Possibilities For the Urban Grower: Finding Sites in the City of Atlanta using Geographic Information Systems

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ABSTRACT

Urban agriculture and the local food movement have taken main stage both in academic discourse and public and political media. Socio-environmental downfalls of our current industrial food systems have been highlighted, compelling the public and political spheres to engage in activities that support the integration of local, urban food-growing systems. This thesis aims to contribute to that integration by examining possibilities for urban agriculture within the city limits of Atlanta. Through geospatial analysis methods and consultation of city and county property records, possible future sites were ascertained using socioeconomic and
ecological factors, with 21 key neighborhoods found to have the greatest potential and need to transform existing land use for agricultural purposes. This research contributes to the larger goal of systemic integration of urban and local food systems into our current economic, political and social landscape, and the study is framed using social theoretical insights from urban geography. While further examination of these urban agricultural food systems is vital, this thesis contributes to broader discussions about urban environmental sustainability and supports the roots of the local food movement by identifying possible sites for food cultivation and food markets.

INDEX WORDS: Urban Agriculture, Sustainability, Geographic Information Systems, Urban Political Ecology
POSSIBILITIES FOR THE URBAN GROWER: FINDING SITES IN THE CITY OF ATLANTA USING GEOGRAPHIC INFORMATION SYSTEMS

by

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DEDICATION

To my family and friends who have supported and encouraged me through this journey, thank you.
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1 INTRODUCTION

1.1 Purpose of the Study

We have only to look at the depletion of our aquifers, the pollution of our fresh water, and the collapse of our immune systems to realize that our physical (and mental) separation from our places and the natural world generally has come to lay us low.

-Delind (2006:142)

Since I was young, my life has been framed by food. This is not because I grew up on a farm or had hippie-environmentalists for parents. My connection to food is disjointed, but immense. My father worked in various restaurants my entire life, so I was the little girl in a booth with crayons, helping the hosts stock mints and watching intensely as the bartenders, servers and bussers ran around frantically trying to please difficult customers. I would sit on the counter and watch my dad cook; enjoying the passion he had for food and for new flavors. This passion for food was contagious, and so even as a child I never met a vegetable I did not like. I would go down to rural parts of Georgia to see family, and there I would help harvest vegetables for my grandmother and great grandmother and then watch as they made delicious southern meals from the food I had just picked. As I grew older, my connection to food deepened.

Starting as a host at 15 and eventually becoming a bartender, I have now worked in the restaurant industry for 13 years. Along the way, I have met and become close with renowned chefs, eccentric mixologists, self-proclaimed foodies and everything else in between. As my palate expanded, my interest in local food grew as “food-to-table” restaurants started popping up around the city. Basically, between my experiences with my dad and my own personal work history, I have spent a lifetime in restaurants, developing an intimate understanding of the distribution and consumption of food. And, although I had a cursory understanding of food
production through my family’s personal gardens, a few years ago I began to think more carefully about the methods and geographies of food production.

Four years ago I met my boyfriend, who is from Dixie, Georgia, and all that name implies. A family of generational farmers, his father, brothers, uncles and other extended family members work thousands of acres of land, growing everything from cotton to peanuts, while also raising thousands of chickens and hogs. My experience visiting these farms gave me a glimpse into the large conventional systems that dominate our food culture. His family utilizes industrialized equipment and the newest technology to make production cost-effective and efficient. These are good people, with strong connections to the environment and their community, making me think through the forces that might affect a farmer’s decision to engage in practices that some environmentalists see as unsustainable, such as the reliance on detrimental synthetic fertilizers and pesticides (e.g., Pimentel et al. 2005). This new-found understanding, led me to explore farming in my own environment, influencing my decision to seek out an internship that engaged local food in Atlanta.

I began working in various gardens and networking with those invested in the local food movement. Despite the fact that they each approach engaging and promoting local food differently, they all seem to have the same goal: to reconnect Atlantans and the general public with their food source, a goal, as I show below, that reflects a rejection of the industrialization of agriculture and the disconnection between people and their food. My work led me to growers who are fervent about making urban agriculture and local food an integral part of the city, policy makers who propose projects and initiatives to further this goal, and organizations where the sole mission is to find ways to create a network of urban food, while also providing that food to the community members who need it – those in low socioeconomic areas whose diets are composed
of mainly processed or chemically-filled foods, which scholars have documented cause poor health outcomes (McLaren 2007; Wang et al. 2007).

Even though my connection to rural systems was there, my personal life in this urban environment compelled me to invest in this movement through my thesis work and personal time. Through harvesting and working with growers in my urban home, I have experienced how Mother Nature fights for a way to be integrated into an urban setting, despite various impediments.

The obstacles of urban farming and reconnecting urban populations to their food sources are diverse and vast and include variables such as adequate or affordable water, proper sunlight amidst the sea of skyscrapers and new developments, soil that has not been tainted from urban contaminants, money to finance production, and finding and obtaining a lease for land in the first place that is affordable and available in a dense, urban environment (Brown and Jameton 2000; Lovell 2010). All of these issues can potentially be overcome by experienced urban growers, but an issue that seemed to be ever present is the issue of finding land and then obtaining the right to farm it, which is an issue not normally prevalent in rural areas, where agriculture has been ingrained in the culture and where policies and even infrastructure support farming activities. It is this very geographical and practical gap to which this thesis contributes: developing an approach for identifying land parcels in urban areas that have the potential to be sites of food production for small-scale farmers. Using Geographic Information Systems (GIS), I utilize a geospatial method to finding sites, using vacancy percentages and median housing values to locate affordable and available land, supplying and analyzing zoning code and requirements for city parcels, and supplementing this data with a closer examination of sites through aerial imagery, property records and primary data collection.
In what follows, I situate my research in the broader fields of urban geography and geospatial technologies. Drawing on the connections being made about how our urban structure has been influenced by our market-driven, industrialized systems that, as Delind (2006:142) comments “have come to lay us low,” and asserting how reviving the connection to food, the environment and the city to local food and urban agriculture can alleviate many of the problems facing urban residents and local governments. The following literature review reveals the significance of the variables I chose to utilize in my approach, while also providing context and significance for the support of urban agriculture. I frame my arguments drawing from urban geography literature and insert my methods into the already present dialogue on local, urban food and geospatial technologies.

2 LITERATURE REVIEW

Drawing on Lefebvre’s conception of “the right to the city,” Harvey (2003:939) asserts that “the right to the city is not merely a right of access to what already exists, but a right to change it after our heart’s desire”. Throughout the centuries, cities have been centers for innovation, commerce, and drivers of change (Cockrall-King 2012). But, Harvey (2012) insists that through an emphasis on commerce, unmitigated capitalist development of the city has restructured it so that urban spaces have been indicative of capital gains at the expense of social and environmental justice for its citizens. Through this capitalistic-driven structure, the city has diminished emphasis for the struggles of its citizens and the quality of life outside of financial contribution and instead compelled a system where worth is defined through exchange value and free market structure, many times denying or hindering citizen’s rights to democracy - articulated by scholars as neoliberalism (Brenner and Theodore 2002; Brenner and Theodore 2005; Giroux 2004; Harvey 2005). However, Harvey (2012) also asserts that through the right to the city philosophy, individuals and groups in contemporary cities are beginning to contest neoliberalism
through transformations of the social, environmental, and economic factors that benefit interests beyond accumulation of capital. Shillington (2013) continues this notion through his interpretation of Lefebvre’s ideas on citizenship, asserting that the right to the city is in fact a social and ecological issue. Recently, these assertions are demonstrated through groups like the Right to the City Alliance, founded in 2007, whose mission includes a fight for democracy, justice, and sustainability in our cities through restructuring of the city outside of detrimental market speculation (“Mission and History” 2015). In this mission, the notion of sustainability is an integral part of the right to the city, which is a different approach compared to previous generations (Marcuse 2009). Sustainability, however, is a term that is widely used but not as widely understood or agreed upon (Allen and Hoekstra 1993).

