested over $170 million in developing the civic infrastructure of downtown Akron, including a new convention center, museum, and baseball stadium, as well as renovating and expanding the historic Akron Civic Theatre and Akron-Summit County Public Library (Ledebur & Taylor, 2008). Additionally, the University of Akron, located in the heart of downtown, committed more that $200 million to their "New Landscape for Learning" program, a building and renovation project, designed, in part, to connect the University to the surrounding city in order to foster civic networking (The University of Akron, 1999). It is clear that Akron is making great efforts to utilize civic engagement in order to restore the prosperity of the city, emphasizing the value of building social capital in communities.

Social Capital

Civic engagement lies at the heart of social capital. The term *social capital* is credited to Lyda Judson Hanifan (1916) who, when emphasizing the importance of community involvement for successful schools, defined the term as "...those tangible substances [that] count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit" (as cited in Putnam, 2000, p. 19). These principles were explored by Robert Putnam (1993) in *Making Democracy Work: Civic Traditions in Modern Italy*. Patterns of civic involvement and social solidarity were traced throughout various regions in Italy, and a clear correlation was discovered between strong civic involvement, high institutional performance, and quality of life (Putnam, 1993). Through his work, Putnam

(1995) refined the definition of social capital as, “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (p. 67). Nearly all literature on social capital draws strongly from Putnam's work, utilizing his extensive empirical research to define the various forms of social capital, document its benefits, and develop methods of measurement. Putnam's body of work documents the definition, forms, sources, and importance of social capital, each of which illustrates the value of rebuilding communities in Akron.

In *Bowling Alone: The Collapse and Revival of the American Community,* Putnam (2000) examined civic engagement in America, measuring trends in community involvement through factors including political participation, religious participation, connections in the workplace, volunteering, and levels of honesty and trust. In *Social Capital: Measurement and Consequences*, Putnam (2001) simplified the description of his guidelines, breaking the measurement of social capital down into two indicators: (1) membership and participation in organizations and (2) volunteering and philanthropy.

Identifying the spatial distribution of social capital is key to the research in Akron. As an intangible asset cultivated through civic engagement, the location of hubs fostering these two indicators serve as geographic reference points that were selected against. In order to identify these hubs, criteria were set by the definition of social capital in existing literature. Mohan and Mohan (2002) offered support for this methodology through further explanation of social capital, addressing it in the framework of spatial measurement. They support that variations in social distributions naturally result in variations in civic

engagement, lending to measurable spatial variations of social capital (p.197). A similar methodology is also employed by Rupasingha, Goetz, and Freshwater (2006), who developed an index to measure social capital at county scale for the entire United States. This was also used as a guideline for the proposed research in a new spatial index of social capital.

Community Garden Benefits

Community gardens inherently offer a wide variety of benefits to individuals and communities, and have a valuable role to play in building social capital. These benefits fit the definition of social capital set by Mohan and Mohan (2002), particularly in the effects benefiting both individuals and communities—this definition includes promoting better health, social interaction, and stimulating economic development (p. 193).

Benefits of community gardens are often interrelated, widespread co-benefits, which are greatly quantified and discussed in available literature. Armstrong (2000) surveyed 63 gardens in upstate New York, identifying the benefits sought by community members through participation in community gardening. The top three reasons given were access to better food, to enjoy nature, and reaping mental and physical health benefits (Armstrong, 2000, p. 322). This research also addressed the impact existing gardens had on their respective communities by demographics. As Armstrong (2000) writes: “Gardens in low-income neighborhoods (46%) were four times as likely as non low-income gardens to lead to other issues in the neighborhood being addressed” (p. 319). Armstrong drew conclusions about the potential benefits of community gardens that

may contribute to the development of theoretical models of community health promotion (p. 326). To fill the gap in research on these potential benefits, Wakefield et al. (2007) collected data on the perceived health impacts of community gardening in South-East Toronto. Through interviews, participant observation, and focus groups, gardeners indicated that they benefitted from access to food, improved nutrition, increased physical activity, and improved mental health, as well as promoted social health and community cohesion (p. 92). This study was quite relevant to the proposed research, in that the physical and social circumstances of Toronto are similar to that of Akron. Available literature does not reflect exclusively the study of any one benefit, as these are all so interrelated.

Food security may be addressed as a particular benefit to this research due to the strong relationship between poverty and insecurity, and their relationship to the selected sites lacking social capital (Nord, Andrews, & Carlson, 2009). This correlation is supported by Grootaert and van Bastelaer (2002b) in an exhaustive empirical study focusing on social capital and poverty—the results emphasized the role of social capital as a critical asset for sustainable development in impoverished communities. As Nord et al. (2009) document: “43 percent of households with incomes below the official poverty line were food insecure, compared with 7.6 percent of those with incomes above 185 percent of the poverty line” (p. 11). Based on criteria set by the definitions of social capital and the correlation between food insecurity and poverty, there may be an overlap between impoverished neighborhoods in Akron and fewer hubs of civic engagement. If

this is the case, a site suitability model that addresses social capital deficiency will also address food insecurity.

Successful Models and Physical Characteristics

Urban agriculture is one key to rebuilding sustainable cities. Brown and Carter (2002) identified garden projects across the United States and the beneficial impact they have on communities. Statistics were included as to the potential production of farms in similar climates, such as two vacant lots in Boston totaling 21 acres that annually yield more that 120,000 pounds of fresh vegetables (p. 9). Heimlich and Bernard (1992) offered further statistics, with findings indicating that the productivity per acre of urban farms generally exceeds that of rural crop yields. Brown and Carter (2002) addressed specific challenges in establishing and maintaining community gardens, offering possible solutions to each concern. These include start-up costs, seasonal limitations, and soil contamination, a common concern when farming urban soils (p. 14-18).

Urban soils differ greatly in both structure and content from their rural counterparts. Urban development and intensive human activity deeply impact the land, lending to disruption, compaction, and nutrient depletion of the soil (DeKimpe & Morel, 2000). DeKimpe and Morel (2000) discussed the various soils and potential hazards in urban agriculture—particularly relevant to Akron, the authors discussed the risk and occurrences of heavy metal contaminants found in a variety of former industrial sites. The U.S. General Accounting Office estimated that between 130,000 and 425,000 of these sites, known as *brownfields*, exist nationwide (Bailkey & Nasr, 1999). This can be

addressed through a variety of remediation techniques, particularly when it is cost-prohibitive to conventionally remediate by physically removing the contaminated soil. By using plants to take up metals from the soil—a process known as *phytoremediation*—and immobilizing heavy metals in the soil with a high pH and organic matter, contaminants will not be passed into food grown in urban plots on or near contaminated brownfields (Deelstra & Girardet, 1999; DeKimpe & Morel, 2000).

The *Re-imagining a More Sustainable Cleveland* project employed these techniques when planning for agriculture. As all intensive human activity has an impact on the soil, remediation applications are not limited to industrial sites, though they are less commonly applied in residential areas. According to the report, the sites where remediation was typically used included municipal landfills, agricultural fields, wood treating sites, military bases, fuel storage tank farms, gas stations, army plants, sewage treatment plants, and mining sites (CUDC, 2008, p. 24). Used as a guideline for the research in Akron, contamination through proximity to brownfields was reported (1) in an attempt to achieve a full physical profile for each vacant parcel and (2) for potential future studies of identified sites and subsequent phytoremediation applications. Due to successful remediation techniques, contaminants do not necessarily rule out sites selected by the other criteria—however, these parcels are considered less suitable due to the additional resources required to bring the parcel up to agricultural standards, and were ranked accordingly.

Utilizing GIS, the *Re-imagining a More Sustainable Cleveland* project, provided a complete spatial analysis of many physical and social characteristics that were key to the proposed research in Akron. With the intention of repurposing vacant lands, sites were selected with regard to lead contamination, vacancy rates, population changes, impervious surfaces, hydrology, soil data, sun exposure, food deserts, and existing community gardens (CUDC, 2008). However, this study did not explicitly look at social capital as a factor for determining community garden sites.

Social factors took precedence in determining site suitability for the study in Akron since soil quality can be managed, and social capital and food security remain top priorities. The *Re-imagining a More Sustainable Cleveland* model established the goal of placing every Cleveland resident within a ½ mile radius of a community garden or market garden in order to increase local food security, reinforce neighborhood relationships, beautify vacant lots, and promote local entrepreneurship (CUDC, 2008, p. 32). This project design drew strongly from extensive research performed by the City of Seattle's Department of Planning and Development in which a benchmark of one community garden for every 2,500 households was developed, specifically in order to ensure food security (City of Seattle, 2005). Marking the comprehensiveness and successful implementation of the research in Cleveland and Seattle, a similar methodological framework was used in order to identify potential sites for equal strides in Akron.

Chapter Three: Methodology

To identify ideal plots for community gardens, both physical and social variables were considered. Physical variables were analyzed through parcel and soil data. Social variables were analyzed through a spatial index of social capital designed for this analysis. The methodology follows four main steps: (1) identify vacant parcels and pre-screen for suitable size; (2) analyze and rank vacant parcels by physical criteria; (3) buffer, analyze, and rank vacant parcels by social criteria, followed by the combined ranking; and (4) ground-truthing through on-site analysis and interview with city planner.

