

PPGIS in Neighbourhood Planning:
A strategy for inner-city community gardens, Winnipeg, Manitoba

by

Sangwoo Hong

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Department of City Planning
University of Manitoba
Winnipeg, Manitoba

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Abstract

As spatial information has become more accessible and cheaper, interest in using Geographic Information System (GIS) has increased in a variety of fields including geology, social science, land management, and urban design. GIS has been considered a tool to provide geographically more accurate information and maps, but there are still underexplored questions about whether GIS is a tool that encourages or hinders active public participation in community planning practices; or whether it only intensifies fact-based research methods rather than encouraging more comprehensive approaches. In order to address these questions, this practicum examines how GIS may be useful to encourage public participation, how information and knowledge collected from residents or a neighbourhood can be applied to developing a GIS model and how these data may be incorporated with community plan. To analyze and illustrate the processes, this practicum explores community gardens in the Daniel McIntyre and St. Matthews Communities in Winnipeg, Manitoba and aims to develop a GIS model to assist with the process of identifying the strategical locations for future garden sites.

Keywords: PPGIS, Planning, Cognitive mapping, Perception Research, Public Participation

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1. Introduction

1.1. Statement of Purpose

Green and communal spaces in inner-city neighbourhoods have been recognized as venues that can help create a sense of belonging for communities and provide places for residents to share the stories of their lives. Even though creating and sustaining these spaces needs to be addressed by both planning and decision-making processes, the aspiration to provide more green and communal spaces generally has been overlooked and displaced by desires to accommodate other land uses and developments, such as building more housing or parking. Sivam, Karuppannan, and Mobbs (2012) note that urban development pressures have required more compact and high-density urban forms and decreased the number and quality of public and open spaces for residents living in urban areas (p. 817). They note that the provision of more housing options or infill developments is often considered as a primary goal in planning processes, and these sorts of development also generate additional tax revenues for local governments and tangible profits for private investors. Often, such demands for economic developments and more intensive uses of lands have resulted in the reductions in the quantity and quality of public spaces in inner-city neighbourhoods.

One of reasons that insufficient attention is paid to public space in urban policy and planning could be found in the concept of *return on investment*. Public spaces have not been considered as a factor to be sold and to generate immediate results that elected politicians or private investors expect from their investments (Madanipour, 2010). Even though urban planning has addressed many social problems including community health, unemployment, and degraded infrastructure, the creation of public spaces often tends to be a minor factor that has insufficient interests and support from the local government and elected politicians. Gans (1993) argued,

“[i]n a large heterogeneous society like the United States, or in a large heterogeneous city, there are few goals or programs that are clearly in the public interest” (as cited in Madden, 2010, p. 189).

In *Greening Cities, Growing Communities: Learning from Seattle’s Urban Community Gardens* Hou, Johnson, and Lawson (2009), illustrate how some communities are addressing this issue: “community gardens have been started by local residents seeking an alternative form of open space” (p. 3). That is, gardening programs are used as a means to transform vacant spaces and underutilized parks into beautiful and creative places – often through extensive resident engagement and cooperation. Furthermore, the garden spaces often become venues that create a sense of community and more accessible outdoor spaces serving community health and needs.

In Winnipeg, the inner-city neighbourhoods of Daniel McIntyre and St. Matthews (DMSM), have shown a good example of how community gardens can restore the function undermanaged public spaces. DMSM residents and a community organization have created four community gardens on vacant lands or underutilized public spaces to fulfill residents’ needs for safer and more accessible communal and green spaces within the neighbourhoods. Even though the gardening programs do not increase the actual number of public spaces officially designated by City of Winnipeg land use policy, the community gardens perform a role to reinvigorate the functions of existing spaces in the neighbourhoods, which were underutilized and perceived negatively by residents. The Lipton Tot Lot, located on north-east side of the community is a good example to show how the space was transformed by a community garden. The tot lot was a space for children activities, owned by the City. Although the City had responsibilities to maintain the space, a lack of awareness of the conditions of the tot lot led to the deterioration of the play structures. The degraded conditions subsequently resulted in residents having negative

perceptions of the space, that it was plagued by antisocial behaviours like vandalism or crime. After the Daniel McIntyre St. Matthews Community Association (DMSMCA) took a leadership role to reinvigorate the space by creating community gardens, the negative atmosphere was dramatically changed. Specifically, the gardening programs invited more residents to the tot lot, and the space becomes more visible and accessible to people.

Through extensive public consultations and resident participation, DMSMCA (2010) also has developed the *Five Year Green Action Plan* to improve its communities in a sustainable way and to address residents' needs and desires for more community gardens. As a medium term goal in the *Action Plan*, the community association aims "to create a new community garden or park each year" (p. 40). Furthermore, the *DMSMCA Community Plan* (DMSMCA, 2012) proposes community gardens as an initiative to enhance the physical and natural environments in its neighbourhoods and to increase residents' food security (p. 16).

From these perspectives, this practicum research considers community gardens as an alternative form of public spaces and aims to explore how GIS can be included in planning practices for community gardens, and to use GIS as a means to integrate local knowledge into developing a strategy for locating future community garden sites in DMSM. This is because many community organizations generally consider vacant or underutilized lots as potential spaces for community gardens. Although many efforts and gardening programs from DMSMCA have brought positive influences to the communities, there are still possibilities that GIS can support building strategies for creating community gardens. Longcore, Lam, Seymour, and Bokde (2011) emphasize that "the absence of any strategy around community gardens is a hindrance to the establishment of more gardens to meet the extensive need for fresh, healthy food in low-income ... neighborhoods" (p. 1). They also demonstrate how mapping can be a

foundation to build a strategy driven by a variety of features, such as landscape needs, demographic profiles, and services areas from existing farmers' markets and community gardens¹.

Scholars have argued the benefits and possibilities of using GIS in planning practice. Preston and Wilson (2014) argue that GIS not only provides a means to address multiple aspects of spatial knowledge, but can also include individuals' voices that might be marginalized from discourses. Other researchers also state the benefits of using GIS for addressing quantitative and qualitative information. For example, while GIS is often used to represent spatial patterns and statistical analysis, GIS generated through public participatory approaches allows the visualizations of unstructured spatial information including the interpretations of different forms of knowledge and narratives (Knigge & Cope, 2006; Preston & Wilson, 2014). Therefore, this research also explores GIS as a means to capture and analyze peoples' perception. Furthermore, it seeks potential ways that community organizations in inner-city neighbourhoods can use GIS as a participation tool for supporting their community goals and plans.

1.2. Research Questions

The intent of this practicum is to seek a way to use GIS in community planning as a participatory strategy to serve the needs of communities. Furthermore, the research will build GIS models that incorporate community's perceptions and to support one of the Daniel McIntyre and St. Matthews (DMSM) communities' goals: to create more green and public spaces within the neighbourhood. Two types of research questions frame this work. The first type examines how GIS models can be developed, in this case to determine the strategical areas for future

¹ See LA Gardens: Mapping to Support a Municipal Strategy for Community Gardens: <http://spatial.usc.edu/wp-content/uploads/2014/03/LAGardens-Research-Report.pdf>

community garden activities in an inner-city neighbourhood:

1. What would be advantages to engaging with residents on mapping exercises to capture their perceptions of a neighbourhood?
2. How can the collected local knowledge help identify community priorities, such as housing improvements and creating a safe neighbourhood?

Specifically, the first type of question will be addressed by observing how residents react to mapping exercise in two field surveys, which aim to collect residents' experience and knowledge about DMSM communities and existing community gardens.

The second type of research question aims to explore the potential of GIS as a participation tool that community organizations can employ when developing strategies for future community plans:

3. What challenges and opportunities are associated with GIS when developing a model for strategically siting interventions (in this case, the suitable areas for future community gardens in an inner-city neighbourhood)?
4. How can community organizations in inner-city neighbourhoods use residents' perception to support their community plan, and what would be the roles of GIS in its processes?

The second type of question will be addressed in a workshop that aims to assess the GIS model developed in this research and to identify how DMSMCA can use the captured perceptions in GIS for its future community plans.

1.3. Background Characteristics of DMSM Communities

The Daniel McIntyre and St. Matthews (DMSM) communities, located in the centre of Winnipeg, Manitoba, are two separate communities, but they share diverse and common

characteristics. The communities combined boundaries are: Portage Avenue to the south, Ingersoll Street to the west, Notre Dame Avenue to the north, and Victor Street to the east (DMSMCA, 2010, p. 5). Unlike the boundaries defined by DMSMCA, the City of Winnipeg defines the eastern boundary as Sherbrook Street instead of Victor Street. For the purpose of this practicum, this research follows the boundaries s defined by DMSMCA. Figure 1 describes boundaries, schools, and community gardens in DMSM.