A generally held definition of sustainability, as defined by the World Commission of Environment and Developers, is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” In other words, sustainability refers to development where the future viability of citizens and in turn their urban environment is considered, a conception associated to the right to the city as described by Shillington (2013) given the connection of the city to health of its future ecology (Harvey 2003). However, scholars feel that this definition is incomplete and needs to be expanded to include explicit ecological, social and economic factors, as described by Agyeman and Evans (2004: 157): “sustainability… cannot be simply a ‘green,’ or ‘environmental’ concern […] A truly sustainable society is one where wider questions of social needs and welfare, and economic opportunity are integrally related to environmental limits imposed by supporting ecosystems”. Sustainability is therefore important when discussing the future livability of cities and the rights of its residents as defined through socio-environmental terms (Heynen et al. 2006; Shillington
2013; Swyngedouw and Heynen 2003). Discussing the future sustainability of cities is especially crucial as of late because, as indicated by the United Nations, more than 50% of the world’s population is now living in urban areas and over two-thirds will be by 2030 (Cockrall-King 2012). Hence, the need to realize the full potential of these urban centers and find ways to create sustainable urban spaces is vital (Pretty 2010)—not only for the short term revitalization of the city, but also for long-term issues such as food security (Heckler 2012). Striving for this definition of sustainability allows city leaders to engage urban residents at various social, environmental and economic scales, addressing areas of infringement while providing overall revitalization (Heynen et al. 2006). Therefore, when discussing plans for urban sustainability, each of these components of sustainability must be addressed.

Now, while urban planners, activists, politicians, and citizens alike acknowledge pressing issues that impact the urban resident and provide obstacles for instituting a fully realized sustainable city, such as problems with crime, poverty, hunger, public health, social justice, and environmental and economic stability, scholars suggest that there is a single variable that impacts and influences each facet of urban infrastructure, providing a solution for these above mentioned ailments through one of life’s basic essentials: food (Morgan 2009; Pothukuchi and Kaufman 1999). Continuing the thread of Shillington (2013), along with the assertions of other scholars, the health of a community’s food system is a significant indicator of its social and environmental sustainability, playing a major role in the social reproduction of the city (Pothukuchi and Kaufman 1999). These assertions indicate that “food is very much an urban issue, affecting the local economy, the environment, public health and quality of neighborhoods” (Feenstra 1997; Lovell 2010; Pothukuchi and Kaufman 1999: 217). Yet, for various reasons, academics and city planners note that food has been a much less visible piece of the city infrastructure discussion
and has not always been considered as a viable choice when deciding on strategies to create a more sustainable urban environment (Pothukuchi and Kaufman 1999). However, when discussing food as a possible solution to a variety of urban ills, academics declare that we must be specific, because while food connects us all, certain food systems contribute to the neoliberal structure the right to the city is trying to contest (Cockrall-King 2012; Lovell 2010). Thus, when discussing food in terms of sustainability, academics and activists emphasize that the discussion should focus on sustainable food systems through sustainable agriculture farming practices, distribution, and marketing (Lovell 2010; Pollan 2006). In 1989 the American Society of Agronomy defined sustainable agriculture as “one that over long term enhances environmental quality and the resource base on which agriculture depends, provides for basic human food and fiber needs, is economically viable, and enhances the quality of life for farmers and society as a whole.” As articulated earlier and in the above definition, scholars and activists assert that sustainability is multifaceted with a common emphasis for the recognition of society’s needs and the health of the environment ahead of neoliberal market values. In addition, as academics refine the scope of analysis to focus on specifically urban sustainability, Mougeot (2000) concludes that we must also refine our search to the local, urban environment; hence, investment and analysis of urban agriculture is shown by scholars to be an integral part of urban sustainability, and a “way through which many inhabitants claim their right to the city” (Shillington 2013: 103; Van Veehuizen 2006).

Through an exploration of the past century’s food system, I expose how an emphasis on unsustainable food systems shaped in recent decades by neoliberal processes that emphasize profits in the market rather than the health of social or environmental systems has led to problems for society as a whole in terms of health, economics, and environmental stability, and
how these issues translate to the urban scale. These unsustainable systems are situated as problems associated with the transformation of local, organic farming practices to agro-industrialized production and global markets – whose unjust impacts can, many scholars and activists believe, be alleviated through investment in local food markets and urban agriculture. Additionally, I use these insights to develop my own approach to addressing the very practical problem of identifying potential sites to expand the local food system of the city utilizing geospatial methods.

2.1 America’s Century of Changing Food Landscapes

2.1.1 Fragmentation in food

Before 1945 and the end of WWII, urban environments and food production systems were intimately linked, as American settlements were dependent on the agricultural production of nearby farms and local gardens (Broadway 2009; Lovell 2010). Vacant land parcels were frequently used for unofficial community gardens to support those without means to purchase groceries, and government initiatives supported and even encouraged local agriculture with programs like the victory gardens movement during WWII which urged citizens to cultivate their own home vegetable gardens to allow any available food resources to be used for military purposes (Brown and Jamston 2000; Cockrall-King 2012; Lovell 2010). Yet, by the end of WWII, scholars, environmentalists and economists note a massive shift towards the development of farming systems that increased global agricultural production and distribution through technological industrialization, pushing agriculture away from the city and its residents (Bandyopadhyay and Contractor 2012; Reganold et al. 1990; Thrupp 2000). Noted by academics, these highly productive systems shifted agriculture away from small, local structures and began a fragmentation between the cultivation process, the producer (farmer), the
benefactor, the distributor, the market, and the consumers, while commodifying food products and creating ecological problems with changing practices (Cockrall-King 2012). These modifications to the city and the emphasis on exclusive rural or peri-urban farming created a detrimental separation of the farm and its food products from urban residents.

However, through reinvestment into the local food movement, which Delind (2006: 123) defines as a movement that “focuses on reconnecting people to their food supply and reinvigorating the values (and relationships) inherent in community through the production, purchase, and consumption of local food,” that fragmentation between consumers and their food products and between urban residents and nature can be bridged. Moreover, Delind (2006) suggests that food has become increasingly commodified, so if “we are what we eat,” then Delind (2006: 126) suggests that we “too are in the process of becoming commodities”. Therefore, activists for the reconceptualization of food as something more than a mere commodity are not only advocating for environmental worth and viability but also worth and substance of the individual (Delind 2006; Lockwood 1999). In fact, Cobb (2011) and other scholars explain how the local food movement has begun the process of changing the way people view food through local markets, establishing connectivity between consumers and the farmers, between consumers and their food products, and between nature and the individual (Bell and Cerulli 2012; Delind 2006; Falguera et al. 2012; Lamer 2003). That change in perception and interaction can lead, and in many areas has led, to purchasing locally and moving away from highly processed, industrialized food – providing a closer relationship between cultivation, production, and consumption for urban residents that allow food to be reclaimed as a local good from the industrialized systems that exploited them. This reclamation is necessary for Cobb (2011) and others because of conventional, industrialized practices that cripple the ecological
health of the environment and many argue the physical health of American consumers (e.g., Falguera et al. 2012).

Industrialized practices, which not only promote a detachment of the consumer from their food source, relies on a certain level of secrecy for the methods being utilized by these farmers, the policies and expectations of the benefactors (which were and are many times the national government), and the marketing practices of the distributors (Guthman 2011). Through a lack of transparency, and partly a complacency or obliviousness of consumers, industrialized systems have been allowed to operate outside of public scrutiny, seemingly invisible to the average urban or non-farming individual (Cockrall-King 2012). Due to this lack of oversight, the twentieth century was shaped by fossil-fueled mass distribution, new global markets, and increased crop yields through large, mechanized equipment, and institution of harmful agro-inputs, which became, in the western, industrialized world, conventional farming practices (Cockrall-King 2012; Swanson et al. 2015).

2.1.2 Problems with Convention

Beginning in the early 1900’s the use of synthetic nitrogen, created by Fritz Haber in 1908 and improved on by Carl Bosch, was found to be useful as a powerful fertilizer, along with extensive pesticide production – both products stemming from wartime production of weaponized chemicals (Cockrall-King 2012; “DDT – A Brief History and Status” 2015). While nitrogen is essential for plants to grow and thrive and with enough input can increase crop yield substantially, when coupled with phosphorus to be used as a synthetic fertilizer academics and environmentalists note it can be toxic to the surrounding environment (Cockrall-King 2012; Malvaney et al. 2009; Vollenweider 1971). Through soil leaching and runoff, ecologists insist that the synthetic fertilizers can contaminate groundwater and cause problems such as
detrimental algal blooms; in fact, the EPA estimates that 70 percent of all water quality issues are generated by agriculture runoff (Malvaney et al. 2009; Mogk et al. 2012; Vollenweider 1971). Pesticides can also aid in increased crop yields, but at a serious detriment to the environment and the public’s health (Carson 1962).