Previously, social capital has overwhelmingly been measured through survey methods (Armstrong, 2000; Fukuyama, 2000; Grootaert & van Bastelaer, 2002b; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Lochner, Kawachi, & Kennedy, 1999; Putnam, 1993, 1995, 2000, 2001; Wakefield et al., 2007). However, this type of survey method was not employed in this study due to time constraints and reliability—Rupasingha et al. (2006) noted that survey methods have well-known reliability issues associated with consistent participant responses in real-world versus laboratory settings. This variable instead relied on the geographic reference points of hubs of civic engagement—sources of social capital for the City of Akron. A survey method was used in this study, but asked for a more concrete variable—membership numbers—instead of personal views of trust toward the community.

The spatial index of social capital drew from the definition of social capital and previous literature on its spatial measurement to identify hubs of civic engagement. As Mohan and Mohan (2002) discussed, variations in social distributions naturally result in variations in civic engagement. The term *social distributions* describes both (a) where people are gathering and (b) who is gathering—therefore, social distribution can include both spatial distribution of the population as well as socioeconomic data (i.e. poverty and unemployment rates). These social variables were both utilized in the spatial analysis of social capital by Rupasingha et al. (2006), and was subsequently used in this Akron methodology. Hubs of civic engagement—the places where people are gathering that cultivate social capital—can be mapped as geographic reference points to identify the spatial framework of social capital resources in Akron.

To map these hubs, locations identified were required to fall under Putnam's definitions of social capital, which followed five criteria—namely, locations include those that foster community activity, political participation, religious participation, networking, and volunteering (Putnam 2000, 2001). The index also drew from the methodology of Rupasingha et al. (2006), who developed a similar spatial index at the county scale using counts of the following establishments in each county: civic organizations, bowling centers, golf clubs, fitness centers, sports organizations, religious organizations, political organizations, labor organizations, business organizations, and professional organizations (p. 89). The index used in Akron attempted to derive its geographic references points from these categories, including civic organizations,

bowling centers, golf clubs, fitness centers, sports organizations, religious organizations, and political organizations. Existing community gardens were also mapped as representative geographic reference points of civic engagement. The spatial distribution of social capital was reflected through these geographic reference points, which were weighted by each establishment's membership counts. The membership counts, in contrast to the Rupasingha et al. (2006) measurement of establishment counts per county, better suit the city scale, and were examined against the population count surrounding each vacant parcel. In order to accurately compare vacant parcels, these variables had to be normalized. The percentage of memberships in the population were calculated for each vacant parcel's buffer zone. Parcels with low percentages were ranked as more suitable, allowing the model to address areas lacking social capital resources.

Physical and social characteristics were both weighted for individual vacant parcels. The term *vacant parcels* refers to plots of land belonging to the City of Akron—these properties are often acquired as foreclosures through land reutilization programs to be resold by the city (Wheat & Kleinhenz, 2012). This study was constrained to vacant parcels because they (1) were not being utilized at the time of this writing, (2) were often unkempt and unsightly, reflecting negatively on community, and (3) belonged to the City of Akron, operators of the city's community garden program, *Akron Grows* (York, 2010). The Land Marketing division of Akron's Department of Planning and Urban Development maintained tabular data for each parcel. These data were joined with spatial parcel data provided by the Summit County Fiscal Office (2011). A ranking

system for each vacant parcel allowed for a properly weighted overall ranking of the final parcels, as an average of each parcel's rank (Table 1). This returned three ranks assigned to each parcel—physical, social, and overall—allowing for selection of parcels based on overall rank or priority of variables.

	Physical Rank	**Social Rank**	**Combined Rank**
Parcel Number	*P*	*S*	$\frac{(P+S)}{2}$

Table 1. Combined (overall) ranking system.

In this model, vacant parcels analyzed were selected through a preliminary size screening. The minimum size was greater than or equal to the smallest existing community garden (0.13 acres), accounting for multiple smaller adjoining vacant parcels that may fit the criterion. This measured the existing low end of the city's investment in viable community garden space. The maximum size was determined by the acreage of available parcels and the feedback received from the City of Akron's Department of Planning and Urban Development. In analysis, greater parcel size was considered an asset and a parcel's rank was higher with greater parcel acreage. Following this preliminary screening, vacant parcels were ranked by physical and social characteristics.

Physical Variables

1. **Soil Characteristics**

   Soil data from the Natural Resource Conservation Service (NRCS) was used to determine soil profiles of each vacant parcel (Soil Survey Staff, 2012). This step allowed for the determination of preferences for selection based on soil

characteristics. Preference was to be given to parcels that require the least amount of remediation, particularly prime farmland and well-drained soils. Rankings are detailed in Table 2. Slope and drainage rankings were derived from data of the soil types present in the study area. As drainage classifications were only represented in four categories, this ranking maintained a maximum score of four to account for the total possible score normalization. However, this scoring method was a limitation to the study because the drainage score was not weighted equally, and therefore the best drainage scores contribute somewhat less to the overall score.

	Slope	**Drainage**	**Approximate Percent Prime Farmland Status**
Parcel Number	**5** = 0-2% **4** = 2-6% **3** = 6-12% **2** = 12-18% **1** = >18%	**4** = well **3** = moderately well **2** = somewhat poorly **1** = very poorly	**5** = all **4** = 75% **3** = 50% **2** = 25% **1** = none

Table 2. Soil characteristic ranking system

2. Sun Exposure

An essential criterion for each proposed garden site in the *Re-imagining a More Sustainable Cleveland* project was at least 8 hours of sun exposure each day (CUDC, 2008). This variable was measured for the study in Akron by the approximate percentage cleared of canopy and buildings, and was assessed with aerial imagery (surveyed during leaf-off seasons) and on-site analysis. Vacant parcels with more open area were ranked higher, as these would require the least

amount of physical surface alterations to be prepared for agricultural production (i.e., no removal of trees or structures). Additionally, the potential existed for sun exposure to be affected by surrounding tree/structure shadows cast on the plot—this variable was also adapted from the *Re-imagining a More Sustainable Cleveland* project (CUDC, 2008). It was assessed through on-site analysis (taken twice during early June, mid-morning and mid afternoon) and aerial imagery, and recorded for each vacant parcel with the following rankings in Table 3.

	Sun Exposure (% Clear of Canopy and Buildings)	**Structure/tree Shadow**
Parcel Number	**5** = 100% **4** = 80% **3** = 50% **2** = 30% **1** = <30%	**5** = no shadows cast and no structures/trees around border **4** = structures/trees on N side of border only, shadows cover less than 50% of lot **3** = structures/trees on S, E, or W sides lot, shadows cover less than 50% of lot **2** = structures/trees on S, E, or W sides lot, shadows cover more than 50% of lot **1** = tall structures/trees on all sides

Table 3. Sun exposure characteristic rankings

3. Additional Physical Variables (Table 4)

a. Brownfield Status

The Ohio Environmental Protection Agency (2012) maintains a Brownfield Inventory Database. Using this database, brownfields identified in Akron were matched to parcel data provided by the Summit County Fiscal Office (2011). Vacant parcels were then compared to the brownfield parcels to determine their status. Parcels on or directly adjacent to a brownfield would likely

require the removal of industrial waste and/or heavy metals, therefore reducing rank by requiring more resources.

b. Parcel Size

Acreage of parcels will be treated as an asset in this model; (1) a larger number of community members may partake in gardening with greater available space, and (2) a parcel that is considered too large for a community garden by the City of Akron's Department of Planning and Urban Development may be divided into multiple lots. Size ranking categories were determined by the Jenks natural breaks in the dataset.

c. Hydrant Access

Hydrant access for irrigation is a variable adapted from the *Re-imagining a More Sustainable Cleveland* project (CUDC, 2008). This variable was assessed through on-site analysis and manually digitized due to a lack of utilities data. Each parcel was ranked according to its proximity to the nearest hydrant.

	Size (acres)	**Brownfield**	**Hydrant Access**	**Total = Final Rank *(P)***
Parcel Number	**5** = 2-5 **4** = 4-1.9 **3** = 0.2-0.39 **2** = 0.15-0.19 **1** = < 0.15	**5** = not a brownfield, not within ½ mile **4** = not a brownfield, not within ¼ mile **3** = not a brownfield, but **is** within ¼ mile **2** = not a brownfield, but adjacent to one **1** = is a brownfield	**5** = Along border **4** = within 50ft **3** = within 100ft **2** = within 500ft **1** = >500ft away	**Total points possible = 39**

Table 4. Other characteristic rankings and final total

The physical analysis was followed by a proximity analysis to characterize social variables near potential sites using the spatial index of social capital. The proximity analysis also characterized accessibility to the garden, using a buffer distance of ½ mile around each vacant parcel—this was drawn from the goals of the *Re-imagining a More Sustainable Cleveland* project to put every within a ½ mile radius of a community garden and to site new gardens at least ½ mile away from existing gardens (CUDC, 2008). Using this distance identified any sources of social capital immediately surrounding the vacant parcels, and provided a socioeconomic profile of residents that would reap the benefits of the community garden sites.