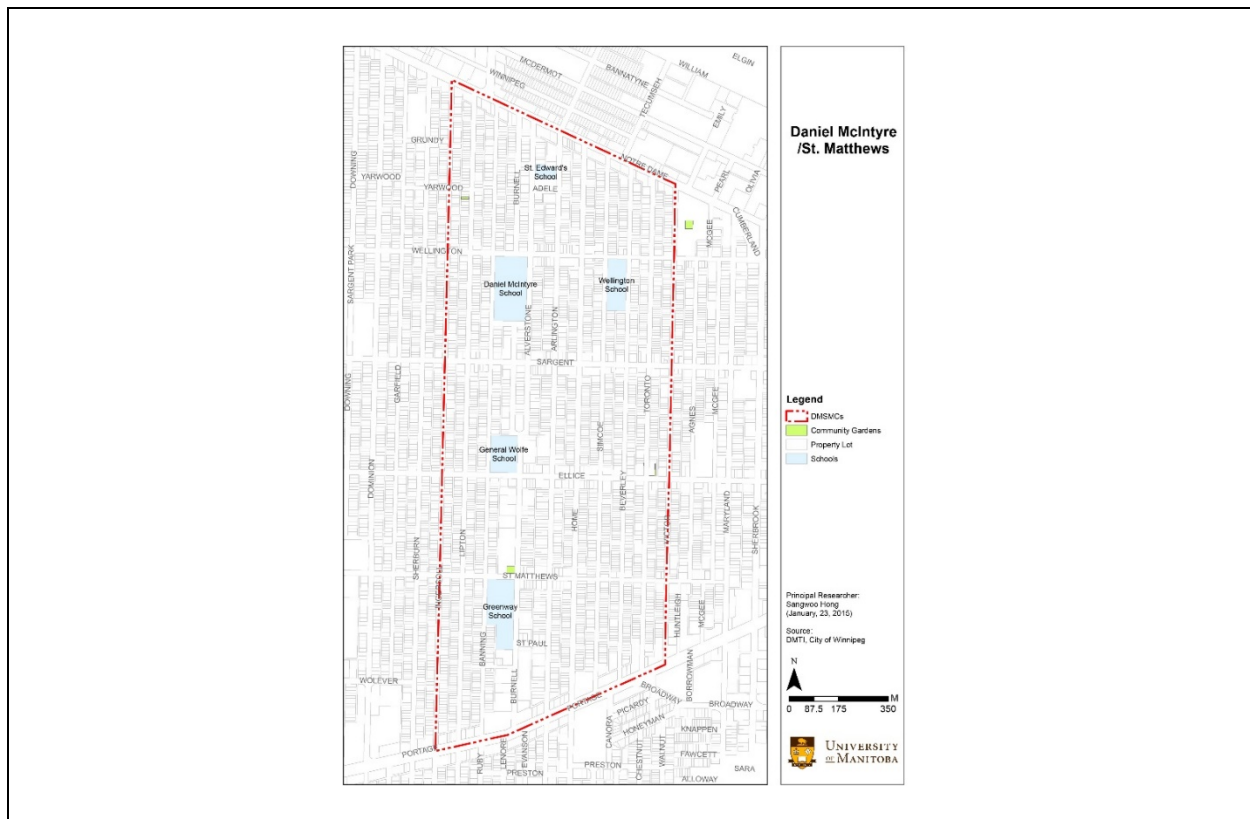


Figure 1. Map of DMSM including boundaries, schools, and community gardens

Predominant land uses in both communities are residential. Ellice and Sargent Avenues perform roles as main hubs providing community-based businesses and services including grocery stores, restaurants, and a community association (DMSMCA, 2010). Specifically, the Daniel McIntyre St. Matthews Community Association (DMSMCA), as a non-profit community organization located on Ellice Avenue, takes strong responsibilities for developing community

revitalization strategies and coordinating community economic development initiatives through collaborative efforts with residents and stakeholders of the neighbourhoods.

Historically, inner-city neighbourhoods in Winnipeg have experienced population decline because of improper housing conditions, decreased property values, and people's desire for suburban living. For example, between 1971 to 2011, Daniel McIntyre lost about 13% of its population, and St. Matthews decreased by about 29% (Table 1)². However, although the communities' total population has declined, the proportion of the communities that identify as visible minorities increased from about 3% to over 20% of the population between 1996 to 2011 (Table 2)³.

Table 1. DMSM population changes

Year	Daniel McIntyre	Change (%)	Comparison with 1971	St. Matthews	Change (%)	Comparison with 1971
1971	11,505	-	-	8,035	-	-
1976	10,840	-5.8%	-5.8%	7,335	-8.7%	-8.7%
1981	10,470	-3.4%	-9.0%	6,710	-8.5%	-16.5%
1986	10,960	4.7%	-4.7%	6,920	3.1%	-13.9%
1991	10,400	-5.1%	-9.6%	6,390	-7.7%	-20.5%
1996	9,885	-5.0%	-14.1%	6,365	-0.4%	-20.8%
2001	9,725	-1.6%	-15.5%	5,885	-7.5%	-26.8%
2006	9,750	0.3%	-15.3%	5,795	-1.5%	-27.9%
2011	10,040	3.0%	-12.7%	5,730	-1.1%	-28.7%

Table 2. Visible minorities population changes in DMSM communities

Year	Daniel McIntyre	Change (%)	Comparison with 1996	St. Matthews	Change (%)	Comparison with 1996
1996	4,315	-	-	2,045	-	-
2001	4,455	3.2%	3.2%	2,210	8.1%	8.1%
2006	4,630	3.9%	7.3%	2,300	4.1%	12.5%
2011	5,650	22.0%	30.9%	2,260	-1.7%	10.5%

² 2011 Winnipeg Neighbourhood Profile was completed through the re-interpretation of the 2011 Census and National Household Survey from Statistics Canada, and the census enumeration was voluntary. Therefore, the results of 2011 Winnipeg Neighbourhood Profile could be less reliable than 1996, 2001, and 2006 profiles.

³ The assessment about the population of visible minorities relies on 1996, 2001, 2006, and 2011 Winnipeg Neighbourhood Profiles provided by the City of Winnipeg.

Even though the total population has declined since 1971, tremendous efforts from the Manitoba provincial government and community organization have strived to make the DMSM more sustainable and vital. For example, the provincial government's *Neighbourhoods Alive!* Program provides funding and other resources to assist the revitalization of designated neighbourhoods. DMSM, one of its designated neighbourhoods, has used the funds to develop a variety of community strategies, such as *Five Year Green Action Plan*, *Housing Plan*, and *Community Plan 2012-2017*. As a part of *Five Year Green Action Plan*, DMSMCA has developed four community gardens including over 75 gardens plots (Orioles Community Garden: over 40 raised beds, Lipton Community Garden: 11 raised beds, Winnipeg Central Mosque Community Garden: 11 raised beds, Jacob Penner Park Community Garden: 15 raised beds).

1.4. Significance of Research

As a guideline to enhance Winnipeg's characteristics and to manage future growth in a sustainable and integrative manner, the City of Winnipeg developed a secondary plan named *Complete Communities* (2011), to help implement its development plan, *Our Winnipeg* (2011). *Complete Communities* defines DMSM as one of its "Areas of Stability," which are "primarily understood as the residential areas where the majority of Winnipeggers currently live" (p. 78). In order to make these areas more "complete", the planning documents provide direction to improve the public realm including the provision of more parks, open spaces, and other public services. According to *Complete Communities*, the City will "develop a *Parks, Places, and Open Spaces Management Plan* that addresses open space requirements and guidelines for Areas of Stability" (p. 81).

Complete Communities and other planning documents have emphasized the importance of public and open spaces and provided directions for their development. However, practical actions or plans to achieve the goals have not been established. For example, the *Parks, Places, and Open Spaces Management Plan* is still not developed. Investments for public spaces and community gardens, specifically in inner-city neighbourhoods, are insufficient to support community organizations that are striving to create more community gardens and sustainable communities.

To address these challenges and create more sustainable communities, DMSMCA has developed four community gardens and active programs through extensive community engagement and participation, such as *Green Action Plan* (2010) and *Neighbourhood Green Map*⁴ sharing knowledge about community assets and green infrastructure. Even though these efforts have helped transform DMSM into more positive and active neighbourhoods, the established community gardens are still insufficient to fulfill the community's needs. For example, the locations of existing community gardens are scattered. About 55 percent of the neighbourhood is not within a walking distance (400 meters)⁵ of existing community gardens. Furthermore, while community members' aspirations for participating in gardening programs are increasing, a lack of political will and funding remains an obstacle to creating and sustaining community gardens. Creating a GIS model could be a good starting point to identify the potential areas for new community gardens and to support DMSMCA's goals to create sustainable and green communities.

⁴ The Neighbourhood Green Map is a web-based mapping tool that share the information of community assets and green infrastructure in DMSM communities. See <http://www.dmsmca.ca/greening/neighbourhood-green-map>

⁵ Atash (1994) states four hundred meters are "the distance the average American will walk rather than drive" (as cited in Aultman-Hall, Roorda, & Baetz, 1997, p. 12).

1.5. Limitations and Biases

This research assumes that GIS can be a strong tool to support participatory approaches. Even though GIS can generate more accurate information and allow broader analysis through overlapping layers and analyzing interconnectivities among data, using GIS in community plan could be another challenge. Rambaldi, Chambers, McCall, and Fox (2006) state complexities that GIS has can decrease residents' accessibility to information (p. 14). In order to reduce the challenges, researcher performs a role as a GIS facilitator to prepare maps and GIS analysis rather than residents are directly working with GIS.

Another limitation is that GIS analysis in this research relies heavily on participants' perception and responses collected through mapping exercises in two field surveys and discussions in a workshop. This is because this research assumes collecting residents' perception and using it for developing strategies for future community gardens and goals can be a strong engagement tool and encourage marginalized people's participation. However, if participants do not remember accurately the locations of areas that they value, or that they have concerns about, it could result in errors in GIS analysis. In order to minimize this limitation, the principal researcher assisted participants, when they participated in mapping exercises. Participants were also asked to share the reasons they highlighted the areas, and the responses were compared with the GIS analysis, which aims to identify strategical areas for future community gardens and community plans. However, if participants did not wish to share their reasons, they could leave the questions and maps as blanks.

The last limitation is that the sample size of surveys and workshop in this research relied on residents' voluntary participation although this practicum aimed to invite as many participants as possible. Many scholars in cognitive research argue a large sample size allows researchers to

more accurately analyze and identify public images that represent people's perception (Lynch, 1990; Platt, 2005). However, this research had limited ability to increase the total number of participants because it relied on people's voluntary participation. In order to effectively invite participants, the principal researcher visited DMSMCA to meet with a staff to confirm the possibilities of incorporating surveys and a workshop into existing community events.