For several decades after WWII the main pesticide being used was in the form of dichlorodiphenyltrichloroethane (DDT) – a chemical asserted by Rachel Carson (1962: 21) to be “definitely toxic”. However, its ability to devastate problematic insect populations created a miracle solution for farmers battling with crop disease, and was therefore seen as an invaluable invention for some time (Carson 1962; Cockrall-King 2012). In addition to synthetic fertilizers and pesticides like DDT (which was banned as of the early 1970’s), was the development of herbicides to manage weed infestations, as they became a problem for the monoculture field of crops that now lacked some of the impediments once provided by the natural environment (Swanson et al. 2014). The most widely used brand of herbicide is known as Roundup and was developed by Monsanto in 1974 (Swanson et al. 2014). Through a review done by Swanson et al. (2014) the main ingredient in Roundup, glyphosate, is found to again be exceedingly harmful – with connections to chronic disease. In addition to possible problems of synthetic fertilizers and pesticides, as of the 1980’s, a new technique was introduced as many of the companies that produced and marketed these harmful inputs began investing in development of genetic alteration of seeds, known now as genetically modified organisms, or GMO crops (Cockrall-King 2012). Cockrall-King (2012) explains that although the GMO crops were not used in the fields until the early 1990’s, they have already had an immense effect – as of 2012, 70 percent of processed foods contain GMO ingredients and 165 million acres in the United States are devoted to its cultivation. One example of such a crop is the highly publicized cash crop of corn
According to popular writer Michael Pollan (2006), corn provides a perfect instance of how our harmful farming practices dominate our current food culture and have become ingrained in American’s diets. No longer just a crop or a source of sustenance; corn is a driver of our economy, dominating just about every aspect of our national food landscape (Cockrall-King 2012; Pollan 2006). In fact, Todd Dawson, a Berkeley biologist, jests that so much of our diet is composed of corn or corn products that “when you look at the isotope ratios, we North Americans look like corn chips with legs” (Pollan 2006: 23). Corn, and other cash crops, have flourished due to those inventions of synthetic fertilizers, pesticides, herbicides, and the alteration of seeds through GMO’s, allowing farmers to seemingly supersede the laws of nature, resulting in humans making “something of a Faustian bargain with nature when Fritz Haber gave us the power to fix nitrogen” (Pollan 2006: 43; Pimentel et al. 1993; Pimentel et al. 2005). Swanson et al. (2014) explains how industrialized corn has depleted soil fertility causing consequent loss of nutrients in food and is now found mainly in the form of “Roundup ready corn”, which results in issues of obesity, malnutrition, but also correlations to health risks as serious as cancer. It was through these developments in agricultural practices that farming became an industry and a kind of law unto itself – promoting large acreage of only one or a few crops that were most profitable (cash crops) through reliance on synthetic fertilizers, pesticides and herbicides, utilization of fossil fueled industrialized equipment and commercial distribution – no longer relying on historic, sustainable practices including the use of diverse, natural seeds, crop rotation, natural inputs, and local markets (Guthman 2006; Reganold et al. 1990).

To date, the industrialization of farming practices, and the global distribution and marketing of food stuffs has created vast ecological and public health issues, with changes to
historic practices so widespread and the encapsulation of the farming landscape so complete that these practices became and are still known as the conventional way to farm (Cockrall-King 2012; Pimentel et al. 2005; Pollan 2006). Therefore, scholars and environmentalists assert that conventional agriculture systems contradict the ideals of sustainability defined earlier. As a result of unmitigated use of these systems, there has been subsequent deterioration and degradation of the environment and the public’s health that went seemingly unchecked for several decades and is still felt today (Bandyopadhyay and Contractor 2012; Lichtfouse 2009; Lichtfoise and Elington 1995; Reganold et al. 1990; Thrupp 2000). However, this is not to say that these industrialized systems have not been contested throughout the decades.

2.1.3 Time to Make a Change

As early as the 1960’s, activists like the aforementioned Rachel Carson, who wrote the controversial book Silent Spring, began coming forward to educate the public of the horrible effects associated with these conventional systems both environmentally and socially, especially in terms of public health with risks associated with ingesting pesticides like DDT (Cutter and Renwick 2004; Scheffer 1991). Acknowledging the concerns of the public, policy makers purposed legislation in the 1970’s that would authorize the distribution of seeds and plants for use in home gardens, which encouraged local agriculture but was more focused on small, private lots and did not promote comprehensive reform for conventional systems (Alonge and Martín 1995; Brown and Jameton 2000; Lovell 2010). Yet, because the general public began to demand products free of chemicals, a ban was put on DDT in the early 1970’s and a market for organic food began developing in the 1980’s, which the National Organic Standards Board (NOSB) of the US Department of Agriculture (USDA) defines as foods resultant of “an ecological production management system that promotes and enhances biodiversity, biological cycles and
soil biological activity [and] is based on the minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony” (Allen and Kovach 2000).

Organic agriculture aims to minimize use of harmful agro-chemicals, preserve ecological functions and enhance nutrition in resultant foods, providing the public with the products they fought for alongside Rachel Carson (Pimentel et al. 2005). In fact, economists note that markets for organic food has flourished over the past two decades and now represents one of the fastest growing segments of the agricultural products industry, offering proof of this paradigmatic shift (Allen and Kovach 2000; Raynolds 2004). However, it should be noted that in the definition of “organic” goods there are references only to environmental inputs and management factors – addressing simply the on-site environmental aspects of organic agricultural systems - leaving room for criticism from advocates of sustainable agriculture.

2.1.4 Not all Change is Good

Through the various established articulations of sustainable agriculture and urban sustainability, organic farming practices, while addressing some of the components, do not meet the multifaceted socio-environmental needs to be truly sustainable. Therefore, certain criticisms of organic practices are due to the neoliberal markets and the industrialized practices that have co-opted much of the production and distribution of those foods (Delind 2006). By allowing “organic” food stuffs to reside outside of strictly local production and distribution, much of the organics market has become industrial (creating “industrial organic” - a term Pollan (2006) asserts is a contradiction of terms); therefore, many argue that the booming organics market cannot be sustainable through the above definition, and instead find that the growing organics market contributes to some of the problems of agro-industrialization, just like conventional systems (Bandyopadhyay and Contractor 2012; Delind 2006).
Most notably of these problems is that the large scale of agro-industrialization of both conventional and much of the organic production and distribution systems have been found by scholars to be intimately linked to the fuel market (Cockrall-King 2012). This link implies that the carbon footprint left by industrialized food, organic or otherwise, is significant due to food miles (a term to describe the fuel consumed and carbon emitted in distributing food) and its support, or rather dependency, on the fossil fuel industry which in turn associates it to any environmental degradation associated with the continued use of that fuel (Bell and Cerulli 2012; Pollan 2006). These associations suggest that even organic practices, if industrialized, can be detrimental to the condition of the global environment. But, academics like Delind (2006) assert that these systems can be contested and their effects alleviated through investment in urban agriculture and local markets that support organic practices without the detrimental commercialized, global distribution.

2.1.5 Benefits of Urban Agriculture

For too long, our urban structure has resulted in what Platt et al. (1994: 41) refers to as “environmental sterility and sensory undernourishment.” Through development of urban agriculture, scholars indicate that an environment for improved public health and an image of ecological sustainability for the city can start to take shape (Cobb 2011; Lovell 2010). Like organic foods, commended for being free from harmful pesticides and fertilizers - providing assuagement and many times solutions to serious health ailments - urban agriculture has proven benefits to the health of urban residents (Cobb 2011; Dauchet et al. 2006; Lovell 2010). It is through scholars such as Dauchet et al. (2006), health experts, and other academics that urban agriculture is argued to present opportunities for improved nutrition both through organic practices and increased access to more nutrition-rich foods (Guitart et al. 2012; Morgan 2009).
Academics and physicians agree that an increase in fruit and vegetable consumption can alleviate chronic health issues, such as obesity and heart disease (Dauchet et al. 2006). Now, while some might argue that creating spaces for nutritious food to be grown and distributed does not guarantee that they will be chosen over processed and harmful foods, Alaimo et al. (2008) finds that those that engage in urban agriculture (specifically community gardens) intake 1.4 times the amount of daily fresh produce than others not participating. Subsequently, these improvements in health expand to create healthier lifestyles that engage nature and support the local food movement (Morgan 2009). Through increased support, urban agriculture thrives, which extends to improved ecology through ecological development at varying scales: through the cultivation of a plant to the sustainable distribution of its products (Cockrall-King 2012; Morgan 2009; Pollan 2006).