Spatial Index of Social Capital

Census Data

All census data was analyzed at the block group scale within each vacant parcel buffer. There were five categories in the ranking system determined by natural breaks (Jenks) in the census data (Table 5). If multiple category rankings were within a buffer zone, the value was averaged. To determine the inclusion of a block group in the analysis, 75% of the total block group area had to lie within the buffer boundary. Of 196 block groups that intersected with the boundary study areas, 121 were included in the analysis.

1. **Median Household Income** (Esri, 2010a)

   Increased rank for high poverty rate, drawing from the correlation between poverty and food insecurity.

2. **Population** (Esri, 2010b)

Increased rank for high population allows for the greatest potential of community member involvement and prevents vacant parcel selection in deserted regions of the city.

3. **Unemployment** (Esri, 2010c)

   Increased rank for high unemployment rate to address lower social capital in correlation with economic depression.

	Avg. Unemployment Rate	**Avg. Income**	**Population Range**
Parcel Number	**5** = 22.8 - 100% **4** = 15.4 - 22.7% **3** = 8.0 - 15.3% **2** = 4.1 - 7.9% **1** = 0 - 4.0%	**5** = $0 - $27,000 **4** = $27,001 - $41,000 **3** = $41,001 - $70,000 **2** = $70,001 - $84,000 **1** = $84,001 - $375,000	**5** = 6000+ **4** = 5000-5999 **3** = 4000-4999 **2** = 3000-3999 **1** = <3000

Table 5. Census data ranking system

Hubs of Civic Engagement

All defined hubs of civic engagement were identified and selected against in analysis. These variables were selected by the known local establishments in Akron, the definition of social capital by Putnam (2000, 2001), and the social capital index designed by Rupasingha et al. (2006).

	(Population Total)	**(Total Memberships)**	**(Memberships / Population)**	**Membership Rank**	**Total = Final Rank *(S)***
Parcel Number	Total population to be used in membership rank calculation, not to be added to total	Total memberships to be used in membership rank calculation, not to be added to total	Percent of population that have memberships	Rank number (24-1) after comparing percentages against other parcels—lower membership percentage = higher rank	**Total points possible = 39**

Table 6. Membership-to-population calculation, rankings, and final total

1. Existing Community Gardens

A list of existing community gardens was provided by the City of Akron's *Akron Grows* program (York, 2010). With only six community gardens listed, all without distinct addresses, these sites were manually digitized for a proximity analysis with vacant parcels.

2. Churches

A point shapefile of churches listed in the Geographic Names Information System (GNIS) was used (Esri & United States Geological Survey, 2010). These points were used to identify their corresponding polygons in a Parcel shapefile from the Summit County Fiscal Office (2011)—this allowed for a comparison consistent with other polygon variables in analysis (i.e. more consistent proximity distance from perimeter rather than centroid). Parcel data were also examined to add any churches not included in the GNIS list.

3. Synagogues

These locations were joined with parcel data through address matching. Address data was provided by Google Maps (2012d).

4. YMCA Locations

Parcel data and address matching were used to identify YMCA locations. Addresses were provided by the YMCA (2012).

5. Free Mason Lodges

Parcel data and address matching were used to identify the locations of Free Mason lodges, with lodge information provided by The Grand Lodge of Ohio (2012).

6. Service Organizations (Lions Club, Kiwanis Club)

Parcel data and address matching were used identify the locations of service organizations and their meeting places, with addresses provided by the Akron Host Lions Club and Kiwanis International's Akron Kiwanis Club (Akron Host Lions Club, 2012; Kiwanis International, 2012).

7. Political Organizations

The Democratic Party of Summit County maintained a list of all democratic clubs and their meeting locations for Akron (Democratic Party of Summit County, 2012). These locations were joined with parcel data through address matching. The Summit County Republican Headquarters address was the only officially listed address found as a gathering place for the Republican party in Akron, which was also joined to the parcel data through the address field (Summit County Republican Party, 2012).

8. University of Akron

This was included as a variable due to the recent efforts by the university to foster civic networking through creative landscape and renovation projects (The University of Akron, 1999). Due to the size and distribution of the university, this variable was digitized as several polygons for proximity analysis.

9. Akron's Civic Initiative Projects

This variable was included to incorporate the recent efforts towards developing the civic infrastructure of downtown Akron. Locations were joined with parcel data through address matching (Downtown Akron Partnership, 2012).

a. Convention Center

b. Akron Art Museum

c. Baseball Stadium

d. Akron-Summit County Public Library

e. Akron Civic Theater

10. Bowling Centers

As the theme of bowling has carried through social capital literature, notably in the work of Putnam (1993, 1995, 2000, 2001), and then into Rupasingha et al. (2006), this variable was included in the model. These locations were joined with parcel data through address matching. Address data was provided by Google Maps (2012a).

11. Golf Clubs

Golf Link (2012) offered a comprehensive list of golf courses in Akron, OH. These locations were joined with parcel data through address matching.

12. Fitness Centers

As a common facility for community members to participate in exercise, sports, and recreational activities, fitness centers are a hub of civic engagement—this

particular variable was supported by Rupasingha et al. (2006). These locations were joined with parcel data through address matching. Address data was provided by Google Maps (2012b, 2012c).

On-site Assessments

On-site assessments of each vacant parcel were performed to determine local social capital conditions through perceptible signs of urban blight. Breger (1967) defines the term *urban blight* as functional and social depreciation of property beyond acceptable condition to the community. Breger states that this definition is subjective by nature in determining what is acceptable. However, this can be assessed by physical indicators, particularly under-maintenance of property and perceptible disutility of land and buildings (Breger, 1967, p. 372). This may include buildings falling into disrepair, litter scattered, graffiti, and any other signs of neglect and depreciation.

Limitations

There was one primary limitation to this methodology. This is the decision to not implement the individual survey technique for measuring social capital. Though this method has well-known shortcomings (Rupasingha et al., 2006), by not implementing these surveys, the study was limited to the measurement of social capital by documented memberships at physical locations rather than individual opinions of trust and community well-being. Following this singular school of thought does not assess real-world, local conditions, though this was partially addressed in the ground-truthing exercise at sites estimated to be lacking social capital resources.

Chapter Four: Results

Of the 268,497 parcels within the Akron proper jurisdiction, thirty-nine parcels are listed for sale of the City of Akron. Twenty-four parcels passed the preliminary size screening. The minimum size of analysis was 0.13 acres in area, including possible adjoining parcels. After these were ranked, an adjusted analysis was run for parcels not within a ½ mile radius of any existing community garden. Sixteen parcels qualified for the adjusted ranking.

Physical Variable Ranking Results

The results of the physical variable ranking system returned results that generally matched the ground-truthing exercises in the field (the on-site assessment of observable physical variables and feel of each location suitability for a community garden). Table 7 shows the vacant parcels ranked in order of highest-to-lowest score according to the devised methodology.

The total score possible for each parcel was 39. The results reflect an average total score (*P*) of 23.3 with a standard deviation of 3.8. The median score was 22. No parcel had any prime farmland nor were any parcels brownfields or within ½ mile of a brownfield. As predicted, all parcels contained urban soil types, which would require some form of remediation to be suitable for agriculture. Frequently soils were Chili-Urban land complex, undulating or rolling (CuB and CuC, respectively). Also common were Canfield-Urban land complex, undulating (CfB), Ravenna-Urban land complex

(Rn), and Rough broken land, silt and sand (Rw). Parcel number 6815312, 123 East Lods Street, partially contained soil from a sanitary landfill (Uf). When a parcel contained two or more soil types with different slope and/or drainage characteristics, the most prominent soil type's characteristics were used. Slope rank in the vacant parcels varied between 3-5 (all parcels < 12% slopes). Drainage classes were determined from the tabular data of each soil type. When drainage class or slope data were not available for these soils, a score of 0 was assigned. Two parcels tied for the highest ranking position—interestingly, one of these parcels (773 Lovers Lane) is an existing city-run community garden, meaning that it falls on one of the vacant parcels listed for sale by the Land Marketing Division. This detail is discussed in the ground-truthing exercise with the City of Akron's Department of Planning and Urban Development. 773 Lovers Lane and 630 Diagonal Road, the other top-ranked parcel, both received identical scores for slope (4/5), drainage (2/4), percent prime farmland status (1/5), building/tree shadow (5/5), brownfield status (5/5), and hydrant access (5/5). 773 Lovers Lane received a slightly lower score than 630 Diagonal Road (4/5 and 5/5, respectively), and a slightly higher score for sun exposure (5/5 and 4/5, respectively). Both were mostly comprised of Canfield-Urban land complex, undulating (map unit symbol CfB) from which soil characteristics were determined and then confirmed by a digital elevation model (DEM) from the State of Ohio Office of Information Technology (2007).