1.6. Outline of Chapters

This practicum consists of five chapters. The first chapter provides overall introductions including research purposes and questions, background characteristics of the Daniel McIntyre St. Matthews Community Association (DMSMCA), and limitations and biases of this research. The second chapter is a review of literature. In order to build the better understanding of community gardens and public participation, the first section explores the benefits of community gardens and factors that increase the likelihood that they will be successful. The second addresses public participation and its backgrounds and challenges. Last two sections explore the critiques and strength of cognitive mapping research, Public Participatory GIS (PPGIS), and examples of GIS used in perception research. The third chapter focuses on the research methods used in this practicum. It explains surveys with completion mapping and a workshop designed for this research and their data collections. The fourth chapter describes the analysis for captured perception in GIS and its findings including scenario for future community gardens in DMSM and GIS as a participation and supporting tool in community plan. The last chapter concludes this research by revisiting the research questions and providing recommendations for future research.

2. Literature Review

In order to understand the opportunities of community garden activities, uses of GIS as a participatory tool, and capturing perception as local knowledge through GIS, this literature review consists of four sections: community garden, public participation, cognitive mapping, and public participation geographic information system (PPGIS). The first section explores the benefits of community garden activities and what makes community gardens successful.

Community gardens are often considered as an alternative means of creating communal and open space in inner-city neighbourhoods that have insufficient green spaces and social venues.

However, there are still many challenges, such as a lack of guidelines or legal instruments that might enable communities to use gardens for longer periods of time or permanently. This section examines three elements that should be considered when implementing community gardens.

The second section explores levels of public participation and empowerment and examines backgrounds and challenges faced in conventional public participation processes. Public participation is generally considered as a way of achieving democratic involvement in decision-making process. However, conventional public participation tends to provide benefits for people who are affluent and those who have power in decision-making processes. This section aims to build a better understanding of public participation and the challenges of conventional participation.

In 1960s and 1970s, cognitive mapping research was explored by many scholars to understand how people perceive existing environment on a daily basis and how their cognition understanding of the spaces influences their behavioural patterns. One of best-known cognitive mapping approaches in planning and architecture is in the five elements suggested by Kevin

Lynch in *the Image of the City*: paths, edges, districts, nodes, and landmarks. These have also been used by many planners, urban designers, and architects to describe factors that cities should have. However, there are not many evidences to apply people's perception to planning and decision-making processes. Downs and Stea (1977) state "Kevin Lynch ... bemoaned the fact that studies of urban cognition have had few demonstrated applications (and quite a few misapplications)" (p. 241). Furthermore, people's subjective interpretations of spatial environments are often considered as informal information and disregarded by many professionals. The third section explores Lynch's understanding of city image as well as challenges and strengths of cognitive mapping.

The fourth section explores how GIS can be used as a public participation tool. GIS is used in a variety of fields, such as geography, the social sciences and urban design, in order to analyze and visualize existing environment and topography to support decision-making processes. However, there are many critiques that argue that GIS marginalizes those people who have insufficient experience and expertise with the technology. Furthermore, many researchers have warned the conventional approaches in GIS practice insufficiently address local knowledge, which is often considered as informal and narrative data. In order to build the better understanding of GIS as a public participation tool, this section examines the challenges of typical GIS practice, benefits of PPGIS, and the possible way of utilizations of PPGIS in planning practice.

2.1. Community Gardens

Creating green and public spaces in urban areas has been receiving growing attention from planners, architects, and urban designers. Improving accessibility to existing green spaces and providing new open spaces are often used as strategies to revitalize urban areas. However, even

though creating public spaces can be used as a tool to beautify urban areas, it still does not receive the attention that is paid to other land uses. That is, developers often focus on achieving their development goals rather than considering the importance and functionalities of public spaces in urban areas. Madanipour (1999) also argues “as compared with most historical periods of the past, the importance of public space in the cities has diminished” (p. 883).

Creating public spaces typically is not treated as having the same priority as other land-uses like housing and economic improvements. One of the reasons could be that public spaces are not recognized as generating direct financial benefits for developers. In this case, developers or urban designers often consider public spaces as needed to fulfill development regulations instead of considering the diverse functions and complexities of the public spaces and how they enhance other developments. This is because private developers are more “interested in rewards on their investment, which set the parameters for the architect’s scope of action” (Madanipour, 2010, p. 4).

Indeed, words ‘more open space’ is thought to describe a simple and magical way to change cities’ and neighbourhoods’ atmospheres. However, ‘more open space’ does not necessarily perform well as a public space. Jacobs (1961) warns this simplification without understanding of the complexities of open spaces can result in underutilized and abandoned spaces. Indeed, green spaces without accessibility, visibility, and functions that are inviting inhabitants often become huge empty spaces. If spaces are not well used, they may be plagued by anti-social behaviours. That is, insufficient interests from residents and programs for public activities have contributed to making parks or squares empty and unsafe, which increase the feeling of insecurity after dark in urban areas and inner-city neighbourhoods (Balsas, 2007).

In this context, community gardens can be a good starting point to create open and

communal spaces in inner-city neighbourhoods adding programs and functions to the simple idea of 'more open space'. Winnipeg Zoning By-Law defines community gardens as “a public use of land for the cultivation of fruits, flowers, vegetables, or ornamental plants by more than one person or family” (City of Winnipeg, 2016, p. 20). Furthermore, the City also classifies community gardens as one of “park and park-related uses” (City of Winnipeg, 2016, p. 61). It means the City considers community gardens as places having the similar functionality with public spaces and as welcoming places to invite diverse ethnic groups and people interested in gardening and social gathering opportunities although community gardens are sometimes considered as semi-public spaces, which only allow their participants' and gardeners' accesses.

Hou, Lawson, and Johnson (2009) state that “the urban community garden is generally regarded as a model of community open space that provides multiple environmental, social, economic, and health benefits” (p. 3). Indeed, community gardens have been used to transform vacant and underutilized spaces into socially and environmentally interactive places. They are also regarded as “a means to achieve multiple social agendas, such as shoring the economic resiliency of the laboring class, teaching desirable social behavior, and re-visioning the urban neighborhood” (Lawson, 2004, p.165). However, there are still many factors that should be addressed in community garden implementation and using it as an alternative tool to create open and communal spaces in inner-city neighbourhoods. This section explores the benefits of community gardens and what needs to be considered to successfully implement them in inner-city neighbourhoods.

2.1.1. The Benefits of Community Garden

Many researchers have stressed that community gardens are beneficial to communities. Kingsley and Townsend (2006) observe that “community gardens have been appropriated by various

statutory and voluntary agencies as an intervention to aid urban regeneration, social cohesion and related health problems” (as cited in Firth, Maye, & Pearson, 2011, p. 555). Indeed, gardening programs have been used as a tool to relieve economic crisis, to educate residents, as well as to beautify abandoned spaces in communities. From these perspectives, communities can create tangible and intangible benefits from the community garden programs, such as economic and psychological benefits, enhancing environmental sustainability, as well as building social capital (Milburn & Vail, 2010; Lawson, 2004).

In terms of economic benefits, individuals participating in gardening programs can reduce their grocery expenses by growing and harvesting their own crops and foods. Lawson (2004) states the gardening programs have been used to increase economic resiliency. They not only reduce grocery expenses, but also improve employment opportunities as personnel are often needed to administer and maintain community gardens. From a different perspective, when local governments invest in community gardens, they, too, can benefit. For example, the government can develop and maintain them without high expenditures required to sustain many other public spaces (parks, etc.) designated by City policy (Milburn & Vail, 2010).

Community gardens also can generate psychological benefits. According to Howe, Viljoen, and Bohn (2005), participants may feel a sense of well-being and release their stress when gardening, and ethnic minority groups use the garden places to “express their local and ethnic identity” (as cited in Milburn & Vail, 2010, p. 72). Indeed, gardening activities help people relieve tensions, the result of busy lives, and provide “sustained diversion, aesthetic pleasure, and a sense of accomplishment” (Lawson, 2005, p. 217). Furthermore, community gardens can be gathering places for diverse ethnic groups, where they can sustain traditional way of growing foods, share their stories, and barriers can be reduced between local residents and

immigrants. Wakefield et al. (2007) state that community gardens can be places “where different ethnic groups can interact, thus providing a space to help different groups overcome potential barriers between them” (as cited in Firth, Maye, & Pearson, 2011, p. 557)

Another benefit of the gardening activities is that they may also improve environmental sustainability. Specifically, many community organizations have used community gardens transform their vacant or underutilized spaces. This is because community gardens not only to beautify abandoned spaces, but also to reintroduce nature into inner-city neighbourhoods. Lawson (2005) describes community gardens as “oases of green in a concrete-dominated urban world” (p. 7). Indeed, community gardens provide opportunities for people to enjoy viewing the gardens and reconnect with natural processes. They may also make people “more aware of their surroundings and increase their desire to protect the environment” (Milburn & Vail 2010, p. 72). Other scholars also highlight how community gardens help restore existing environments in neighborhoods and reduce energy consumption for transporting food to each family (Harris, 2009; Lawson, 2004).

Lastly, many scholars emphasize enhancing social capital as one of significant benefits that community garden activities create. Firth, Maye, and Pearson (2011) state “strong communities are [...] built by community members who are engaged, participate and feel capable of working through problems, supported by strong social networks” (p. 557). That is, the meaning of community can be defined by people’s connections and relationships rather than its physical boundaries (Kingsley & Townsend, 2006, p. 527). In this context, many scholars highlight community gardens can be a venue that enhance social networks among the community members and create a sense of place, which is generally defined as emotional and spiritual connections to the piece of land (Kingsley & Townsend, 2006; Maarel, 2013; Milburn & Vail,

2010).