Pearson et al. (2010) verifies the ecological improvements, affirming that urban agriculture provides certain ecological goods and services to its urban infrastructure to alleviate problems inherent in the city, many times also improving global environmental issues. For instance, dense urban populations produce mass amounts of waste, which can be recycled through urban agricultural practices that utilize biodegradable waste for compost and wastewater for irrigation (Lockwood 1999; Lovell 2010). Moreover, issues associated with microclimatic conditions, the climate of a small area that is different from the area around it (Craig 2001), can be a problem in urban areas because of the heat island index associated with them (Turner 2011). Scientists describe heat island indexes as the increased temperature of urban spaces due to building concentration, roads and traffic density, and building and surface characteristics that absorb more incoming radiation than surrounding rural areas (Hart and Sailor 2009). This increased radiation absorption causes higher urban temperatures which can result in
inefficient energy consumption, health issues (i.e. heat stroke and respiratory problems), and poor air quality due to the increased rate of photochemical ozone production (Gaitani et al. 2011). Increased green space can alleviate much of the problems of urban microclimates by changing the landscape and in turn the solar absorption, while also augmenting poor air quality issues with increased plant life (Gaitani et al. 2011; Hart and Sailor 2009). Furthermore, urban agriculture also addresses the concern of biodiversity loss, a conception mentioned previously as an integral component of organic practices, through a commitment and necessity of cultivating diverse plant life (Goddard et al. 2010; Lockwood 1999; Van Veenhuizen 2006).

The importance of biodiversity in both our urban and rural landscapes is becoming more public, as conventional-industrialized systems that rely more on monocultured fields, or homogenization of crop species, are resulting in mass loss in biodiversity (Thrupp 2000). Lockwood (1999) and other environmentalists affirm that biodiversity (genetic, species and ecological) is essential to sustaining the world’s agriculture, and in turn our food security, countering the monoculture associated with conventional systems, which is stressed by ecologists to be a sure way to ecological collapse (Mouysset et al. 2010; Lockwood 1999; Reganold et al. 1990; Thrupp 2000). Therefore, scholars suggest that urban agriculture, as examined by experts in the field of ecology, supports the resuscitation of a more biodiverse landscape, while also productively utilizing or converting city pollutants into positive inputs and outputs; therefore supporting various facets of urban, ecological stability (Goddard et al. 2010; Lockwood 1999).

Academics and activists insist it is through local food that the social equity, improved environmental and public health, and economic stability as foundations for democracy through the right to the city can be addressed (Feenstra 1997; Lovell 2010; Mougeot 2005; Van
Veenhuizen 2006). As mentioned above, local distribution and investment in urban agriculture development is the foundation for reimagining the city through components of sustainability that address problematic urban structures (Bell and Cerulli 2012; Ferris 2001; Pollan 2006). The local food movement and urban agriculture have been identified as a way to reinvigorate the connection between the consumer and her food, alleviate public health issues indicative of conventional systems, provide ecological viability, improve social justice, and support economic stability (Bandyopadhyay and Contractor 2012; Brown and Jameton 2000; Lichtfouse et al. 2008). Now, the puzzle for many urban environmentalists is where to evaluate expansion of these beneficial practices associated with urban agriculture with current and future urban land use. In this next section I expand on a significant obstacle and a potential instrument to successful integration of urban agriculture, starting with the very important policies around land use: zoning.

2.2 Significance of Zoning

New ordinances have begun to pave the way for development, as discussed by Reed (2013) in his review of San Francisco’s Williamson Act, which is a piece of legislation originally intended to protect large scale agricultural land in the peri-urban fringe of the city, now being looked at to protect urban agricultural development. Reed’s (2013) examination is an important one because of the larger implications it provides for growers in urban environments whose farms are just starting or are having financial issues. Academics note that more attention to policy making and action items supporting urban agriculture needs to be taken in order for these systems to thrive (Van Veenhuizen 2006). Thus, by adapting the zoning code to support urban agriculture, the city allows urban agriculturalists to take advantage of urban space. However, cities are large and finding suitable areas that will properly support urban agriculture, the
growers and the urban residents can be difficult; therefore, many scholars have utilized geospatial assessments and Geographic Information Systems (GIS) software to investigate the status of urban agriculture and its possibilities in the city.

2.3 **Geographic Information Systems**

Academics and planners utilization of GIS is based on its ability to manipulate and store large datasets, analyze spatial data efficiently, and present findings in an accessible medium of mapping (Li and Yeh 2001). Hanna (2010: 274) notes that maps allow us “to navigate, explore and see more of our world than we can ever experience firsthand.” GIS has the ability to create geostatistical maps that can help analyze and interpret data to reveal relationships, patterns and trends through a data rich visual environment (Clarke and Gaydos 1998; “Main” 2012). Scholars note that it provides the user with software that has the ability to overlay different types of data and allow the information collected to be quickly and easily understood (“Overview” 2012). It is through this software that one would be able to layer various pertinent attributes, such as census data, zoning code information and aerial images, all into one map for easy analysis (Goodchild 2010: 381). Therefore, GIS has been integral to many land use studies and policy improvements lending itself well to deciphering areas ripe for urban agricultural development (Bibby and Shepherd 1999; Campbell et al. 1994; Coppock and Rhind 1991; Li and Yeh 2001).

Scholars comment that GIS has long been associated with issues concerning the environment and urban development (Clarke and Gaydos 1998). Expanding on this notion, Kremer and Deliberty (2011: 1) assert that “spatial research methods are central to the understanding and evaluation of different components of local food systems.” In an attempt to examine local urban food systems many researchers have begun utilizing GIS’s data manipulation capabilities to understand the pathways between cultivation, production and
consumption within a confined area (Kremer and Deliberty 2011). It is through these analyses, such as the 100-mile studies done by Kremer and Deliberty (2011) for Philadelphia and Thompson et al. (2008) for San Francisco, that demonstrate the connections of the various scales of local food and the potential for expansion. For the examination of cultivation specifically, GIS is found to be useful in an assessment by McClintock et al. (2012) in Oakland, California as they utilized the software to recognize, define, and catalog areas of potential agriculture sites on underutilized public land.

In determining possible sites for urban agriculture assessment multiple variables are required and therefore benefit from the use of GIS and aerial imagery, as demonstrated by Taylor and Lovell (2012) in their analysis of gardens in Chicago. Van Veenhuizen (2006) notes that it is through these types of data collection and improved availability of information contributing to potential sites that advances the ability of planners and growers in determining sites for the beneficial urban agriculture systems. This leads to my analysis and research question.

3 METHODOLOGY AND METHODS

3.1 Research Question

Broadly, the goal of my research is to utilize GIS to find possible urban agriculture sites for the American city. In this thesis, I use the case study of the city of Atlanta to develop and test this methodology. More directly, the purpose of my study is to find actual sites that could be viable for urban agricultural development and supply the zoning code and financial information pertinent for purchase and development. This thesis aims to construct a visualization of a potential approach to determine potential urban agriculture sites using publicly available data through mapping. El-Harem et al. (2006: 98) suggests that “given the inherent complexity of the concept of sustainability, its representation visually would be of great value in promoting among stakeholders a common understanding of the interrelations between multiple component issues”.
The application of GIS will aid my research by providing me a way to present my findings visually, allowing the information presented to reach a wider scope of individuals, especially those looking to acquire new areas for agricultural development, specifically within the City of Atlanta.

In creating my approach, I relied on the existing urban agriculture literature but also quite heavily on the expertise of local growers and other invested and experienced parties of the local food movement. Years of experience among these various individuals informed the focus of my work towards ascertaining a way to pinpoint areas or sites ripe for agricultural development in the City of Atlanta. My goal is to utilize the capabilities of GIS to analyze census data, zoning code, brownfield sites and aerial images to determine possible future sites for agriculture within the city limits of Atlanta.

To begin with, I choose not to include certain ecological factors when determining site suitability. Although soil, water, and air quality issues are discussed in the literature and appear to be an ever present concern for the local food movement and urban growers, my decision to not include them stemmed from several factors. First, there is literature challenging the apparent risks, arguing that, for most cities, the perceived health risks associated with urban soils are most likely higher than the reality – or at least are balanced in some part by the benefits it provides (Doucette et al. 2007; Leake et al. 2009). Second, sampling soil, air and water requires certain equipment and expertise, which is beyond the scope of this research. Lastly, many growers are utilizing cemented properties or abandoned structures through above ground beds or hydroponics, and would not need to access the soil on the property to create their urban gardens.