A parcel with a median score of 22 was 445 Alexander Street. The limiting variables for this parcel were size (1/5), building/tree shadow (2/5), and hydrant access

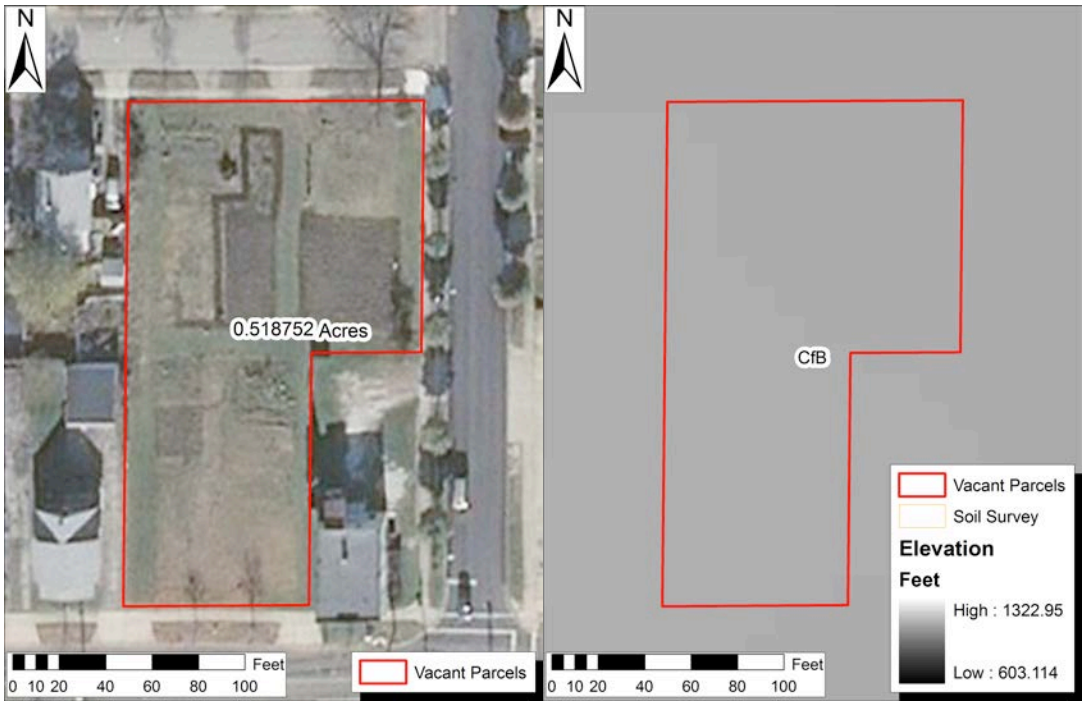

Figure 1. 773 Lovers Lane, an existing community garden, imagery and acreage (left), and DEM displaying relatively even terrain with soil map unit symbol (right)

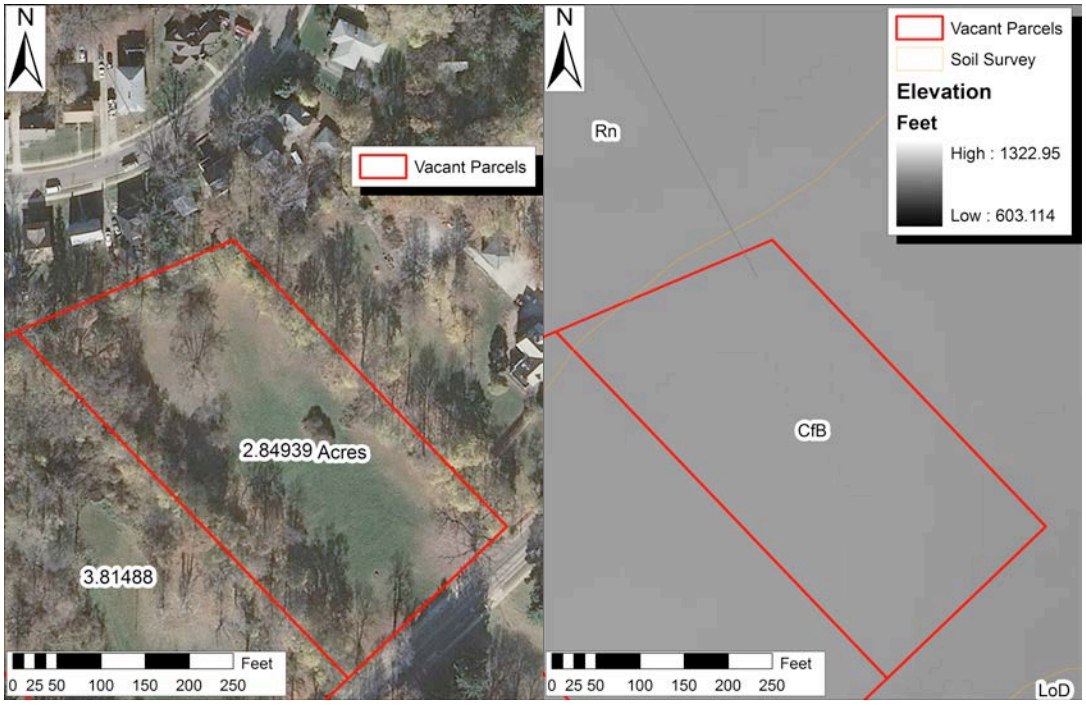

Figure 2. 630 Diagonal Road imagery and acreage (left), and DEM with soil map unit symbol (right)

(2/5). As for the other variables, scores were relatively average: slope (4/5), drainage (2/4), percent prime farmland status (1/5), sun exposure (5/5), and brownfield status (5/5). This parcel also contained Canfield-Urban land complex, undulating, which was again confirmed though a digital elevation model.

The parcel ranking the lowest in the physical variable analysis was 983 Stadelman Avenue, with a score of 18 out of the possible 39 points. This parcel scored well for slope (4/5) and brownfield status (5/5), but had lower scores for drainage (2/4) and hydrant access (3/5), and the lowest scores for size (1/5), percent prime farmland status (1/5), sun exposure (1/5), and building/tree shadow (1/5). This parcel would require a great deal of alteration to the surrounding parcels in order to be more suitable as a community garden, a cost that would likely not be outweighed by the benefits.

Figure 3. 983 Stadelman Avenue imagery and acreage (left), and DEM and soil map unit symbol (right)

Table 7. Final physical variable ranking

Parcel Number	Address	Slope	Soil Drainage	Size (acreage)	Prime Farmland Status	Sun Exposure (Percent Cleared)	Building/ Tree Shadow	Brownfield	Hydrant Access	Total: (P)
6840195	773 LOVERS LN	4	2	4	1	5	5	5	5	31
6822628	630 DIAGONAL RD	4	2	5	1	4	5	5	5	31
6839979	642 DIAGONAL RD	4	2	5	1	2	4	5	5	28
6815312	123 E LODS ST	5	0	3	1	5	4	5	5	28
6762933	299 HICKORY ST	3	4	3	1	5	4	5	3	28
6762932	303 HICKORY ST	3	4	3	1	5	4	5	3	28
6763023	309 HICKORY ST	3	4	3	1	5	4	5	3	28
6857980	943 COPLEY RD	5	2	2	1	4	3	5	4	26
6845928	917 BAUGHMAN ST	5	2	1	1	4	3	5	4	25
6762878	353 HICKORY ST	3	4	5	1	1	2	5	4	25
6735737	426 CUYAHOGA ST	4	2	2	1	1	3	5	5	23
6807290	135 MUSTILL CT	4	4	2	1	1	1	5	5	23
6814108	445 ALEXANDER ST	4	2	1	1	5	2	5	2	22
6849195	1202 COPLEY RD	4	3	2	1	3	1	5	2	21
6747341	88 OAKDALE AVE	3	2	3	1	2	2	5	3	21
6712894	672 MALLISON AVE	3	2	2	1	5	2	5	1	21
6860896	197 HICKORY ST	3	4	3	1	1	1	5	3	21
6860902	171 HICKORY	3	4	3	1	1	1	5	3	21
6860904	155 HICKORY ST	3	4	3	1	1	1	5	3	21
6745042	948 BRITTAIN RD	4	2	1	1	1	3	5	3	20
6736167	610 MADISON AVE	5	2	2	1	1	1	5	3	20
6738336	876 GARFIELD ST	3	2	1	1	1	4	5	1	18
6831777	849 GARFIELD ST	3	2	1	1	1	4	5	1	18
6830360	983 STADELMAN AVE	4	2	1	1	1	1	5	3	18

Social Variable Ranking Results

Table 8 shows the vacant parcels ranked in order of highest-to-lowest score according to the devised methodology. Interestingly again, 773 Lovers Lane was the highest ranked (with two others) in the social variable analysis, with 36 of 39 possible points. The average social variable score (*S*) was 26.6, with a median score of 25.5 and a standard deviation of 5.8. The top parcels that were not existing community gardens were 876 Garfield Street and 849 Garfield Street. These two parcels had lower population ranges than 773 Lovers Lane (4/5 instead of 5/5), but had the highest membership rank score (24/24), and equal unemployment and median household income scores (4/5).