More specifically, the social connections and relationships formed through the community gardening enhance the sense of community and give people a sense that they belong to it. Firth, Maye, and Pearson (2011) state “community gardens as a common space that brings people together and inspires shared action” (p. 556). Indeed, gardening in a communal space can increase opportunities to invite people having diverse backgrounds, to understand their communities, and to build relationships with new people. Kingsley and Townsend (2006) also argue that community gardens improve the knowledge of people in their communities and bring people to work together, so they can feel more connected to and extend their relationships with communities (p. 531).

The relationships enhanced through community gardens can give people a sense that they can affect change in their neighbourhood. Glover (2004) states “community gardens have the potential to empower residents to take on more active roles in the further development of their neighborhoods” (p. 144). This is because community gardens can be a place that people can have constructive communications covering a broad range of concerns of their neighbourhoods, which address from simple gardening to bigger challenges that community members are facing. Therefore, community gardens can be places to improve social cohesion and to create distinctive characteristics, which encourage story sharing and a sense of belonging to communities. Furthermore, the enhanced social cohesion and sense of place that gardening activities facilitate can be considered as a resource to promote community activism and positive transformation in inner-city and marginalized communities (Lawson, 2005, Milburn & Vail, 2010).

2.1.2. Elements to Make Successful Community Gardens

Unlike other public facilities or amenities, community gardens need constant attention from

residents and community organizations to ensure that they are maintained (Hou, Johnson, & Lawson, 2009). For example, even if people do not use a tennis court for a while, the conditions of equipment, such as nets and poles, could deteriorate. However, its actual function and the designation of the land for a recreational use does not change. Unlike public facilities, gardening programs cannot sustain functions, programs, and lands if there are insufficient supports and constant community interest to acquire land, funding for the programs, and encouragement to involve community members (Hou, Johnson, & Lawson, 2009). Milburn and Vail (2010) highlight four elements that should be considered to successfully implement community gardens: 'land tenure, sustained interest, community development, and design.' In order to build the better understanding of successful community garden implementations within a scope of this research, this section explores three elements except design. This is because this research does not address design strategies for community gardens.

2.1.2.1. Land Tenure

In terms of land tenure, many neighbourhood organizations pursuing community garden programs are facing challenges in controlling the garden spaces over longer periods, or as permanent features in communities. Indeed, community gardens are often recognized as interim uses because the land can be developed for other purposes as and when determined by the land owner. Milburn and Vail (2010) suggest gardening programs should be based on long-term lease agreements, specifically, five- to ten-year leases to ensure that participants' interests and efforts can be sustained. Another way to secure the lands for community gardens is to use land trusts. According to the Milburn and Vail (2010), the process to place community gardens into a land trust can be time-consuming and require responsible gardener groups (p. 76). However, when the gardening programs match the goals of a land trust, the lands can be protected from future

development pressures and used as permanent open or community garden spaces.

Milburn and Vail (2010) also suggest that partnerships with local government may increase the possibility to secure the lands for community gardens for permanent or long-term uses. Many local governments generally commit to “short-term leases of one or two years” for creating community gardens on government-owned lands (p. 76). This is because if community gardens are built on a publicly-owned land zoned for residential use, housing developments would be prior to gardening uses. That is, the governments sometimes prefer to ensure development opportunities that increase their tax revenue. However, partnerships can be beneficial to both communities and the local government. Specifically, the local government can incorporate community gardens into their “open space network with other recreational uses” (p. 76) while communities may receive technical assistances from the local government, such as “developmental, organizational, and maintenance skills” (p. 76). Furthermore, they argue that partnerships between communities and park departments can bring other opportunities, like creating community gardens on lands already designated as open spaces. The community garden spaces can then be protected from future development pressures through the partnership between communities and local government.

2.1.2.2. Sustained Interest

Sustaining participants’ interests is another factor should be considered in community garden implementation. Indeed, without the constant interest and support from the community members and gardeners, gardening programs cannot be sustained. In this context, constant outreach to both participants and non-participants is important. Milburn and Vail (2010) emphasize that early involvement of community members in the planning process for community gardens will help people understand the benefits of community gardens and how they can engage with the

gardening programs. Through the processes, people also need to discuss how to assure “sustained return on investment is necessary for individuals to commit the sweat and labor that is required to transform an infertile, trash-filled lot into a productive garden” (Lawson, 2004, p. 170). Furthermore, engagement with the community can ensure that programs address and match the ideas and needs of community members, and enable participants to become familiar with the processes and to sustain their interests in community gardens.

Strong leadership is also a key factor to sustain community’s interest and to move gardening programs forward. Specifically, leaders can build a relationship with other communities and organizations to share their experience and to bring new ideas and different expertise to the gardening programs. Milburn and Vail (2010) also argue that leaders need to be initiators and to have “the motivation to carry it forward” (p. 78). Indeed, strong leadership can ensure the goals of gardening programs match with community needs and use different tools, such as social media, newsletters, and community events, to sustain their interests in community gardens.

2.1.2.3. Community Development

For successful community garden implementations, the programs should be also a part of a large community development strategy. Specifically, the gardening activities can be a catalyst for community members to address other challenges and to share their ideas to overcome existing problems in their community (Firth, Maye, & Pearson, 2011). Indeed, community gardens can be a tool to re-identify community members’ range of expertise and skills, which can be great resources to enhance the capacity of community. For example, maintaining community gardens requires a broad range of skills, such as gardening, designing the spaces, and the administration of programs and events. In this context, each community member can use their own skills and be

directly involved in community development processes. Through the processes, participants take part in social interactions and share their ideas “to effectively tackle other issues affecting their neighborhood” (Milburn & Vail, 2010, p. 80).

Indeed, the social interactions internal to members of communities are an important factor to successfully implement community gardens in community development processes. However, communities should not overlook the possibilities that they could build broader networks, such as relationship with surrounding communities or other organizations. According to Harris (2009), a strong partnership among community members, non-profit organizations, and government is an important ingredient to successfully manage community gardens (p. 26). That is, when communities want to establish community gardens and use them for community development, it requires both internal and external supports. Firth, Maye, and Pearson (2011) argue “any external support needs to be on a partnership basis and must recognize the significant contribution volunteers make to such schemes” (p. 566). Furthermore, even though the gardening programs should be driven initially by community members, communities should recognize that there may be viable opportunities to extend the programs through the partnership with other organizations and local government. Hou, Johnson, and Lawson (2009) state the interactive communication and sharing information through the web-based mapping, for example, can “articulate the values, roles, and models of community gardens to better secure them as legitimate and protected city open spaces” (p. 41).

2.2. Public Participation and Empowerment

With the increased importance of citizen engagement, many planners and scholars highlight the importance of extensive and active public participation as a cornerstone to achieve spatial justice and empowerment in planning and decision-making processes. Arnstein (1969) stated that “the

idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you” (p. 216). Indeed, seeking solutions and envisioning communities’ goals through citizen engagement are often regarded as central to democratic approaches that are espoused by most decision makers, planners, social scientists, and citizens (Arnstein, 1969; Day, 1997; Rocha, 1997). Day (1997) also describes citizen engagement in planning processes as a foundation of democracy, and that ignoring engagement threatens democratic traditions (p. 421).

However, general public participation, which is often required by law, faces challenges, such as a lack of a clear framework, insufficient comprehensive methods for the processes, and a lack of consensus building among citizens. Innes and Booher (2004) argue that in general, public participation does not achieve citizen empowerment in decision-making and planning processes:

They do not achieve genuine participation in planning or other decisions; they do not satisfy members of the public that they are being heard; they seldom can be said to improve the decisions that agencies and public officials make; and they do not incorporate a broad spectrum of the public. (p. 419)

Typical participation methods result in the failure to achieve ‘genuine participation’ and generate benefits only for certain individuals or groups – those who are affluent or already have power to influence decision-making processes. In these contexts, this section explores the theories of citizen participation and empowerment, why public participation has become a significant factor in planning processes, and what challenges have arisen for conventional participatory methods.

2.2.1. Citizen Participation and Empowerment

The concept and implementation of citizen engagement in decision-making processes have been addressed by a broad range of literature and criticism. Many scholars have focused on how people can be empowered and how they may benefit through participatory methods. Conroy (2011) notes “the extensive literature on citizen participation addresses benefits to organizations

and participants, motivation, and procedural elements” (p. 469). Citizen participation is also recognized as a way of empowering marginalized groups and individuals, who desire to participate in planning and decision-making processes. Arnstein (1969) argues citizen participations “can induce significant social reform which enables them to share in the benefits of the affluent society” (p. 216). However, even though planners and decision makers acknowledge the importance of citizen participation, it is difficult to define what public participation is and what makes a successful process.

Arstein (1969) helps develop an understanding of the extent of citizens’ power in public participations. In “A Ladder of Citizen Participation,” she divides citizen participation into eight levels (Illustration 1). They are clustered into three major groups: “nonparticipation,” “degrees of tokenism,” and “degrees of citizen power” (p. 217). Nonparticipation consists of “manipulation” and “therapy,” levels at which social elites have the most of power in decision-making and planning processes. Marginalized people may be treated as groups that need to be educated and cured by those who hold power (p.217). Within “tokenism,” “informing,” “consultation,” and “placation” are levels at which citizens’ voices start to be heard in the processes. However, these levels do not ensure that decision makers would accept participants’ needs. It generally focuses on informing citizens about goals and purposes that have been developed by social elites; they use citizen participations to achieve legitimacy in decision-making processes. At the highest levels, according to Arnstein, “degrees of citizen power” citizens start to have experience authentic participation in decision-making processes. In these level, citizens have opportunities to negotiate and work with decision makers. At the very top level, citizens and marginalized people obtain enough power to manage and influence decision-making processes.