Furthermore, much of the additional variables I feel would have provided a more robust project cannot be accessed at this time because of the introductory level of garden assessment
that has been completed for the City of Atlanta. Although multiple organizations, individuals and consulting groups have begun examining these spaces, there is no assessment of current gardens as comprehensive as in areas like Chicago and Philadelphia. Information that would be pertinent to future analysis would include average plot size or acreage needed or being used for community garden use versus urban garden versus market garden as discussed in an ordinance for urban agriculture that was just implemented by the City of Atlanta. This ordinance was implemented into the zoning code not even a year ago – therefore, most of the existing gardens are not necessarily acting within the terms of the new zoning or adhering to strict parcel boundaries, making it difficult to nail down a more applicable definition.

Therefore, my variables were determined by available and pertinent data, such as vacancy and socioeconomic data. The focused use of these variables to find possible sites were supported through the literature, most notably by Kremer and Deliberty (2011) in their assessment of local food in Philadelphia and McClintock et al.’s (2013) evaluation of vacant land for vegetable production in Oakland, and the study area was confined to the city limits because of the new urban agriculture zoning ordinance which is a city ordinance and therefore does not apply to areas outside of that study region.

3.2 Background of Study Area and Variables

3.2.1 Study Area and Land Use

Atlanta is one of the fastest growing metropolitan cities in the country, emerging as a commercial, industrial, and transportation hub for the entire southeastern region (Lang and Lo 2002). The transformation of Atlanta from a compact, railroad town in the 19th century to a vehicle-centric metropolis, largely stripped Atlantans’ connection to nature. Fujii and Hartshorni (1995) confirm this modification of the city’s structure, insisting that the multifaceted scales and
areas of the city are exceedingly automobile based. Additionally, through a 25-year assessment of satellite imagery of Atlanta, researchers Lang and Lo (2002) assert that through this rapid growth benefits to the (neoliberal) commercial, industrial, and automobile-focused markets have been at the expense to the environment. These authors submit that increased traffic congestion due to limited public transit (along with vehicle-centric modification) and loss of forested and open green space through increased dense, commercial development, has led to deleterious air and water conditions for the city (Jeon et al. 2010; Land and Lo 2002). However, with the introduction of initiatives, such as the Beltline development, and programs like Truly Living Well’s Urban Grower Training Program and the Atlanta Urban Gardening Program, which is funded through the Georgia Cooperative Extension Service, boasting the development of numerous urban gardens and urban growers throughout the metro-Atlanta area (Kaufman and Bailkey 2000), Atlanta is attempting to restructure the city to become less rigid and environmentally degraded, and, as some hopeful activists and planners see it, moving towards creating a more sustainable urban environment.

In what follows, I focus on several key variables that shape the potential urban agricultural sites in the city. Specifically, I identify and discuss the city’s zoning code, vacant land, land values, Atlanta’s urban health index, brownfield sites, and importance of neighborhood level study.

3.2.2 Atlanta’s Zoning

Georgia is known as an agricultural state. In fact, the Georgia Farm Bureau reports that agriculture contributes more than $71 billion annually to Georgia’s economy, with one in seven Georgian’s working in agriculture, forestry or related fields. However, when it comes to Georgia’s capital and largest urban center of Atlanta agriculture is not nearly as prominent
Although agriculture is a welcomed and integral land use throughout the state, there has been no recognized space for agriculture in the city, until recently.

Up until the summer of this past year (2014) there was no designated ordinance or land use for agriculture within the city limits of Atlanta. Zoning codes regulate how land is used in any given area of a city and reflect land use priorities of a given era and by different groups, therein holding immense power for new initiatives concerning land (Voight 2011). Scholars, city planners and developers agree that space is valuable in a dense, urban landscape. This fact inevitably leads to problems between various parties on how that land should be used – for instance, while some might want to utilize a space for agriculture others might prefer to profit from real estate or commercial development (Bell and Cerulli 2012; Ferris et al. 2001). Lovell (2010: 2502) and other scholars admit that “as a result, few cities include community gardens in their city planning process, and fewer still protect these features through zoning.” Although changing the zoning code might not invoke government plans for gardens, it would provide officially sanctioned validity for the movement. Activists of the movement note that this is a main concern or obstacle for urban agriculture because of subsequent issues that ensue such as obtaining and retaining land tenure for their gardens so that they are not in fear of future developments – a mission only accomplished if the land is zoned appropriately (Ferris et al. 2001). As such, in order for urban agriculture to expand and become an effective part of the City of Atlanta there must be zoning regulations that institute agriculture as an official land use (Li and Yeh 2001), a challenge for many American cities.

Atlanta Local Food Initiative and Emory’s Turner Law School took notice of this impediment and began the long process of drafting an ordinance that would protect growers and their land. After three years the ordinance made it through Atlanta bureaucracy, and went into
effect June of 2014. The ordinance describes two main types of land use: urban garden and market garden – with requirements and stipulations within each category. An urban garden is described as:

“a lot, or any portion thereof, managed and maintained by a person or group of persons, for growing and harvesting, farming, community gardening, or any other use, which contributes to the production of agricultural, floricultural, or horticultural products for beautification, education, recreation, community use, consumption, off-site sale, or off-site donation.”

This translates to agriculture where the purpose is mainly for community gardens or personal use, with no intent of selling products on the premises. However, one is able to grow on one site and sell at another location. On the other hand, a market garden is:

“a lot, or any portion thereof, managed and maintained by a person or group of persons for growing and harvesting, farming, community gardening, or any other use, which contributes to the production of agricultural, floricultural, or horticultural products for community supported agriculture or on-site sales.”

These two categorizations cover almost all of the agriculture being engaged within the city, with each parcel containing some form of the ordinance so that the entire city is zoned for agriculture in some way or another. Still, as explained earlier, there are other stipulations that dictate how a certain parcel can be used and what, if any, permit is required. For instance, most residential parcels will be required to have a special use permit, while commercial, institutional or industrial areas have fewer requirements for use. Impediments are consequently reduced and the potential greater, as those parcels tend to be larger or have consecutive surrounding parcels.
available. Therefore, I focus my research to commercial districts or other areas that are “permitted by right” for use.

### 3.2.3 Vacant Land

As touched on briefly, vacant parcels and blighted areas have a history in American cities as spaces for investment in community and local agriculture projects (Cockrall-King 2014). However, most planners have not widely considered investing in food and urban agriculture development to utilize vacant land or unused or underused urban spaces (Lovell 2010). Scholars note that this is quite an oversight because of the many problems or risks associated with high rates of vacant or abandoned property that therefore require attention and possible alternative solutions (Mougeot 2000). Urban agriculture provides this alternative, while also providing areas for the expansion of beneficial local food systems (Morgan 2009). In fact, across the country many of these vacant properties are already becoming productive spaces as a result of urban agriculture development, finding roots across the country in land that would otherwise be contributing to images of disinvestment and degradation (Dewar and Thomas 2013; Bowman and Pagano 2000; Pagano and Bowman 2000). Scholars, such as Platt et al. (1994: 21-22), contend that “contemporary thinking on urban open space emphasizes the social and biotic functions of unbuilt or underbuilt land within cities, regardless of ownership.” Through utilization of these un-or-underused urban spaces, agriculture can find a space to thrive, contributing to social and economic equity.

While the U.S. Department of Housing and Urban Development concedes that there is no universal definition of vacancy (Evidence Matters 2014), a universal truth held between municipalities is that large amounts of vacancies in an area are detrimental to that district, subsequently contributing to an adverse quality of life for residents and a burden for local
governments (Dewar and Thomas 2012; Kaufman and Bailkey 2000). The burden is noted by scholars and local governments, confirming that properties that remain vacant incur high costs (Kingsley et al. 2009). Vacant properties prove to be costly for local government because abandoned or vacant properties decrease property value, therefore decreasing available property tax (Kingsley et al. 2009). This results in a decrease in funds received, but an increase in costs as it is the government’s responsibility to maintain or demolish the property as well as provide basic protection services – all of which weighs on the city’s budget (Kingsley et al. 2009; McFarland and McGahan 2008). In addition to the burden on local government, is the positive link, determined by analysts, between high numbers of vacant property and increased crime rates and health risks, along with the lowered property values that contribute to overall decline for communities (Accordino and Johnson 2000).