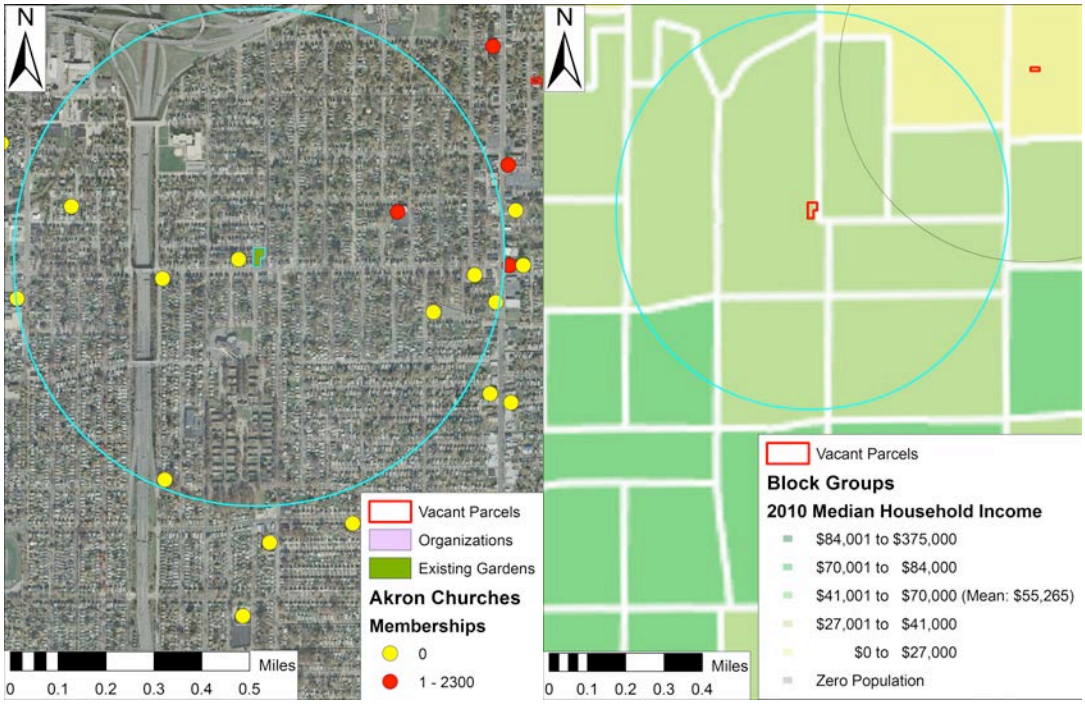

Figure 4. 773 Lovers Lane ½ mile buffer with membership hubs (left) and unemployment rates (right)

A vacant parcel with an approximate median score of 25 was 672 Mallison Avenue, which received unemployment and median household income scores of 5/5, a population score of 2/5 and a membership rank score of 13. The lowest ranking vacant parcel, 135 Mustill Court, received unemployment and median household income scores of 5/5, a population score of 1/5, and a membership rank of 8. The calculation of reported memberships divided by approximate population yielded a number greater than 1—there were more reported memberships than population determined by the census data analysis. This error may be a result of (1) inaccurate membership numbers reported during interviews, (2) inaccurate census data, or (3) inaccurate calculation of approximate population during analysis. Additionally, this may not be an error, but an accurate report reflecting church members coming from an outside area to attend. Regardless of the

Figure 5. 672 Mallison Avenue, (right), and adjacent house.

Table 8. Final social variable ranking

Parcel Number	Address	Avg. Unemployment Rate	Avg. Median Household Income	(Population Total)	Population Range	(Memberships)	(Memberships/ total pop)	Membership Rank	Total: (S)
6840195	773 LOVERS LN	4	4	7838	5	310	0.0395509058	23	36
6738336	876 GARFIELD ST	4	4	5606	4	209	0.0372814841	24	36
6831777	849 GARFIELD ST	4	4	5606	4	209	0.0372814841	24	36
6830360	983 STADELMAN AVE	4	4	6996	5	475	0.0678959405	22	35
6849195	1202 COPLEY RD	4	3	6304	5	450	0.0713832487	21	33
6845928	917 BAUGHMAN ST	4	4	7233	5	725	0.1002350339	18	31
6735737	426 CUYAHOGA ST	5	5	2834	1	209	0.0737473536	20	31
6857980	943 COPLEY RD	4	3	5180	4	475	0.0916988417	19	30
6747341	88 OAKDALE AVE	4	4	5431	4	675	0.1242865034	17	29
6822628	630 DIAGONAL RD	4	4	5297	4	1225	0.231262979	15	27
6839979	642 DIAGONAL RD	4	4	5297	4	1225	0.231262979	15	27
6736167	610 MADISON AVE	4	4	5512	4	1325	0.2403846154	14	26
6712894	672 MALLISON AVE	5	5	3976	2	1073	0.2698692153	13	25
6814108	445 ALEXANDER ST	5	4	4670	3	2955	0.6327623126	12	24
6745042	948 BRITTAIN RD	3	3	3161	2	455	0.1439417906	16	24
6860896	197 HICKORY ST	5	5	3711	2	2500	0.6736728645	11	23
6860902	171 HICKORY	5	5	3711	2	2518	0.6785233091	11	23
6860904	155 HICKORY ST	5	5	3711	2	2518	0.6785233091	11	23
6815312	123 E LODS ST	4	4	3603	2	2868	0.7960033306	10	20
6762933	299 HICKORY ST	5	4	3035	2	2500	0.823723229	9	20
6762932	303 HICKORY ST	5	4	3035	2	2500	0.823723229	9	20
6763023	309 HICKORY ST	5	4	3035	2	2500	0.823723229	9	20
6762878	353 HICKORY ST	5	4	3035	2	2500	0.823723229	9	20
6807290	135 MUSTILL CT	5	5	2599	1	2900	1.1158137745	8	19

source of anomaly, this parcel stood out as significantly lower ranked—if compensating for possible error in calculation, assuming that the population could have been up to the maximum, one category higher (a score of 2 instead of a 1, and a population count of 3999) the membership ranking would be 10, and the total *S* rank would be 22 out of 39.

In Table 6, the parenthesized columns were used in calculation, but not added to the final rank score. All parcels were located in areas having higher rates of unemployment and lower median household incomes. Twenty-one parcels were located in areas which had a median household income of less than $41,000, and twenty-three parcels had unemployment rates of 15.4% or greater—these scores (4 and 5) were derived from the census dataset's existing income ranges. The lowest income range ($0-$27,000) accounts for six of the twenty-four vacant parcels.

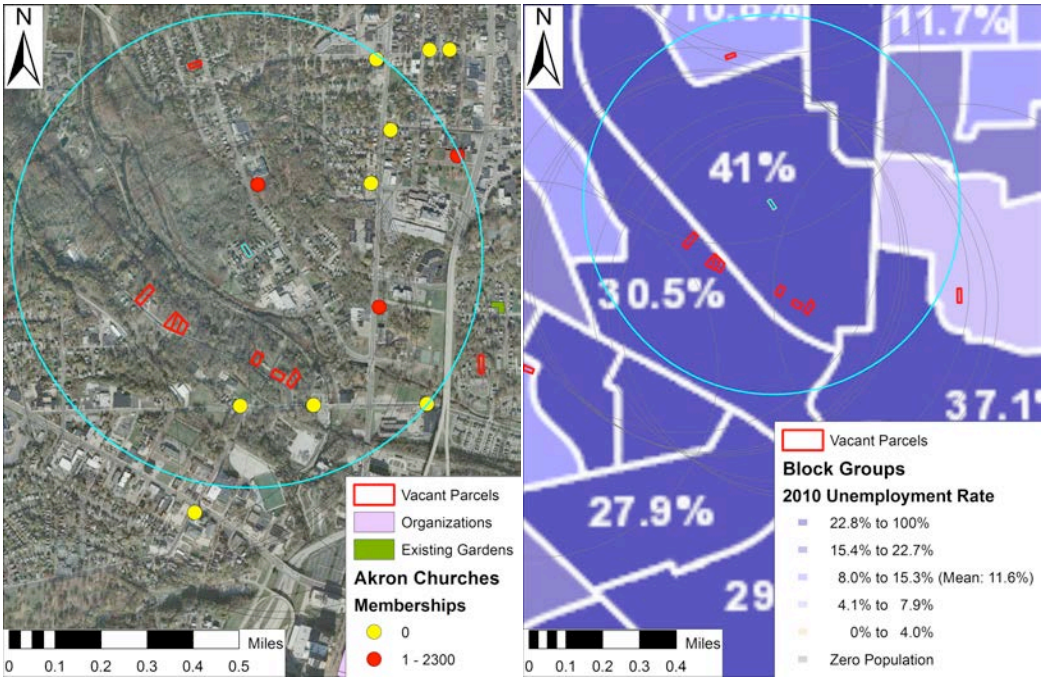

Figure 6. 135 Mustill Court ½ mile buffer with membership hubs (left) and unemployment rates (right)

Analysis of Social Capital

This study attempted to identify a diverse set of social capital sources through hubs of civic engagement. While many types were initially identified and located, those that fell within the study area were restricted primarily to church memberships, a significant limitation which leaves much room for subjectivity in the social capital variable. A future analysis should incorporate more rigorous field work to identify a more exact profile of each neighborhoods memberships.