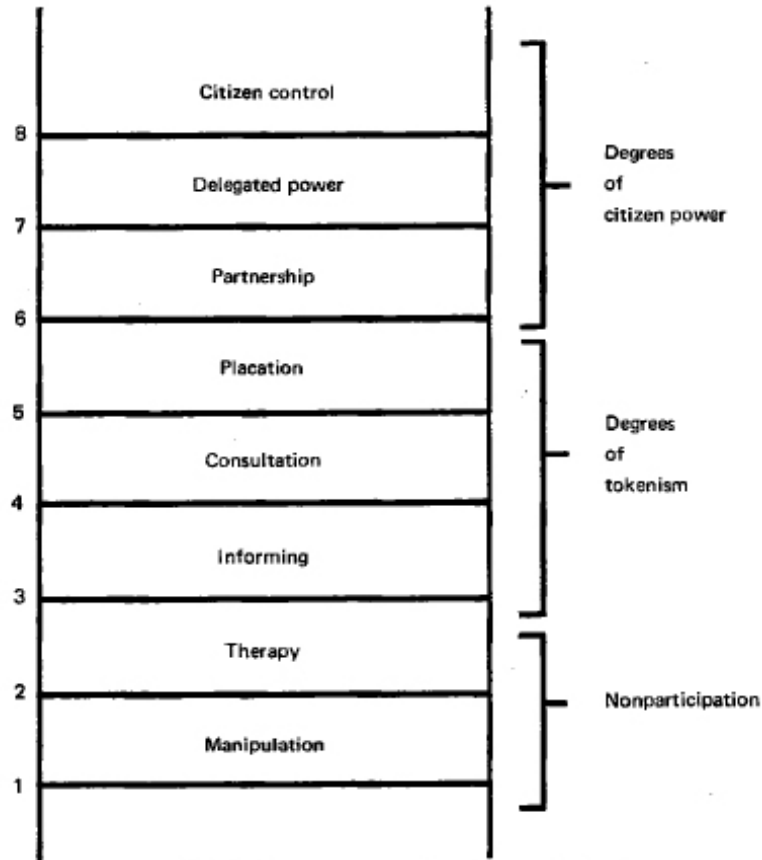


Illustration 1. Eight rungs on a ladder of citizen participation (source from Arnstein, 1969, p. 217).
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Likewise, Arnstein's ladder describes and helps understand how participants experience power. However, it seems like participants in each level experience the same type of power. Wartenberg (1990) argues "not all power experiences embody the same type of power" (as cited in Rocha, 1997, p. 32). Different environment and local settings influence individuals and groups participating in decision-making processes, and they often have different inquiries and goals. That is, each individual and group can differently experience power in the processes.

In these context, Rocha (1997) shows how individuals and communities experience the different type of power using a ladder model like Arnstein's. Rocha (1997) divides the empowerment into five rungs, and each rung includes four factors: locus, process, goals, and power experience (Illustration 2 and 3). As a first level on the ladder, "atomistic individual

empowerment” is an experience of power within which individuals are strengthened by the support of powerful others (Rocha, 1997, p34). This mostly increases individuals’ satisfaction without changing the system or structures. For example, social service organizations, such as career or homeless service centres, provide immediate supports for individuals. However, the assistance does not address long-term solutions, such as capacity building, which could encourage the individuals to more actively participate in the processes.

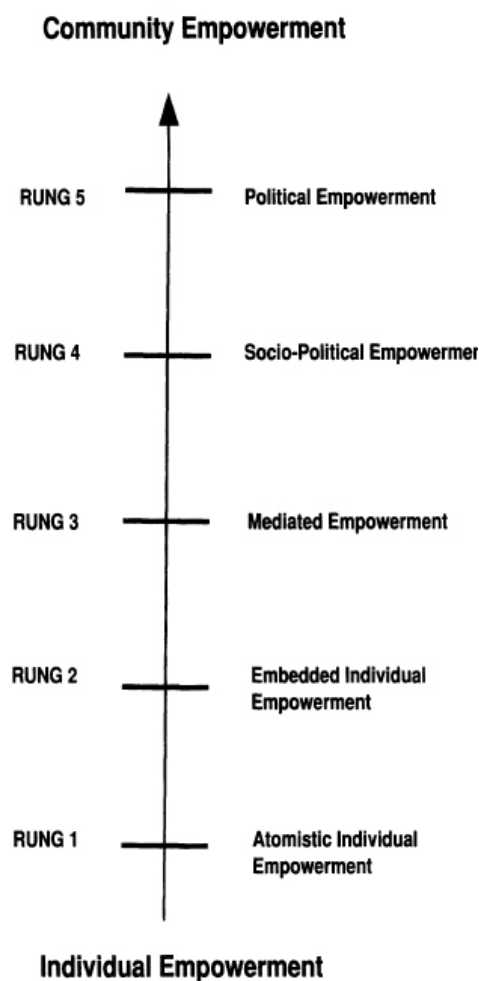


Illustration 2. A ladder of empowerment (source from Rocha, 1997, p. 34).
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Illustration 3. Five empowerment types (source from Rocha, 1997, p. 35).

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	Atomistic Individual	Embedded Individual	Mediated	Socio Political	Political
Locus	- Individual	- Individual	- Individual - Community	- Individual - Community	- Community
Goal	- Personal satisfaction - Increased coping ability	- Personal satisfaction - Competence in negotiating daily environment	- Knowledge & information for proper decision making	- Individual development - Expanded access to community resources	- Expanded access to community services, goods & rights
Process	- Therapy - Daily living skills	- Organizational participation	- Professional/client relationship	- Organizational participation - Collaborative grass-roots action	- Political action, voting, Protest - Political representation
Power Experience	- Nurturing support	- Nurturing support - Direct & control self	- Support - Strengthen self - Control by helping - Moralized action	- Support - Strengthen self - Influence, coerce others - Togetherness	- Influence, coerce others - Assertion

“Embedded individual empowerment” is the next rung, which affects and is influenced by surrounding environments and services. Zimmerman (1990) states that individuals are “embedded within the larger context affecting their circumstances” (as cited in Rocha, 1997, p. 35) and empowered through participation in organizations. In this level, Rocha (1997) argues that participation in neighbourhood groups and non-profit organizations are an important foundation to empower the individuals. Specifically, individuals can obtain skills, knowledge, and experience through participation. The skills and knowledge obtained enable the participants to have more opportunities to interact with experts in decision-making processes. However, the critique of this stage is that the participants are not encouraged to deal with “the external environment as an element that can be acted upon” (Rocha, 1997, p. 35).

As a third rung on this ladder, “mediated empowerment” suggests that individuals or communities are empowered by relationship between experts and participants (Rocha, 1997). In

this stage, the individuals or communities are regarded as groups that lack the necessary skills and knowledge to fully participate in decision-making processes. The experts provide information and knowledge and help them develop capacities to address internal and external environment at conditions. However, this level sometimes results in unequal power between participants and experts. Rocha argues that the inequity in power relationship between participants and experts sometimes results in unintended and negative consequences, such as resisting the “interaction that may invalidate a truly empowering process” (p. 37). Conversely, Rocha argues that this situation may also be a strength because the relationship with experts helps participants address issues that should be dealt with, in decision-making processes.

The fourth rung of the ladder is “socio-political empowerment.” In socio-political empowerment people are recognized as essential components of a community. Rocha (1997) argues “this model of empowerment uses collaborative, grassroots, political actions as a benchmark” (p. 38). With knowledge acquisition and collaborative social action, members of the community proactively engage in decision-making processes, and the community transforms “itself into a powerful actor” (p. 38). In this stage, the individuals and community become critically aware of “their relationship to structures of power and collective action upon those structures” (p. 38). From these perspectives, individuals and communities develop their capacities to simultaneously address physical and social problems.

“Political empowerment,” the fifth level, incorporates institutional and political actions. It involves legislative changes to support marginalized communities. Manzo and Perkins (2006) state political empowerment “offers the advantage of a whole community perspective that creates a proactive sense of empowerment” (p. 344). However, although the model provides larger legal and institutionalized power for the marginalized community, building the capacity for individuals

is not an essential component.

Likewise, exploring Arstein and Rocha's models about citizen participation and empowerment helps planners navigate how individuals or the community experience the power and which stage they are in. For extending the understanding of public participation in planning practices, the next part explores how public participations have been emphasized by legal system and what the challenges are.

2.2.2. Backgrounds and Challenges of Conventional Public Participation

With intensive desire for rapid urbanization in early twentieth century, local governments faced urban and social problems, such as urban decline and social inequity. In order to revitalize the urban slums and address citizens' needs in planning processes, the 1954 Urban Renewal Act in the USA, legally required citizen participations (Day, 1997). The Act required that seven to fifteen citizen leaders be included in processes. Although the Act promoted citizen participation, it insufficiently considered the participation of marginalized people in the decision-making processes. Day (1997) states: "grassroots participation was not necessarily encouraged for idealistic reasons, but was encouraged when it became expedient for housing and business rehabilitation" (p. 423). That is, the citizen leaders who participated in the processes were generally affluent and familiar with the planning processes, and grassroots' engagements were not necessarily guaranteed unless there were specific reasons that they needed to participate.