Although the country is digging its way out of the foreclosure crisis, there are still neighborhoods and disinvested areas of each city that need to be examined (Wilson 2014). As suggested by Accordino and Johnson (2000: 301) “one of the most visible and demoralizing signs of inner city decline is vacant and abandoned property – houses, apartments, commercial and industrial buildings, and lots – that sit and deteriorate, undermining the appearance and economic value of blocks, neighborhoods, and city districts.” Land in a city is valuable to its identity and vacant land can contribute to a deleterious identity for the city and its residents (Bowman and Pagano 2000). But, by utilizing vacant property for urban agriculture, as discussed by academics, there is potential to transform these blighted areas into productive spaces for the city (McCIntock et al. 2013; Pagano and Bowman 2000).
3.2.4 Land Values

Scholars have established that, regardless of region, the lowest socioeconomic areas are associated with higher illness rates and more hazardous living conditions (Smith 1998; McLaren 2007). In cities, land values have traditionally been an indicator of the socioeconomics of an area implying certain social and environmental needs (McLaren 2007; Pinquart and Sorensen 2000). Brulle and Pellow (2006) discuss these needs in terms of environmental justice, as they show disparities between areas of high and low socioeconomic status. Through the literature, urban agriculture has been found to take roots in areas of low income neighborhoods and is where housing values provide relevancy when determining possible sites (Kremer and Deliberty 2011).

3.2.5 Urban Health Index

Urban Health Index (UHI) studies have been done around the world and at varying scales, with a mutual goal to provide a measure of health and health disparities, taking into account various interconnected determinants (Rothenberg et al.. 2014). Researchers suggest that the studies are especially helpful due to their geographic component, understanding the data spatially through GIS (Rothenberg et al.. 2014). The UHI for Atlanta was created by distinguished academics and health workers to provide a comprehensive view for the geographic region of Atlanta (Rothenberg et al. 2014). Now while the study acknowledges the possible faults in its simplicity, it does provide a helpful basis to judge areas in need, providing “an objective marker for setting goals, evaluating interventions, and planning for future improvements” (Rothenberg et al. 2014: 824). The data is based on a ranking system and informed by the literature, including variables such as percentage of employed, percentage above the poverty level, graduation rates, and other demographic data (Rothenberg et al. 2014).
3.2.6 Brownfield sites

Through deleterious industrial practices this century, many areas once used for manufacturing have left behind problematic environmental hazard issues (Desousa and Ghoshal 2012). These areas are termed brownfield sites and are defined by the EPA as a “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.” Brownfields are many times associated with environmental justice concerns, as many of the sites are in areas of low socioeconomic status, with cities in particular having to find ways to manage the fallout of extensive industrial negligence (Brulle and Pellow 2006). In the 1990’s urban municipalities that were striving for more sustainable urban development were especially focused in on brownfields because of their ability to compromise future generations to meet their own needs (a staple of sustainability) (Desousa and Ghoshal 2012). Various practices were utilized to remedy these toxic sites, either through “in situ” processes (removal of contaminates without displacement of soil or water) or “ex situ” processes (displacement of soil or water for contaminant removal), creating reuse projects that increased urban vitality (Desousa and Ghoshal 2012). Although many of these properties have been useful in providing sustainable redevelopment projects, for the purposes of my methodology they were excluded because of the risks and complications investment might cause.

3.2.7 Importance of Neighborhoods

Martin (2003: 730), who discuss place making in neighborhoods, argues that “place provides an important mobilizing discourse and identity for collective action”. Scholars observe that neighborhoods provide the geographic sphere for where everyday life takes place, thereby providing a connection between citizens through a shared experience, creating the feeling of
community (Wilson 2009). The importance of neighborhoods is discussed by academics as demonstrated through continued local activism and persistent neighborhood identity in spite of shifting political and economic dynamics (Martin 2003). It is because of these defining characteristics that many researchers argue that the neighborhood scale is uniquely capable of providing context of study for urban analysis (Greene and Pick 2011; Martin 2003; Wilson 2009). Therefore, the decision to refine the analysis to the neighborhood level in Atlanta was informed through the literature, which asserts that neighborhoods can be an effective scale to develop and assess urban structures and potential developments (Van der Ryn 1986).

*For my analysis neighborhood was defined through established municipal districts.

In sum, I identified five variables that represent important elements of social, environmental, economic, and even political dimensions of land use that shape where the greatest potential might be for urban agricultural production in cities like Atlanta. Now I turn to how the data was acquired and my analysis of Atlanta’s potential land use.

### 3.3 Data Collection and Analysis

In order to assess median housing values and vacancy percentages recent census data is required. Therefore, to begin, I acquired 2008-2012 American Community Survey 5-Year estimates for Fulton and DeKalb counties (the two counties that encompass the City of Atlanta limits) from the U.S. Census Bureau’s online GIS resource center. Each data set was joined with parcel data obtained through Fulton County and Dekalb County GIS departments, and then was clipped to display only values within city of Atlanta limits (acquired from Atlanta Regional Commission). This was to keep the data consistent because most other factors were confined to city limits. Once the files were clipped, I examined median housing values and vacancy percentages at the block group level and ran a hot spot analysis to determine where there were
concentrations of high and low median values and high and low vacancy percentages. These areas of high vacancy and low median values were then compared with the Urban Health Index map for the City of Atlanta, created by Rothenberg et al. 2014, for further analysis of other determinant factors.

Once a trend was established, the data was refined further through assessment of the block group level data. After mapping several thresholds for analysis, I defined the areas of interest by selecting out the block groups that contained vacancy percentage averages above 20% and median housing values below $80,000 (using “select by attributes”) to determine the areas with the largest amount of available, affordable land. The threshold for vacancy and housing values was determined through the data analysis- finding when the threshold began showing little variability between levels. In addition, I consulted representatives from the Atlanta Regional Commission and Atlanta Local Food Initiative, both with intimate knowledge of land values and the local food movement in Atlanta, to reinforce the thresholds I had chosen.

Once those block groups were determined, I created a quarter mile buffer around the selected block groups. This buffer allowed neighborhoods to be better included. Then, neighborhoods were selected out (using “select by location”) that contained these block group buffers, pinpointing the neighborhoods that would most likely have the most space and affordable property for development. Although neighborhood boundaries could be a matter of contestation, I relied on the neighborhood shape boundaries provided by the City of Atlanta GIS inventory. In addition to affordable and available property, I assumed a level of need for healthy dietary options and community investment because of indications provided in the Urban Health Index report (Rothenberg et al. 2014).
Besides the neighborhoods that needed to be focused on was the spatial understanding of the new urban agriculture zoning code. Therefore, to create a map of the new zoning code, I first read through the ordinance (supplied to me by Atlanta Local Food Initiative and also publicly available online at http://gogrowatlanta.org/) and cataloged the zoning language, aligning the amended code with the existing parcel data for the City of Atlanta in an excel spreadsheet. It should be noted that parcel level data could only be acquired for Fulton County, therefore I began omitting areas in DeKalb county. Additionally, it should also be noted there were no neighborhoods that were selected in the DeKalb county portion of the City of Atlanta, which further validated the choice of omission.

Once the spreadsheet was comprehensive, I joined the excel sheet with parcel data of the City of Atlanta (acquired from Atlanta Regional Commission). I also overlaid Fulton County parcel data to get a more inclusive understanding of the parcels. To define and categorize each parcel I created six varying codes to describe the acceptable use of agriculture within the parcels and possible permits that might be required:

1. urban gardens and market gardens permitted by right
2. urban gardens and market gardens are permitted by right; all sales and display activities at market gardens must be in enclosed buildings
3. urban gardens are permitted; market gardens are permitted as an accessory use on institutional parcels
4. urban gardens are permitted; market gardens are permitted on institutional property
5. urban gardens are permitted; market gardens conditionally permitted accessory uses limited to institutional parcels
6. urban gardens permitted as accessory uses; urban gardens permitted as a principal use on an undeveloped lot with SAP; market gardens as accessory use on institutional property

Although every parcel is zoned for some form of agriculture, as mentioned previously, I wanted to focus on areas that were permitted by right. These areas will not require a special administrative permit (SAP) and the agriculture or sale of products do not have to be contingent on any factors, allowing for the least amount of municipal impediments. Therefore, parcels were selected out that were zoned as “urban gardens and market gardens permitted by right” to determine where those areas were correctly zoned.

It is at this point I began narrowing parcels for possible sites. First, by including brownfield site data, obtained by the Atlanta Regional Commission GIS data catalog of the planning and community development department, to ensure that there were no sites considered in exceedingly harmful zones. Once the sites were determined to be outside the contaminated zones, I consulted a semi-comprehensive list of existing gardens (collected by the Atlanta Regional Commission) to make sure there was not a garden already on site or too close to the future sites.