When analyzing memberships in analysis, hubs of civic engagement that fell within the study area were comprised of forty-seven churches, four existing community gardens, and a fitness center. Of the forty-seven churches that fell within the ½ mile buffer of each vacant parcel, twenty-two churches responded when asked about membership numbers (detailed in Table 9). The other twenty-five churches that did not respond (i.e. did not return phone calls, emails, and/or did not hold regular office hours at which they could be reached) are presumed to be small enough that membership numbers would not be significant to this study. Church memberships varied from 70 to 2300, existing garden memberships ranged from 3 to 18, and the fitness center had 1350 members. As the membership rank variable carried more weight than the other social variables, the lowest membership ratios (higher membership rank) correlated with the overall highest *S* rank. This variable is weighted to normalize the overall *C* rank and to emphasize the significance of civic engagement as a variable in community development.

Organization	Memberships	Interviewee	Position	Date of Interview
Abundant Life Center of Eternal Truth	90	Darlene Garber	Pastor	Jun 9, 2012
Akron Alliance Fellowship Church	250	Gus Brown	Pastor	Jun 9, 2012
Arlington Church of God	1155	Natalie DeGraffenreid	Receptionist	Jun 6, 2012
Bethel Seventh Day Adventist Church	200	Ann Clark	Church Secretary	Jun 13, 2012
Bethel Temple Original Glorious Church	2300	Connie Rohaley	Receptionist	Jun 13, 2012
Church of Our Savior	175	Patricia Wilson	Financial Administrator	Jun 13, 2012
Emmanuel United Church of Christ	285	Demetria Davis	Church Secretary	Jun 13, 2012
Faith United Methodist Church	170	Linda Bradley	Office Manager	Jun 13, 2012
First Apostolic Faith Church	600	Lula Hampton	Church Secretary	Jun 13, 2012
Good Shepherd Baptist Church	75	Anonymous	Church Employee	Jun 13, 2012
Goodyear Fitness Center	1350	Carol jordan	Fitness Center Coordinator	Jun 18, 2012
Greater Bethel Baptist Church	80	Rachelle Henderson	Church Secretary	Jun 13, 2012
Macedonia Baptist Church	300	Pamela Bray	Administrative Assistant	Jun 6, 2012
Mount Calvary Baptist Church	500	Lisa Davis	Church Administrator	Jun 13, 2012
Mount Olive Baptist Church	200	Jean Dixon	Office Manager	Jun 13, 2012
Mount Zion Baptist Church	200	Carissa Martin	Church Administrator	Jun 13, 2012
New Mission missionary Baptist Church	70	Anonymous	Church Employee	Jun 6, 2012
Parcel 6734572, 342 Turner Street Garden	18	Kurt Mulhauser	City Planner	Jun 27, 2012
Parcel 6828536, Cuyahoga Street Garden	9	Kurt Mulhauser	City Planner	Jun 27, 2012
Parcel 6840195, 773 Lovers Lane Garden	10	Kurt Mulhauser	City Planner	Jun 27, 2012
Parcel 6847002, Vernon Odum Blvd Garden	3	Kurt Mulhauser	City Planner	Jun 27, 2012
Peoples Baptist Church	130	Danita Smith	Church Clerk	Jun 13, 2012
Providence Baptist Church	200	Lilian Smith	Church Secretary	Jun 13, 2012
Saint Anthony's Catholic Church	400	Jenny Toth	Receptionist	Jun 13, 2012
United Baptist Church	250	Sonya Harris	Church Secretary	Jun 13, 2012
Unity Church of God in Christ	200	Jackie Owen	Church Secretary	Jun 13, 2012
Wesley Temple African Methodist Episcopal Zion Church	150	Kirsten Eckley	Church Secretary	Jun 13, 2012

Table 9. Organizations within the study area and their memberships according to interviewees responses

Overall Ranking Results and Ground-truthing

The overall ranking results of the twenty-four vacant parcels returned one clearly top-ranked parcel, 773 Lovers Lane. This normalized average score (33.5 out of 39) revealed that this existing community garden is the most ideal, in terms of physical and social variables, for fostering social capital according to this study's devised methodology. Second to this existing garden, 630 Diagonal Road appears again for its suitability as a community garden based on both sets of variables (a *P* score of 31, an *S* score of 27, and a *C* score of 29). The average *C* score was 25.08333, with a median score of 24, and a standard deviation of 2.984. A vacant parcel with a median ranking (*C* score of 24) was 299 Hickory Street, with a *P* score of 28 and an *S* score of 20. The lowest ranking vacant parcel was, again, 135 Mustill Court, with a *P* score of 23, and *S* score of 19, and a *C* score of 21.

Figure 7. 773 Lovers Lane, an existing community garden

As part of the ground-truthing exercise, an interview with Kurt Mulhauser, the City Planner for Akron's Department of Planning and Urban Development, was conducted on June 27th, 2012. As the city's community garden program is relatively new, the department relies on Mr. Mulhauser as the singular person in charge of identifying sites for and implementing community gardens for the *Akron Grows* Program. In a presentation of the results of this study, Mr. Mulhauser was very interested to see the physical variables identified in the study match the variables he sought when identifying potential sites. It was revealed that, in efforts identical to this study, he has been attempting to utilize vacant parcels owned by the city for community gardens—this explained why 773 Lovers Lane was identified as both a vacant parcel and an existing community garden in analysis.

While walking Mr. Mulhauser through the results of this analysis, he gave feedback on the top parcels and their real-world suitability as community gardens. First, the top-ranked parcel that was not already a community garden was discussed, as the analysis and field work point to this parcel as an ideal location out of all twenty-four researched. The lot was notably larger than the others, included room for parking, and was lined by trees and greenspace. However, upon closer inspection, the lot and surrounding neighborhood reflected recognizable signs of urban blight that reinforced this parcel's high ranking—nearby abandoned buildings, and litter scattered on and around the property indicated neglect. Mr. Mulhauser agreed that he would have chosen 630 Diagonal Road as one of the best sites for a community garden, and had previously

tried to discuss this with other planning departments. Unfortunately, they held other agendas and had reserved this land, as well as the adjacent 642 Diagonal Road, for a cul-de-sac development. Mr. Mulhauser was impressed that the analysis returned this plot as one of the most suitable, as he had previously identified it as well, but went on to explain that many of the plots identified—by both this study and himself—were unfortunately reserved for residential uses. Could this have been a potential garden site, the atmosphere was ideal—the lot is in a walkable neighborhood, close to residential areas as well as restaurants and historical districts, but is also surrounded by more green space, providing a beautiful oasis in an urban center.

Figure 8. 630 Diagonal Road, a top-ranked parcel for a future community garden

In contrast to this potential garden site, we discussed the real-world suitability of the top-ranked existing community garden. The area surrounding 773 Lovers Lane also reflected signs of urban blight through functional and social depreciation while conducting field research—there were several seemingly abandoned properties within sight, graffiti, and copious amount of litter in neighboring properties. The outer neighborhood looked neglected, but the garden was well-cared for. The parcel was fenced and very visibly located on a busy street. However, according to Mr. Mulhauser, there have been reports of theft from gardeners' plot, perpetrators being both outside community members and fellow gardeners. Truly, these factors only solidify this parcel as the top-ranked ideal location to foster social capital for the community. Mr. Mulhauser stated that he does not like this community garden location. It is relatively new compared to the other gardens and has not yet fostered community betterment. Comparatively, Mr. Mulhauser reported that *Akron Grows* maintains two community gardens on Cuyahoga Street and one at Turner Street which are very successful, safe, and have a "community" feeling. He stated, "We can't really predict what makes one garden work and another one not. It comes down to the people you get there, and that can't be put into numbers and equations." He preferred that gardens be placed in neighborhoods that already have social capital resources, and therefore would be safer for gardeners.

Similarly to the atmosphere of 630 Diagonal Road, the median ranked parcel (299 Hickory Street) was also in a semi-residential, semi-urban center that was very walkable and in an existing natural green space. Mr. Mulhauser also would have agreed to putting a

community garden on any of the Hickory Street plots, but they were also reserved for residential development.

The lowest ranking parcel, 135 Mustill Court, did not appear to meet any criteria as an ideal location for a community garden when visiting sites in the ground-truthing. The lot was very small, the surrounding houses were in good condition, and the neighborhood and lot did not outwardly reflect the signs of urban blight and lack of social capital as other neighborhoods did in the on-site assessments.

Overall, the results of the on-site assessments adhered to the results of the model in identifying areas with greater social capital need that were also physically suited for agricultural purposes. Vacant parcels that ranked higher in the analysis results reflected more urban blight through under-maintenance than parcels that ranked lower.

After the presentation and reviewing the full report, Mr. Mulhauser said, “I am judging the methodology based on the results, and it definitely seemed useful in selecting good lots in good areas.” He did advise for future analyses the addition of a lot visibility variable, possibly from using traffic data, because of aesthetics and safety. Apart from the devised methodology, he expressed the desire to expand the successful community gardens, and suggested choosing vacant parcel suitability by proximity to successful community gardens. However, this would (1) require a methodology to measure success of existing community gardens and (2) unevenly distribute the city’s resources in favor of neighborhoods that already house social capital resources, bypassing the purpose of this study, which prioritizes neighborhoods that are low in social capital

To more directly address the lack of community gardens as a specific source of social capital, an adjusted analysis ranking was run through the devised methodology excluding parcels that are within ½ mile of an existing community garden. This amendment better adheres to the *Re-imagining a More Sustainable Cleveland* project's goal, to site new gardens at least ½ mile away from existing gardens (CUDC, 2008). This was not part of the initial methodology because all sources of social capital were broken down and measured as memberships, without discriminating against type of organization or club, in an effort to test the validity of measuring social capital through membership counts. It was assumed that the number of memberships to these gardens would be enough to lower the suitability of vacant parcels near existing community gardens. However, as the initial results reflect, this was not the case, as vacant parcels near community gardens are distributed throughout the ranking.