With tendency to facilitate more public participation in early 1960s in the USA, broader citizen involvement started with Economic Opportunity Act (1964) (Lowry, Adler, & Milner, 1997, p.177). The Act required "maximizing citizen participation," based on a notion that citizens should voice their needs in decision-making processes that influence their day-to-day lives. Indeed, community action programs based on the Act "had to be developed, conducted,

and administered with the maximum feasible participation of the residents of the areas and members of the groups to be served” (Lowry, Adler, & Milner, 1997, p.177). Although “maximizing citizen participation” was more likely to encourage a broader range of citizen involvements in decision-making processes, it resulted in other challenges and conflicts within the processes and among the participants. According to Day (1997),

Mandatory participation in planning led to a chaotic situation in which mass meetings ended in near riots and that decisions were made in a profoundly undemocratic fashion; there was no structural mechanism through which personal wishes were suppressed to reach a consensus. (p. 424)

In order to reduce these conflicts, the extent of citizen participation was changed in 1970s. For example, the Coastal Zone Management Act of 1972 required “encouragement of the participation of the public” and the Housing and Community Development Act of 1974 demanded “adequate opportunity for citizen participation” (Day, 1997, p.424).

Canada has a different experience of public participation in policy-making processes from that of the USA. In their article “Strengthening Citizen Participation in Public Policy-making: A Canadian Perspective,” Woodford and Preston (2011) show how public consultations in Canada have been used as a part of public participation in policy-making processes. Citizen participation in Canada started with the Regulatory Reform Strategy of 1986. Specifically, the Citizen Code for Regulatory Fairness as a part of the Strategy required utilizing “a multi-step process of regulatory review, including pre-publication of regulatory intentions and public consultation” (Woodford & Preston, 2011, p. 347). In 1999, public consultation became a more significant part in policy-making processes through the Social Union Framework Agreement, “which [was] endorsed by federal and provincial government (with the exception of Quebec) and territories” (Woodford & Preston, 2011, p. 347). Under the Agreement, the federal government provided financial support for provincial and territorial governments to encourage public

consultations in policy-making processes. In 2007, the Cabinet Directive on Streamlining Regulations also indirectly emphasized public consultations in policy-making processes, with “a commitment to regulations through inclusiveness, transparency, accountability, and public scrutiny” (Woodford & Preston, 2011, p. 349).

Likewise, legal and regulatory processes in the USA and Canada have encouraged citizen participation through commitments and provisions in legal documents. However, there are still many criticisms. Specifically, Woodford and Preston (2011) highlight the challenges of public consultation techniques that are often used as participatory methods in policy-making and planning processes. The first is public consultation that tends to be ‘one-way communication’ rather than encouraging interactions between government officers and citizens. For example, citizens are typically either informed about government’s plans by government officers or to simply share their idea and concerns without decision-makers’ guarantees that they will address citizens’ concerns in the processes. That is, one-way communication does not ensure that ideas shared and discussed in public consultations will be deliberatively addressed in decision-making processes. In these contexts, Woodford and Preston (2011) found that citizens “have no opportunity to collective problem-solve” (p. 350), and government representatives lose “opportunities for collaborative problem-solving” (p. 350) in public consultation methods.

Another challenge is that consultation methods provide ‘infrequent feedback’ for citizens. Woodford and Preston (2011) explain “there is an absence of formal feedback on how citizens’ voices influenced and shaped actual policy decisions” (p. 350). Indeed, although government officers and researchers often describe what participants said in their reports, citizens are rarely informed about how their ideas and needs have influenced political decisions. Furthermore, the insufficient interactions between experts and citizens result in the bias that the decision-making

processes with participatory methods would not sufficiently address citizens' needs and goals.

The mistrust and gaps between experts and citizens also results in 'limited involvement.' This means that a lack of trust between them results in citizens either losing interest in participation or avoiding sharing their stories and ideas in public consultation processes. Limited involvement is also caused by 'government control', which is one of the challenges observed by Woodford and Preston (2011). Governments typically specify the process of public consultations. Woodford and Preston argue that governments "determine if the [public consultation] will be open or by invitation only, and in the latter case, government determines the invitation list" (p. 351). In that context, citizens have fewer opportunities to participate in a specific stage of decision-making processes instead of fully involved in the processes.

"Poor representativeness" is another challenge of public consultation techniques. In general, the guidelines or provisions of public consultations require that participants should be representative, and the consultation should not purposely exclude specific groups or individuals in the processes (Woodford & Preston, 2011, p. 350). However, public consultations tend to invite participants who have acceptable ideas and opinions that might align with their political goals and purposes (Abele et al., 1998; Woodford & Preston, 2011). In this perspective, marginalized groups and individuals, who have limited opportunities to participate and different perspective on the policy, could be inadvertently excluded in the processes. Insufficient participatory opportunities for marginalized people result in "their issues less visible and their influence even further marginalised" (Woodford & Preston, 2011, p. 351).

Public consultations as a conventional participatory method have limitations to achieve the empowerment and to provide fair opportunities for marginalized groups and individuals in decision-making processes. According to Day (1997),

There is also the problem that the outcomes of participatory processes will not truly reflect the aggregate of citizen preferences or interests, because relatively few people take advantage of the opportunities for participation that do exist (p. 429).

Indeed, a lack of interactions and inequitable distribution of power in the processes make particular groups or individuals enable to have more power and to consider their own values and needs rather than seeking a fair consensus.

2.3. Cognitive Mapping

In order to build the better understanding of human behavioural patterns in existing environments, how human cognition influences overt behaviours had been explored in environmental psychology and urban studies in 1960s and 1970s. Downs and Stea (1977) defined cognition as “an abstraction covering those cognitive or mental abilities that enable us to collect, organize, store, recall, and manipulate information about the spatial environment” (p. 6). That is, human cognition is developed through individuals’ experience and knowledge, and it represents individuals’ understanding of spatial environments. For example, if a playground is in a small neighbourhood, its primary function could be to provide a safe place for children’s activities. However, the place may be perceived as an unsafe space when it is not visible from streets and adjacent houses or if there is a high volume of traffic in close proximity.

Cognitive mapping can be used to build the better understanding of environments that people regularly interact with and to identify gaps between perceptions and the actual functions of existing environments. Golledge and Stimson (1997) argue that if planners and designers understand the images of what people prefer and their perceptions, the collected information can support urban design proposals and planning regulations. This section explores what benefits and challenges are in cognitive mapping.

2.3.1. Lynch's Approaches to Cognitive Mapping

One of best-known studies about the cognitive mapping of urban environments is be Kevin Lynch's *The Image of the City* (1960), which proposed five basic elements: paths, edges, districts, nodes, and landmarks. The five are often considered as the factors of "creating clarity out of the complexity and confusion of the urban landscape" (Halseth & Doddridge, 2000, p. 572).

In his research, Lynch (1960) describes how mental images are built in people's minds. They are, he suggests, built by a two-way relationship "between the observer and his environment" (p. 6). That is, environments provide "distinctions and relations," and observers select and give meanings to what they see. In these processes, observers manipulate and test images through frequent interactions with the environments. Therefore, observers' images can be changed through their experience and develop their own images. Spencer (1973) also argues that mental images are built through repeated spatial interactions with environments, and each individual can perceive given environments differently (p. 2).

Specifically, Lynch (1960) outlines three components that can be used for analyzing environmental images: "identity, structure, and meaning" (p. 8). He argues that an object should be identifiable to observers and have a distinctive image from others. The objects also need to have a "spatial or pattern relation" to observers and other objects. In these processes, objects have an emotional or practical meaning to observers. For example, if a person wants to cross a street, he or she can recognize a crosswalk as a distinctive object, and there is a spatial relation between the observer and crosswalk. It also has a meaning as a place to cross a street. Likewise, the three factors simultaneously play roles in determining how people perceive environmental images.

In order to analyze human cognition in urban form, Lynch (1960) described five elements: path, edge, district, node, and landmark. As the first step, he interviewed about 30 people in three cities (Los Angeles, New Jersey, and Boston). Participants learned about the five elements and were asked to sketch maps illustrating their perception about spatial environments of their cities. In order to analyze the maps, Lynch counted “the number of features that can be included in each category” (Kitchin & Blades, 2002, p. 142). Even though his method largely relied on the physical sense of urban forms, he demonstrated there was “a public image of any given city which is the overlap of many individual images” (Lynch, 1960, p. 46). Likewise, his research has supported the idea that cognitive mapping could be a means to identify public images.

2.3.2. Critics of Cognitive Mapping

Even though Lynch’s method has showed how perceptions can be used to understand how cities are characterized and identifiable, there is not much evidence about how the cognitive mapping of urban environments can support actual planning and decision-making processes. This is because there is a lack of evidence that cognitive image can be directly link to overt human behaviours (Bunting & Guelke, 1979, p. 456). Furthermore, Lynch (1990) states that when planners adopt his method, they often skip “the citizen interviews as a nuisance, and use the bright new terminology (nodes, edges, landmarks) to describe their own image of the city” (p. 240). That is, adopting his method in planning practices sometimes reduces opportunities for people’s active engagement even though planners use it to validate in their decision-making processes.

Besides Lynch’s study, cognitive mapping has been used in a variety of research fields to identify images that represent people’s understandings of their surrounding world. However,

even though it has shown strengths, there are still many critiques. Bunting and Guelke (1979) argue that behavioural and perception studies focus on "the subjective or ego-centered interpretation of environment" (p. 449), and it can "avoid the deterministic explanations that might arise from more objective interpretations of man's interaction with environment" (p. 449). Appleyard (1974) also states that urban perception and knowledge are abstractive and contradictory images that might be hard to analyze and understand (p. 114). That is, capturing human perception often relies on individuals' subjective images, which might not be considered as objective and formal knowledge.

Another critique is that there is a lack of application to planning and decision making processes. Even though cognitive mapping has been used for building a consensus among participants and identifying common images of existing environments, it tends to have "a minor impact on actual city design" (Lynch, 1990, p. 253). This is because the problems or common images identified through cognitive mapping could not be "central to the concerns of any one group" (Lynch, 1990, p. 253). Therefore, using cognitive mapping may be more suitable in smaller community contexts rather than supporting city-wide decision-making and planning processes (Spencer, 1973).