After analyzing these various overlays, aerial imagery was consulted that focused in on the parcels that were coded with a (1) urban gardens and market gardens permitted by right, were outside the brownfield site polygons, and were within the selected neighborhoods. Through this aerial image analysis, I was able to find parcels that seemed vacant (no visible housing structure on the parcel) and met the criteria expressed. Those parcels of interest would then be marked by creating new point features, with parcel ID number, and other pertinent information noted by the city and county parcel data and recorded for further investigation.
Once a select few sites were chosen, they were put into the city’s and county’s property records online database to consult relevant information for possible development and confirm the parcel information already considered. Although low values of property were considered a high priority, other factors were also considered, such as government programs that would alleviate the financial burden of purchase. One in particular is a government initiative named the Atlanta Neighborhood Stabilization Program. This program provides the city with assistance to acquire and redevelop areas that would otherwise contribute to negative images and disinvestment in a community. Although used for housing and reinvestment for low income families, it provides a framework that could be translated for new programs supporting urban agriculture development.

Lastly, once the sites were thoroughly vetted, and the most advantageous ones were chosen, the street view feature of Google Earth was accessed to again confirm the vacancy of the parcel and to assess the surrounding area. Once all criteria were met and I was confident that these sites would be best for development, primary data at the site was collected through photographic evidence and notes.

### Table 1: Data Sources

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4 RESULTS

4.1 Socioeconomics

To begin the analysis, median housing values and vacancy percentages were considered. A hot spot analysis of the median housing data and vacancy data exhibited similar trends, showing a concentration of low median values with high vacancy within a large swath across the middle of the city of Atlanta (as shown in Figure 1 and 2). This pattern was compared to the urban health index, created by Rothenberg et al. 2014, and was found to have a similar concentration (as shown in Figure 3).
Figure 1: Hot Spot Analysis for Median Housing Values for the City of Atlanta
Figure 2: Hot Spot Analysis for Vacancy Rates in the City of Atlanta
4.2 Refining the Data

Data was refined further to assess the areas found in the zones of concentration. This analysis was examined at the block group level. Once the block group information was added for the city of Atlanta, areas were selected out by attributes using various indices of vacancy rates and housing values. The data was most refined at a vacancy rate of 20% or higher and a median value of $80,000 or less. Additionally, a quarter mile buffer was inserted to provide a
slightly larger area to include for selected of neighborhoods. Figure 4 shows the block groups that were selected with these parameters.

Figure 4: Selected Block Groups by Vacancy and Median Value
In continuing to narrow the data, neighborhoods were selected that contained these areas of block groups, pinpointing the neighborhoods that would most likely have the most space and affordable property for development. Figure 5 shows the neighborhood suitable for urban agriculture development.

![Figure 5 Selected Neighborhoods (high vacancy and low housing values)](image-url)

**Figure 5 Selected Neighborhoods (high vacancy and low housing values)**
Zoning code was then consulted to examine what the City of Atlanta would look like zoned for agriculture. The zoning ordinance was organized to align with city parcel data, as shown in Figure 6 below.

Figure 6: Urban Agriculture Zoning for the City of Atlanta
The above Figure 6 demonstrates the extent that agriculture is permitted within the city limits, with only small parcels with null values attached. This does not indicate that agriculture is not permitted in those areas, there was just no information in the ordinance pertaining to those specific zoning types, a problem I am told is being remedied by Atlanta Local Food Initiative.

As described earlier, areas that were designated as “urban gardens and market gardens permitted by right” were most desirable, as they involved the least amount of requirements and permits. Figure 7 highlights those areas and also includes the outlines of selected neighborhoods to see where the two variables intersect. (City and county parcel data were included to show more detail about ownership and code).
Once areas were selected to be in the correct neighborhood and zoned correctly, other layers were included. Brownfield data acquired by the Atlanta Regional Commission was
overlaid, along with existing garden data collected by the Atlanta Regional Commission, as shown in Figure 8.
Figure 8: Brownfield sites, existing gardens, areas zoned by right, and selected neighborhoods
4.3 **Possible Sites**

Aerial imagery was then consulted, focusing in on the parcels that were within the selected neighborhoods, coded as (1) urban gardens and market gardens permitted by right, were outside the brownfield site polygons and did not already have a garden on site. Below Figure 9 shows the areas that were shown to initially meet the requirements aforementioned. Five sites were marked for further property records analysis.
Each of the five sites were entered into both the city and county property records and assessed through further aerial analysis via Google Earth and street view (first site shown in Figure 11). Through investigation of these records, two areas were concluded to be most beneficial for development.
The first site that was discarded was Site #2. This was due to investigation into the property records that exposed the owner of the property to be a large development firm. Although it is possible that the firm would sell for urban agriculture development, it is more likely they purchased the parcels for a future planned development and therefore would not be willing to sell. In addition, the area, as shown in Figure 10, is heavily forested, which would be an issue for urban growers (initial observation using aerial imaged basemap appeared clear area versus forest).
Another site that was rejected from the final list of sites, was site#5. The main reason for the rejection of this site was the high density of forest (as shown in Figure 11), but if the funds and equipment were available it would be a prime candidate. The area is $154,000 and is 1.91 acres - although not a huge area, I personally know of a thriving garden in the city that is just over two acres.
Figure 11: Site #5 Google Earth street view

Upon initial examination and property records overview for Site #4 were extremely promising. The parcels are owned by the City of Atlanta and were affordable parcels, with land
valued at $35,200. Moreover, the site looked cleared (no infrastructure or dense forest) from initial aerial view (shown in Figure 12).

![Figure 12: Google Earth aerial image of Site #4](image)

However, once further assessment using the street view feature of Google Earth was utilized, it was shown that there already seems to be a small area being used, although overgrown, as gardening plots (shown in Figure 13). These plots were not included in the existing urban agriculture data, however, as mentioned previously, the data was as complete as possible but not fully comprehensive because of the only recent addition of the ordinance and possible tracking of properties used for agriculture. This realization compelled additional
inquiry into the property. What was found when putting a combination of the neighborhood and address was information on a garden right outside of four corners park that provides small plots for the surrounding residents. This information compelled the site to be rejected as a possible site, but is important to highlight because the exact reason it was not included validates the chosen methodology in its ability to find possible sites.

Figure 13: Google Earth street view of Site #4

These next two sites were examined as the others were and remained valid options. Therefore, these two most promising sites were further investigated through primary data of photographic evidence and observation (photos in Figures 17 and 21). Figure 14 displays the county parcel map for first space identified as possible site for agriculture, with the largest parcel highlighted. This first potential site could be composed and developed in different ways: the one
large parcel highlighted below, the large parcel plus the surrounding parcels, the large parcel and some surrounding parcels, just the surrounding parcels, or some of the surrounding parcels.

Figure 14: Fulton County Parcel Map
The reason for the varying potential of this space is dependent upon the amount of money available to the developer and whether they want to try and utilize the neighborhood stabilization program (NSP) that could aid in financing. Table 1 shows a breakdown of all the parcels in this selected area, showing that while some parcels could be considered expensive others are more than affordable – with several parcels costing less than $5,000. In addition to the value of the property is the acreage and owner. It is important to note that all of these parcels are owned by Southern Saw Acquisition Company, so although only some parcels would be of interest to purchase the company might only sell it as a whole.
Table 2: Parcel Breakdown for Possible Site #1

<table>
<thead>
<tr>
<th>Physical Address</th>
<th>Neighborhood</th>
<th>Acreage</th>
<th>Land Value</th>
<th>Ownership</th>
<th>NSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1594 Evans Dr</td>
<td>Sylvan Hills</td>
<td>2.8853</td>
<td>$721,300</td>
<td>Southern Saw Acquistions</td>
<td>Yes</td>
</tr>
<tr>
<td>1616 Evans Dr</td>
<td>Sylvan Hills</td>
<td>0.4215</td>
<td>$110,300</td>
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<td>Yes</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
<tr>
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<td>$3,800</td>
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</tr>
<tr>
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<td>Yes</td>
</tr>
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<td>1615 Langston Ave</td>
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<td>$4,200</td>
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<td>0.2055</td>
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<td>Southern Saw Acquistions</td>
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</tr>
<tr>
<td>1603 Langston Ave</td>
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</tr>
<tr>
<td>1599 Langston Ave</td>
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<td>1575 Langston Ave</td>
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<td>Price</td>
<td>Company</td>
<td>Acquisitions</td>
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<tr>
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<td>Southern Saw Acquistions</td>
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<tr>
<td>Hood Dr</td>
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<td>$177,500</td>
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<td>1572 Evans Dr</td>
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<td>0.1719</td>
<td>$44,800</td>
<td>Southern Saw Acquistions</td>
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<td>1568 Evans Dr</td>
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<td>Evans Dr</td>
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<td>0.2173</td>
<td>$49,800</td>
<td>Southern Saw Acquistions</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Although the site itself was partially fenced in, I was able to see the space clearly. The surrounding area was made up of a mix of industrial complexes and private residents. The streets that lined the north and east side of the parcels were littered with excessive trash and
disposed items. However, much of the lawns and private spaces were well kept, inferring that street clean up and productive use of this space would be welcome.