Parcel Number	Address	Total: (P)	Total: (S)	Combined Rank: (P+S)/2
***6840195**	773 LOVERS LN	31	36	33.5
6822628	630 DIAGONAL RD	31	27	29
6845928	917 BAUGHMAN ST	25	31	28
6857980	943 COPLEY RD	26	30	28
6839979	642 DIAGONAL RD	28	27	27.5
***6735737**	426 CUYAHOGA ST	23	31	27
***6738336**	876 GARFIELD ST	18	36	27
***6831777**	849 GARFIELD ST	18	36	27
6849195	1202 COPLEY RD	21	33	27
6830360	983 STADELMAN AVE	18	35	26.5
6747341	88 OAKDALE AVE	21	29	25
***6815312**	123 E LODS ST	28	20	24
6762933	299 HICKORY ST	28	20	24
6762932	303 HICKORY ST	28	20	24
6763023	309 HICKORY ST	28	20	24
***6712894**	672 MALLISON AVE	21	25	23
6736167	610 MADISON AVE	20	26	23
6814108	445 ALEXANDER ST	22	24	23
6762878	353 HICKORY ST	25	20	22.5
6860896	197 HICKORY ST	21	23	22
***6860902**	171 HICKORY	21	23	22
***6860904**	155 HICKORY ST	21	23	22
6745042	948 BRITTAIN RD	20	24	22
6807290	135 MUSTILL CT	23	19	21

Table 10. Final combined initial ranking, including parcels within ½ mile of an existing community garden (indicated by asterisk)

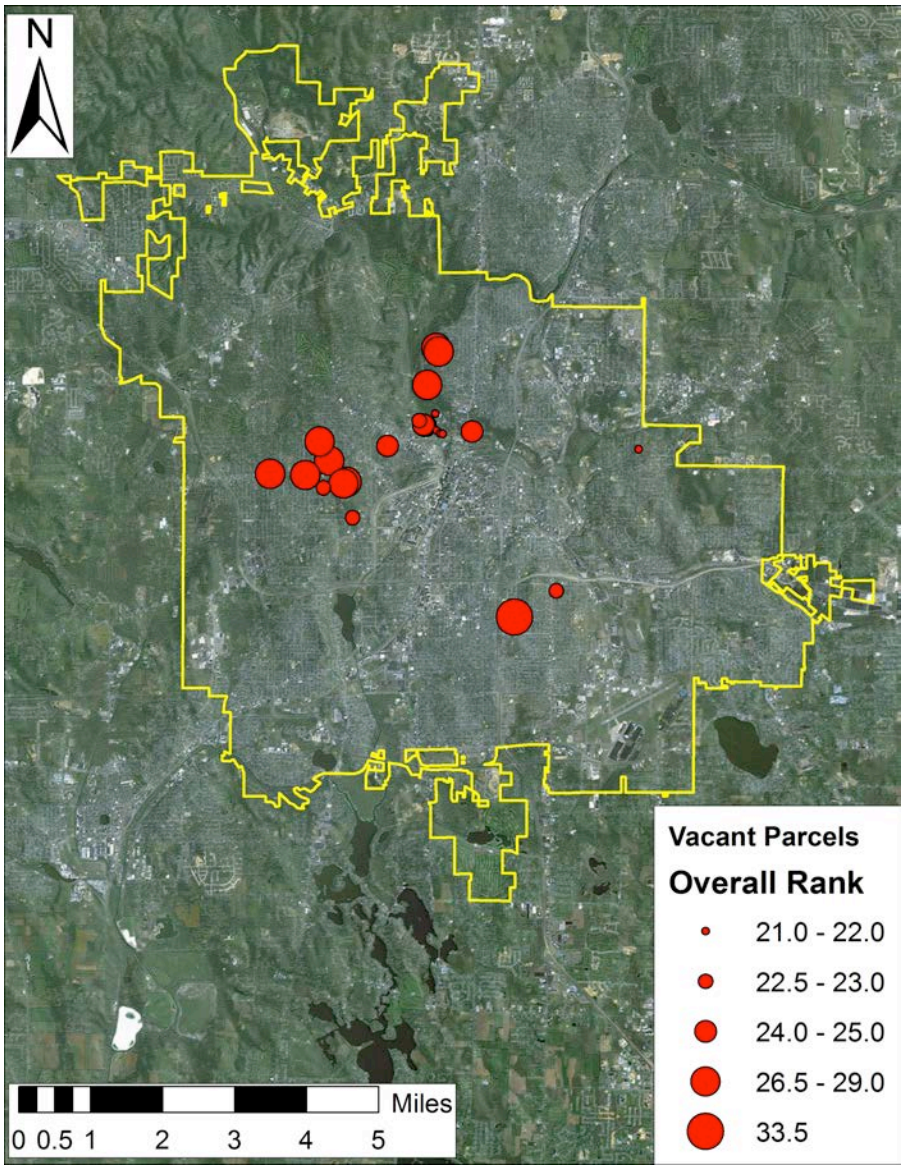

Figure 9. Overall ranking distribution

Adjusted Ranking for Nearby Community Gardens

Initially, the variable of existing community gardens existed as only a consideration of memberships within a vacant parcel buffer. As a secondary consideration, an adjusted analysis ranking of vacant parcels was conducted to exclude vacant parcels that are within ½ mile of an existing community garden. This amendment to the methodology more practically applies the analysis to neighborhoods lacking the social capital resources brought by community gardens. The original results are still useful for the application of expanding existing community gardens that have been particularly successful. However, the secondary results best suit the original intention of the study, as well as providing a better distribution of resources within the city.

After screening for parcels within ½ mile of an existing community garden, sixteen vacant parcels were left for the adjusted analysis ranking. The physical ranking system was relatively unaffected by the removal of these parcels, as the scores used in ranking were not dependent upon the other parcels' scores.

The adjusted analysis results of the social variable ranking were different from the initial results, due to the membership rank variable being dependent on the other parcels. The results had a mean *S* score of 28.6 (compared with the first mean of 26.6), a median score of 28.5, and a standard deviation of 4.8. The top-ranking vacant parcel is 983 Stadelman Avenue, with an unemployment score of 4/5, a median household income score of 4/5, a population score of 5/5, and a membership rank of 24/24, for a total *S* score of 37/39. In the initial results, this vacant parcel was the fourth most suitable parcel,

with a membership rank of 22/24. A vacant parcel with approximately a median score was 445 Alexander Street (*S* score of 28, up from the previous *S* score of 24). This was caused by the membership rank moving from 12 to 16, while the other variables remained the same. The lowest ranking vacant parcel was, again, 135 Mustill Court. The *S* rank moved from 19 to 21, but the same anomaly in calculation existed here as before (more memberships than population), as the raw data was not affected by adjusting the analysis. This calculation still had the most significant impact on the *S* rank, leaving 135 Mustill Court to remain as the bottom ranked parcel.

Figure 10. 135 Mustill Court, ranked lowest in physical suitability and social capital need

Parcel Number	Address	Slope	Soil Drainage	Size (acreage)	Prime Farmland Status	Sun Exposure (Percent Cleared)	Building/ tree Shadow	Brownfield	Hydrant Access	Total: (P)
6822628	630 DIAGONAL RD	4	2	5	1	4	5	5	5	31
6839979	642 DIAGONAL RD	4	2	5	1	2	4	5	5	28
6762933	299 HICKORY ST	3	4	3	1	5	4	5	3	28
6762932	303 HICKORY ST	3	4	3	1	5	4	5	3	28
6763023	309 HICKORY ST	3	4	3	1	5	4	5	3	28
6857980	943 COPLEY RD	5	2	2	1	4	3	5	4	26
6845928	917 BAUGHMAN ST	5	2	1	1	4	3	5	4	25
6762878	353 HICKORY ST	3	4	5	1	1	2	5	4	25
6807290	135 MUSTILL CT	4	4	2	1	1	1	5	5	23
6814108	445 ALEXANDER ST	4	2	1	1	5	2	5	2	22
6860896	197 HICKORY ST	3	4	3	1	1	1	5	3	21
6747341	88 OAKDALE AVE	3	2	3	1	2	2	5	3	21
6849195	1202 COPLEY RD	4	3	2	1	3	1	5	2	21
6736167	610 MADISON AVE	5	2	2	1	1	1	5	3	20
6745042	948 BRITTAIN RD	4	2	1	1	1	3	5	3	20
6830360	983 STADELMAN AVE	4	2	1	1	1	1	5	3	18

Table 11. Adjusted analysis physical variable ranking

As for the adjusted-analysis combined variable results (Table 13), the mean *C* score was 26.3125, the median score was 26.25, and the standard deviation was 2.516. Of the sixteen vacant parcels, 630 Diagonal Road remained the top-ranked parcel with a *C* score of 30.5 (up from 29 in the initial results), 299 Hickory Street had an approximately median *C* score of 26.5 (up from 24), and 135 Mustill Court remained the lowest ranking parcel with a *C* score of 22 (up from 21). This final set of results lays out the most accurate portrayal of site suitability based on the methodology for the intended purpose of this study. The second highest ranked parcels were 917 Baughman Street (*C* = 29.5) and 943 Copley Road (*C* = 29.5), which, unlike 630 Diagonal Road, had no future plans detailed.