Although cognitive mapping can allow participants to share what they perceive in day-to-day interactions with existing environments, cognitive mapping often requires participants' drawing skills that adequately represent their mental images on a blank paper. Spencer (1973) highlights participants, who do not have enough cartographic skills, can recognize drawing a map as a difficult task (p. 32). In this case, participants sometimes focus on what they can draw, and their drawing might not be fully relevant to research questions. In these perspectives, the author argues that "greater control is necessary so that variation in the possible meaning of

response is reduced” (Spencer, 1973, p. 32).

2.3.3. Strengths of Cognitive Mapping

Even though there are many limitations and critiques in perception research, cognitive mapping can help researchers identify common ideas and build consensus among participants.

Specifically, Spencer (1973) explains cognitive mapping helps not only build better understandings of “the differences between the perception of planners, policy makers, and the general public,” but it also reduces the gap between the general public and a middle-class professionals’ perceptions about built environments (p. 3). Indeed, professionals can be biased by legitimate and statutory information. This could hinder understandings of differences between objective information and people’s perceptions, which represents the ideas of their day-to-day interactions with existing environments. For example, if there are concerns for public spaces in decision-making processes, planners often use statistic numbers that indicate sizes and how many open spaces there are. On the other hand, if they aim to understand how the spaces are functioning and how residents are using them, these dimensions may be difficult to identify without observations and communications with residents.

Spencer (1973) also argues that cognitive mapping can be more adequately used for neighborhood plans than city-wide structure plans (p. 4). Participants’ perceptions are often built through frequent interactions with environment around their homes and neighbourhoods. That is, when participants share their needs and ideas, the scales can be more community-oriented rather than based on city-wide knowledge. Furthermore, cognitive mapping as a planning aid can be used to identify people’s perceptions, preferences, and images. That is, cognitive mapping can be more properly used, when researchers aim to identify social values, which might not be found by conventional planning methods, which often rely on more formal and professional knowledge.

Stadler, Dugmore, Venables, MacPhail, and Delany-Moretlwe (2013) also state cognitive mapping, as a qualitative research method, can avoid “predictable responses and provides access to a highly personal and intimate perception of the built environment” (p. 12). That is, the method can minimize researcher’s preconception and bias in its research processes. Golledge and Stimson (1997) also argue the information collected through cognitive mapping assists and improves “designers’ and planners’ intuition, guidelines, and legal restrictions” (p. 239). For example, when participants are asked to draw a sketch map to represent their perception about community, the maps help researchers identify specific areas that need special attentions. This is because researchers can identify them through observing what areas are repeatedly represented and which ideas are often emphasized by participants.

Cognitive mapping can be also used to explore how marginalized groups can more actively engage in decision-making processes and how they understand their surroundings. For example, Halseth and Doddridge (2000) use cognitive mapping for the purpose of building the better understanding of “how children interact with their neighbourhood environments” (p. 565). This is because even though planners or designers have employed a variety of means “to identify the needs and aspirations of clients or property owners” (p. 565), there are not many chances to learn how children interact with their spaces and to include their perspectives in planning or development processes.

Likewise, cognitive mapping continues to be used in research although there are obvious limitations and strengths. Next section explores how GIS can be used as a public participation tool and how it could minimize limitations that cognitive mapping has.

2.4. PPGIS in Planning

As large amounts of spatial data become more accessible and cheaper, the utilization of

Geographic Information System (GIS) in planning practices has increased and even emphasized by politicians, land use planners, urban designers, and social scientists. GIS typically has been used as a mapping tool to describe or visualize land designations, ecologically significant areas, or existing infrastructure to support land and resource managements and decision-making processes. It has also assisted in analysis and visualization of spatial information for participants in planning and decision-making processes, persuasively conveying ideas (Sieber, 2006). However, using and adopting the new technology in planning practice raises essential questions about whether it empowers or marginalizes people who do not have knowledge and experience with GIS and whether it only increases reliance on objective and quantitative information in planning processes (Elwood, 2002; Talen, 2000). This section explores the limitations of GIS in conventional uses, how Public Participation GIS (PPGIS) is emerged, what planners should consider in PPGIS implementation, and the possible way of utilizations of PPGIS in planning practice.

2.4.1. Critics and Limitations of GIS

Some authors have criticized the limitation of conventional uses of GIS, which might insufficiently understand and address democratic approaches. According to Talen (2000), GIS as used conventionally, could represent a return to fact-based planning (p. 279). She also argues that the typical uses of GIS in planning tend to insufficiently consider democratic approaches that emphasize communication and interaction with the public and participants in the processes. That is, if GIS is adopted without efforts to encourage communications and extensive participation in planning practice, people who do not have experience and expertise with GIS, could be marginalized by lack of specific skills and knowledge about the technology. It could discourage people's active participation in planning processes.

In “The Impacts of GIS use for Neighbourhood Revitalization in Minneapolis,” Elwood (2002) shows an example of challenges of using GIS in public discourse. The use of GIS in by the Powderhorn Park Neighborhood Association (PPNA) has changed participants’ language in their discourse. Elwood (2002) describes how many participants have started to use legal terminology, such as *land titles*, to describe their visions and ideas during PPNA’s discussions (p.85). Even though the changes are not problematic to participants who have experience in the planning processes, it constitutes a barrier to other participants, who do not have expertise (p. 85). Likewise, GIS in planning and decision-making processes has potential to both enhance and marginalize residents’ participation. Although Elwood’s research focuses on how public participation and using GIS successfully supported PPNA’s community-based housing improvement, those challenges should be considered in order to use GIS as a tool to encourage community engagements in planning practice.

Another criticism could be that GIS cannot sufficiently represent social and cultural complexity on maps. Sieber (2006) states that the result of this is that GIS users “reduce complex societal processes to points, lines, areas, and attributes” (p. 491). GIS in conventional uses tends to describe and visualize existing urban structures and environments as data that can be used to minimize or reduce negative impacts of future developments. However, this simple representation of existing circumstance and conditions, lacks considerations for community members’ knowledge and perceptions, which need to be addressed in community planning.

Even though some scholars have explored how local knowledge can be a foundation to identify communities’ own characteristics and to represent residents’ perceptions (Casey & Pederson, 2002; Harris & Weiner, 2002), the information is often regarded as informal knowledge. For example, Casey and Pederson (1995) state the limitations of GIS in traditional

mapping exercise in Philadelphia:

With the parcel base maps, tax assessors' data, tax delinquency and vacancy data, there does not seem to ... convey the beautiful old stone buildings which are such a part of Philadelphia's Germantown neighborhood. ... There does not seem to be a means to convey the value of this wonderful architecture to the neighborhood or what it is worth as a resource. (as cited in Casey & Pederson, 2002, p. 67)

Likewise, GIS as a conventional means has limitations to address local knowledge, and it often hinders marginalized people's participation because of high reliance on participants' understanding of its technical skills and terminology. In order to challenge the limitations, GIS practitioners and researchers have been seeking an alternative form of GIS, which could reinforce democratic approaches and emphasize more communicative and participatory processes in GIS practices. From these perspectives, next section explores PPGIS and its strengths.

2.4.2. Emerging PPGIS and its Strengths

With an effort to find the alternative applications of GIS, the National Center for Geographic Information and Analysis (NCGIA) held two conferences that aimed to improve the science of geographic information in 1996. From these conferences, the new term PPGIS emerged, which stands for Public Participation or Public Participatory GIS. There is a diversity of definitions and approaches to PPGIS – scholars are using different terms based on their implementations, such as *participatory GIS*, *community-integrated GIS*, or *Bottom-Up GIS* (Harris & Weiner, 2002; Sieber, 2006; Talen, 2000). Even though they are each applying GIS differently, the common theme of these approaches is to make GIS more accessible to and interactive with the general public and communities, and to promote more communicative approaches to strive for empowerment in the processes of building GIS models and decision-making.

Schroeder (1996) defines PPGIS as “a variety of approaches to make GIS and other

spatial decision-making tools available and accessible to all those with a stake in official decisions” (as cited in Sieber, 2006, p. 492). Elwood (2002) also states that “extending GIS access to grassroots groups and other nontraditional users is beneficial because it enables development of alternative knowledge and its inclusion in decision-making” (p. 907). That is, PPGIS pursues more community-based and bottom-up approaches, based on the belief that community members are much closer to problems. Advocates of PPGIS believe that the incorporation of local knowledge will increase opportunities to empower people, especially those who are marginalized in planning and decision-making processes (Elwood, 2002; Harris & Weiner, 2002; Talen, 2000).

Even though governments still have central responsibilities for planning and making decisions, the awareness of importance of citizens’ involvement makes the roles of community organizations more crucial in planning processes. In this context, many organizations are adopting new tools and practices, such as PPGIS, as a part of their efforts (Elwood, 2002). Researchers have suggested directions as to how PPGIS can be implemented in the context of organizations context and what should be addressed in the implementation. They highlight ways in which successful implementation of a PPGIS in community contexts is highly dependent on local and organizational factors, such as different legal regimes, organizational capacities, and resources to access and use GIS (Elwood & Ghose, 2010; Sieber, 2006). Elwood and Ghose (2010) also argue that “the use and impacts” of PPGIS is influenced not only by “the processes of acquisition and application of hardware, software and spatial data for GIS analysis, but also the social and political contexts in which GIS is being employed....” (p. 84). They suggest factors that should be addressed in PPGIS implementation in organizational context including: incorporating the knowledge and experience of organizations, sustaining leadership, and using it

as two-way communication tool between professionals and citizens.