Possible Site #1 was also investigated, with parcel map shown in Figure 17, parcel breakdown in Table 2, Google Earth images in Figure 18 and primary photos in Figure 19.

Figure 17: County Parcel map of Possible Site #1
Table 3: Parcel breakdown of Possible Site #1

<table>
<thead>
<tr>
<th>Physical Address</th>
<th>Neighborhood</th>
<th>Acreage</th>
<th>Land Value</th>
<th>Ownership</th>
<th>NSP</th>
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<tbody>
<tr>
<td>776 Metropolitan Pkwy</td>
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<td>$441,500</td>
<td>Lieu Minh C et al</td>
<td>Yes</td>
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</tbody>
</table>

Figure 18: Google Earth image of Possible Site #1
Through this geostatistical analysis two sites were found that could be bought and developed for the expressed purpose of agriculture. Each site is zoned to be permitted by right and therefore would not require a permit or additional requirements, resides within the selected
neighborhoods, does not have existing gardens on the property and is outside of harmful brownfield zones.

5 DISCUSSION

To summarize, this thesis explores the possibilities of urban agriculture broadly and creates a dynamic use of GIS and property data records for ascertaining possible new urban agriculture sites. The analysis was done with publicly available data, with the exemption of the garden data (which will be public in the coming months) to explore the possibilities for developers or growers who might not have the resources of government planners. GIS and property data, along with aerial imagery enabled me to find possible sites; however, there were other methodologies that could be utilized and other variables included that were not for this thesis. In this next section I will elaborate on my chosen methods and speak to possible alternatives or shortcomings of my methodology.

5.1 Other considerations and concluding thoughts

To begin, it should be understood that one of the main factors I included, housing values, are not objective, quantitative values. Property is assessed by individuals who estimate the value based on the market, cost, or income approach. Each approach is flawed and subjective in its own way and is not permanent; meaning, the research and the values I assessed this past year might not hold true a year from now. For instance, prospective home owners might run into this if they look for a house for a long period of time, as a house they looked at 5 months ago can reduce or increase significantly depending on the market, or depending on the assessor. Therefore, much of the data I relied on for property data could be invalid within a matter of months. These facts could again be reiterated for property taxes, which are based mostly from assessed value of the property and again are subjective. Property taxes and assessed values take
into consideration both the value of the land and the value of whatever could be or is going to be built on the land. So, although the land itself could be financially viable the built value could be substantial. To summarize, property records are subjective and constantly in flux and therefore should not be understood as static facts.

Additionally, in terms of methods, some researchers might fault my exclusion of remote sensing analysis – a method frequently used when conducting land assessments. Although many studies that employed remote sensing to find suitable land use (especially in terms of agricultural land) were successful, I chose not to utilize it because of my experiences in Atlanta gardens and the downfalls of using it for the explicit purpose of urban agriculture examination. Remote sensing has the ability to inform what land cover is present; however, researchers note that a common problem upon analysis is the difficulty distinguishing certain land types, such a tree cover versus open green space, allowing for potential complications for assessment (Kremer and Deliberty 2011). Additionally, as mentioned previously, urban growers are known for being creative with their spaces, indicating that intimate knowledge of each land cover type would not necessarily include or exclude a site from analysis and therefore would not be a necessity.

However, there are methods, attributes, and content I hope to include in furthering the examination of local food in Atlanta and discussion of larger food systems.

In the future, I hope to expand my research to also include analysis of not only the location for urban agriculture in Atlanta, but also the production, distribution and outlets for local food across the metropolitan area – informed by the study done by Kremer and Deliberty (2011) in their comprehensive assessment of the movement and production of local food in Philadelphia. Once this analysis is done, Atlanta can be integrated into the larger discourse on agri-food business, comparing systems and advancing and improving on the movement as a
whole. In addition to the pathways and connections of food, is the story of those involved with it: from the grower to the distributors to the chefs and the consumers.

Illuminating the story of these individuals and not relying on broad generalizations could extol the benefits of the movement and gain support from others outside or unfamiliar with local food in Atlanta and other agriculture systems. In addition, these stories should also include experienced rural farmers, especially ones involved in industrial practices. Although improvements in local structures are vital, this discussion around food needs to be at all scales. Therefore, without including the farmers and farms that dominate our food culture, much of the transformation that needs to occur for the social, ecological, and physical health of our citizens (rural and urban) will be incomplete. Much of the blame falls on the farmers, when instead more examination needs to be focused on the financial influences (especially in terms of government subsidies) and consumer demand that informs much of the practices and methods being utilized. If supporting the farmer was emphasized over supporting cash crops and education and resources were provided to industrial farmers looking to change their practices, meaningful transformations could be seen in our future agricultural landscape.

In terms of examining local food, many of these proposals are already in some form of development, as students, researchers and other invested individuals have been creating fragmented pieces of this large, intricate system. Through these important projects, agriculture can once again be ingrained into the urban environments that once were lost. However, while the literature does support the integration of agriculture and local food systems into the urban, it must be noted that there are also objections and fears associated with its institution.

In addition to the certain ecological factors that could be of concern, there are matters concerning agriculture within urban areas of high density, especially near residential districts.
Although my analysis concentrated on produce primarily, some urban agriculture can contain livestock. For neighbors of these farms, certain noises, smells or other issues (chickens have been known to carry or attract disease and disease carrying rodents) could adversely affect their daily routine or lead to issues of public health (Mogk et al. 2010). Outside of animal husbandry, is the need for pollinators in the cultivation of produce. Urban beehives could be a nuisance at the very least and a danger at the very worst if not properly managed. For instance, if the beehive is situated, without the proper impediments, against a fence of a neighboring yard that has children or residents that are highly allergic problems could ensue. Lastly, is the innocuous issue of appearance. Although an overgrown garden or compost pile might not be something to fear, it can be an issue of contention for neighbors that prefer the look of manicured lawns.

To conclude, urban agriculture has been shown as a way to contest the large agri-food systems that have dominated the past century. Although the support for the movement as a whole is prevalent, there still needs to be work done in terms of assistance for farmers and small businesses trying to encourage non-commercialized or industrialized food products. Farm-to-table restaurants are popping up all over the city and across the country, yet many of the growers that provide that $10 side of broccoli, customers will happily purchase, are having trouble supporting a financially viable situation for themselves and their farm. It is not enough to go to the local farmers market on Sunday or volunteer weeding plants on occasion. For a plant to grow the roots must be stable – without financially stable growers there will be no movement to thrive and grow.

In returning to the “right of the city”, succeeding in integrating local food into our urban landscape is a vital step in contesting neoliberal structures that would attempt to undermine urban citizens claiming that right. Urban agriculture and the mission of the local food movement
allow marginalized residents and disenfranchised areas of the city to create spaces of urban
vitality and sustainability. Although the twentieth century has produced industrialized systems
and arguably harmful food stuffs that have raised concerns for the future viability of the world
and specifically our exponentially expanding urban centers, scholars and activists find hope in
transitioning away from the systems that have “come to lay us low” through development and
investment in urban agriculture and its local food markets (Delind 2006: 142).

Micheal Pollan (2006: 411) asks us to examine “what it is we’re eating. Where it came
from. How it found its way to our table. And what, in a true accounting, it really cost”. It is not
only our right to question the forces that dictate our food landscape and urban structure, it is our
responsibility. It has been shown that our everyday choices in matters as small as food
consumption and purchasing have rippling effects across our social, political, economic and
especially environmental spheres and therefore require our attention for the health of our current
existence and our future one. To end as we began, with Delind (2006: 125),

“The ultimate conclusion seems brutally ironic: if “we are what we eat,” then we too are
in the process of becoming commodities. We become known for our capacity to act as the
receptacles of abstracted and detached values realized as product attributes, rather than as
well-placed and localized citizens.”
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