Figure 11. 917 Baughman Street, the second highest ranked parcel

Parcel Number	Address	Avg. Unemployment Rate	Avg. Median Household Income	(Population Total)	Population Range	(Memberships)	(Memberships/ total pop)	Membership Rank	Total: (S)
6830360	983 STADELMAN AVE	4	4	6996	5	475	0.0678959405	24	37
6849195	1202 COPLEY RD	4	3	6304	5	450	0.0713832487	23	35
6845928	917 BAUGHMAN ST	4	4	7233	5	725	0.1002350339	21	34
6857980	943 COPLEY RD	4	3	5180	4	475	0.0916988417	22	33
6747341	88 OAKDALE AVE	4	4	5431	4	675	0.1242865034	20	32
6822628	630 DIAGONAL RD	4	4	5297	4	1225	0.231262979	18	30
6839979	642 DIAGONAL RD	4	4	5297	4	1225	0.231262979	18	30
6736167	610 MADISON AVE	4	4	5512	4	1325	0.2403846154	17	29
6814108	445 ALEXANDER ST	5	4	4670	3	2955	0.6327623126	16	28
6745042	948 BRITTAIN RD	3	3	3161	2	455	0.1439417906	19	27
6860896	197 HICKORY ST	5	5	3711	2	2500	0.6736728645	15	27
6762933	299 HICKORY ST	5	4	3035	2	2500	0.823723229	14	25
6762932	303 HICKORY ST	5	4	3035	2	2500	0.823723229	13	24
6763023	309 HICKORY ST	5	4	3035	2	2500	0.823723229	12	23
6762878	353 HICKORY ST	5	4	3035	2	2500	0.823723229	11	22
6807290	135 MUSTILL CT	5	5	2599	1	2900	1.1158137745	10	21

Table 12. Adjusted analysis social variable ranking

Parcel Number	Address	Total: (P)	Total: (S)	(P+S)/2
6822628	630 DIAGONAL RD	31	30	30.5
6845928	917 BAUGHMAN ST	25	34	29.5
6857980	943 COPLEY RD	26	33	29.5
6839979	642 DIAGONAL RD	28	30	29
6849195	1202 COPLEY RD	21	35	28
6830360	983 STADELMAN AVE	18	37	27.5
6747341	88 OAKDALE AVE	21	32	26.5
6762933	299 HICKORY ST	28	25	26.5
6762932	303 HICKORY ST	28	24	26
6763023	309 HICKORY ST	28	23	25.5
6814108	445 ALEXANDER ST	22	28	25
6736167	610 MADISON AVE	20	29	24.5
6860896	197 HICKORY ST	21	27	24
6745042	948 BRITTAIN RD	20	27	23.5
6762878	353 HICKORY ST	25	22	23.5
6807290	135 MUSTILL CT	23	21	22

Table 13. Adjusted analysis combined variable ranking

Chapter Five: Discussion and Conclusion

This model tested the viability of social capital as an indicator for community garden planning in conjunction with traditional physical variables adapted for urban agriculture. Practical, suitable sites fitting both sets of devised criteria were identified in areas with lower social capital resources using the measurable variable of memberships within the buffer zone—therefore, this project is considered successful. The model provided a physical and social profile for each site, allowing for selection with preference of physical or social variable priority.

As expected from a study in urban agriculture, physical variables were unremarkable, but this may vary when applied to other cities. There was a surprising, yet welcome, lack of brownfield presence in the results—this raised the rankings of all parcels, as they would require less remediation to be brought up to gardening status. The overall physical variable ranking methodology was sound in assessing variables and can readily be applied on its own for site suitability analyses for urban gardens. With the spatial index of social capital adjusted to site-specific hubs of civic engagement, the ranking systems may be used in conjunction to effectively select suitable community gardens sites to foster social capital in areas with the most need.

Through the on-site assessment, the ground-truthing exercise afforded the confirmation of the suitability ranking of each parcel.This was mostly useful for assessing and documenting the physical criteria, as social capital findings can also be

cross-checked with qualitative observations of neighborhoods to back up social information from the census data. The ground-truthing in speaking with Mr. Mulhauser provided some valuable insight as to social capital in some potential sites, but further interviews would be required to assess each individual vacant parcel identified. However, Mr. Mulhauser's assessment of suitability did not adhere to the ideas presented in this study. His opinion of site suitability should only comprise part of each parcels' final ranking—but in the real-world setting, his word as a city planner is final. To prioritize the distribution of the city's resources for fostering social capital, this methodology affords an assessment tool in aiding the decision to place community gardens and to improve Akron communities through community gardens, a proven method of promoting social health and community cohesion (Wakefield et al., 2007). Addressing these areas of the city will provide the greatest return, as food security and community betterment through community gardening is most greatly returned in lower income areas (Armstrong, 2000). To improve upon this study in the future, a city with a differently structured planning department may be chosen. Having one person responsible for this decision leaves much bias to the results of this portion of the ground-truthing.

There are several other drawbacks to ground-truthing. The temporal aspect of this measurement offers either only a brief glimpse of the sites due to limited time availability to observe or requires extensive investment of time resources. Without living on-site, it would be difficult to gauge the true atmosphere of a neighborhood, and the costs, benefits, and limitations of this measure must be weighed. Additionally, this measure is

rather subjective in nature because every observer may have a different perspective of a neighborhood—this may vary even so simply as the differences in perspective from male to female observers.

Another limitation already mentioned was the measure of hubs of civic engagement. Though many types of hubs based on the definition of social capital were taken into consideration, churches comprised the vast majority of those that fell into the study area. One factor that may have contributed to this is unlisted businesses/hubs that would have only local recognition. Also, hubs that are not categorizable may exist—for example, a cafe where many community members meet every morning for coffee together (though this is not formal membership in a club or organization). To remedy this limitation, intensive local assessment is required for each site to determine all hubs of civic engagement and their memberships. Local knowledge is truly the only way to determine this variable. This explains the reliance in previous studies on individual surveys for social capital (Putnam 1993, 1995, 2000, 2001; Rupasingha et al., 2006). All other variables of the social ranking (those derived from census data) are more readily available for determining local conditions, allowing this analysis to be successful despite limitations from membership measurement.

Apart from intensive local assessment, a future amendment to this study may include individual surveys in assessment. Specifically, as a human study, this would adjust for the observed anomaly in memberships-to-population calculation. Surveying the home addresses of individual members would add a valuable spatial component to more

accurately profile the distribution of social capital through memberships and place of residence.

Less a limitation, and more a policy ramification, is the status of 773 Lovers Lane as both a city-run community garden and a vacant parcel for sale. The consequences on neighborhood social capital ought to be considered should the parcel be purchased and the neighborhood lose the established garden. If the city's policy is that vacant parcels are to be maintained as gardens, a full investment should be made rather than temporarily hosting gardens while awaiting sale of the parcel. The eviction of gardeners may undo all the initial intentions of the garden, causing setbacks for both the residents and the city.

While the city attempts to sell the parcels back into taxable status, it would seem they are trying to optimize their profits by reserving land for specific zoning (i.e. 630 Diagonal Road for a cul-de-sac development). Mr. Mulhauser did not make it clear his source of these details when discussing the futures of reserved parcels. It’s possible that this was from first-hand knowledge, an informal list, or a proper database. This information would have been incredibly useful to amend the pre-screening and remove any reserved parcels from the analysis.

The data and methodology used varies in usefulness, for this study and for future studies. Soil data is commonly used to determine slope, drainage, and prime farmland status—a finer scale may have been more useful to record parcel-to-parcel differences, but the Soil Survey data that was used is the most detailed soil data available in the State of Ohio (Soil Survey Staff, 2012). Sun exposure variables were devised for this study due

to a lack of data for the City of Akron. Datasets where these variables have been less subjectively measured would be useful when applied to other cities, as well as future Akron studies. The brownfield database was very useful, as all parcel IDs were accurately matched between county records and allowed for the profiling of possible contaminants. When measuring social variables, census data were invaluable to ranking social capital, and would be useful for future studies in any U.S. city.

Though it may seem easier to place community gardens in neighborhoods that already have a sense of community, overpopulated and impoverished neighborhoods of urban centers should not be overlooked and are often in greatest need of the benefits. For the overall betterment of the city, these social capital deserts must be nurtured and resources should be distributed accordingly. Time will tell if the existing garden at 773 Lovers Lane will be successful, if there will cease to be theft because the community will come together and step in, and if the garden will bring a safer feel to the neighborhood. In the mean time, it is not sitting unused or overgrown—it is a well-cared for garden, and it is serving a purpose.

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