In arguing the importance of including organizational knowledge and experience to effectively implement PPGIS, the authors note that this is not limited to simply maintaining hardware or software (Elwood & Ghose, 2010, p. 98). It includes residents and staff in the implementation to identify available data resources, to fund opportunities, and proper strategies in PPGIS implementation. Elwood and Ghose (2010) state that many organizations know a variety of resources “to obtain GIS-based maps and analysis [and] ... show a great deal of variability in their knowledge of and ability to access multiple forms of funding, which ... informs their capacity to obtain and use spatial data and GIS” (p. 95). Indeed, when an organization’s knowledge and experience are involved in PPGIS implementation, it brings broader opportunities to access locally appropriate resources and to extend the viability of collaborative relationships among public and private sectors, and institutions.

Including knowledge and experience of organization staff could be a way of finding potential resources that can be used for PPGIS implementation, but it may also help build informal and formal relationships among community organizations, public and private sectors, and institutions that can enhance the implementation. For example, an informal relationship between a staff in a community organization and a university researcher could promote formal collaborations to support a community plan and PPGIS implementation. The university researcher can specifically assist with GIS-based analysis, such as developing community profiles, inventories of housing conditions, and background research for a community plan. Elwood and Ghose (2010) state “organizations with dense social networks have a wider range of potential support in their efforts to assemble ... resources, [such as data, knowledge, training, hardware, and software] than organizations with more limited networks” (p. 98).

The other factors, which should be addressed in PPGIS implementation, are the sustaining of the leadership and the community's goals and visions. Elwood and Ghose (2010) state the stability of organizations' leadership can sustain established relationship with community stakeholders and other institutes (p. 98). That is, changes in the leadership and staff who initiate PPGIS to support community planning change over time, may influence relationships established through their organizational knowledge and experience. Furthermore, changes in personal may also change the organizational priorities. If the altered objectives are not matched with local governments' goals and visions, the organization might be hard to sustain funding for the PPGIS process. In these contexts, community organizations might alternatively use PPGIS as a communication tool instead of adopting it in a broad scope of community developments, which might require consistent funding resources.

Some researchers suggest GIS can be used as an information tool that can address problems of one-way communication that limit participation and communities' reactions in public discourse. Redaelli (2012) highlights the ways that GIS in public participation can overcome the barriers between experts and citizens, when it is used as an educating and informing tool to facilitate two-way communication. King, Feltey, and Susel (1998) state that typical relationship between experts and citizens in public discourse can hinder active participation, and that relationships need to be changed to encourage interactive public engagement. That is, when participants only react to experts' inquiries and when the experts assume roles as administrators, it becomes a hindrance, discouraging "authentic public participation." The authors emphasize that gaps between experts and citizens can be overcome when participants are educated and informed about empirical facts and the processes of policy making in community discourses (King, Feltey, & Susel, 1998; Redaelli, 2012).

Redaelli (2012) suggests two ways to use GIS as a participation tool to overcome these challenges. Her first suggestion is that GIS can be a tool to educate participants about administrative systems. Unlike many other countries where central government has authority over municipalities, the power of municipal governments in Canada is under the jurisdiction of each provincial government. In this context, Redaelli states that “compounding this lack of a standardized structure in a city’s bureaucracy, the proliferation of local government affects its form, redrawing a territory with several jurisdictional boundaries” (p. 653). In public discourses, residents often describe their communities as a part of a city or neighbourhood without understanding the territorial boundaries and different, separate political entities involved. When GIS maps representing the boundaries are provided, residents can better understand the different political entities, and they easily find connections “between their own location and the administrative group to which they belong” (p. 655). Redaelli argues GIS as an education tool could empower participants by encouraging the discussions about the ramifications of territorial boundaries and administrative systems.

Another of her suggestions is to use GIS for sharing knowledge. Indeed, GIS allows its users to provide and reorganize the spatial and statistic data with maps and attribute tables. When the empirical information is provided, it allows residents not only talk about their ideas, but also to change their perception. That is, GIS can be used as a tool to inform quantitative and objective information that people might not recognize before, and also to share their knowledge and visions to enhance the information. According to Radaelli (2012), when this information is “readily observed and interpreted by the diverse groups ..., anyone may suggest how this situation could be improved” (p. 659). These two suggestions are a good starting point to use GIS as a participation tool and to highlight the importance of understanding of social and

political structures in public discourses. However, the suggestions tend to focus on how quantitative information can be improved by people rather than integration between GIS and qualitative method, which can be a more comprehensive approach.

Researchers also argue the importance of including qualitative knowledge in PPGIS implementation. In general, decision-making and planning processes consider quantitative knowledge as legitimate and efficient data, and GIS users easily learn to represent this type of knowledge. In contrast, local knowledge, which is qualitative and created by everyday practice, tends to be considered as less legitimate knowledge. However, PPGIS can enhance both quantitative and qualitative research methods (Elwood, 2006; 2009). Elwood (2006) argues that PPGIS is not only able to represent spatial and quantitative knowledge, but it can also “incorporate diverse and potentially oppositional priorities, and include the knowledge and perspectives of multiple social groups, particularly those that are socially, politically, or economically marginalized” (p. 199). Considering and analyzing the quantitative and standardized information are important in decision-making processes because these data are regarded as more legitimate by government officials. However, these types of information can be reinterpreted and reassessed by community engagements that includes qualitative knowledge that represents how people perceive their surrounding environment, which areas have meaning to them, and what priorities they are pursuing. That is, including qualitative information in PPGIS implementation can enhance decision-making processes.

From these perspectives, many researchers argue for the importance of collecting local knowledge with PPGIS as a distinctive form of participation. Talen (2000) argues that “planners should consider using [GIS] as a cognitive tool ... to express [residents’] views about planning issues, neighborhood meaning, and future preferences” (p. 279). Even though representing or

visualizing residents' perception are not easy tasks in GIS, they could encourage more interactive participation and bring new insights, which might otherwise have received insufficient consideration in conventional public consultations. Specifically, Talen (2000) shows how PPGIS can strengthen interactive public participation compared to existing methods, specifically by addressing "spatial complexity, spatial context, and interactivity" (p. 281).

First, PPGIS can effectively visualize *spatial complexity* compared to paper maps and cardboard models. Even though the maps and models are good materials to show boundaries and spatial structures and to attract people's participation, they have the limitations to simultaneously represent the complexity of communities and neighbourhoods, including characteristics like soil types, community assets, and demographic migration. Indeed, GIS is not only able to show these geographical features by overlapping a variety of layers, but it can also allow people to express their own local insights, such as their perceptual boundaries and places of emotional and cultural attachment. Second, GIS in public participation can effectively describe *spatial context*. For example, if a space that is losing its functions is discussed during a public process, participants can more easily explore factors, such as proximity, density, and other land uses, that influence the area in questions. Lastly, PPGIS encourages participants to express their views in a more interactive way. According to Talen (2000), with GIS residents are able "to view more than one spatially distributed variable, turning coverage on and off as desired, and allowing them to see and react to interconnections of issues" (p. 282). Likewise, the PPGIS can be used as a new facilitation tool to encourage public engagements and to address locally significant issues that might be difficult to identify from typical quantitative research methods.

2.4.3. Examples of Completion Mapping in GIS

In order to minimize the limitations of cognitive mapping and to use public perception as a

means to support decision-making processes, this section explores examples of how informal knowledge, in this case people's perceptions, can be used and analyzed in GIS implementation.

Completion mapping has been used as one of method in cognitive mapping research. Kitchin and Blades (2002) define it as a task to provide "a framework for participants who are only required to place points in the given framework" (p. 144). Although completion mapping has similarities to other sketch mapping techniques in cognitive mapping research, Platt (2005) notes that it provides "more controls over variations in scale and distortion" by offering completed tasks to participants, such as a base map (p. 42). For example, if base maps are given to participants, they can simply draw circles or points. That is, completion mapping has less reliance on participants' cartographic and drawing skills.

Another advantage of completion mapping is that it presents possibilities to use GIS to analyze and quantify local knowledge, which is often considered as subjective and informal information. Indeed, in cognitive mapping research in 1960s and 1970s, it was not an easy task to overlay each sketch map and to identify public images. Furthermore, cognitive mapping exercises often required that participants understood the symbology that had to be used for sketch mapping (Lynch, 1990).

However, these limitations can be minimized through adopting GIS in its processes. An example can be found in O'Connell and Keller's (2002) research about land valuation in First Nations treaties. Specifically, they used GIS to capturing people's perceptions and analyzed it in land valuation processes. They state that land valuation traditionally has been assessed by the direct revenue potential of land-use activities, and the land valuation often has been determined by planners, which is often considered a top-down approach (p. 607). In order to adopt a bottom-up approach in land valuation, they argued that the processes should address qualitative

information “based on experience and personal judgements” (p. 607).

From these perspectives, O’Connell and Keller (2002) used completion mapping to identify homogeneous land values for outdoor recreational uses. They used a method defined as *Collaborative Spatial Decision Support System* (CSDSS) Gestalt Methodology, which was to identify homogeneous land values through stakeholders and experts’ perception and experience about its land-use activities (p. 609). Instead of using a term ‘CSDSS Gestalt Methodology’, completion mapping has been used in this section. This is because this section explores their approach as a means to identify public images through qualitative mapping exercise rather than using it for assessing homogeneous land values.

In the processes, O’Connell and Keller (2002) used topographic maps, and participants were asked to draw groups of circles representing their perceptions about homogeneous land values for outdoor recreation. Four different values were assigned to each group of circles, such as low, medium, high and exceptional value (Illustration 4). Seventy-one people participated, and the captured perception was digitized to identify average responses and to create map for the purpose of facilitating consensus building in land valuation processes. Specifically, GIS was used for analyzing and identifying the spatial distributions of average responses. Collected information, which was converted to polygon forms, were rasterized and overlaid in GIS (Illustration 5). This is because the collected information can be more easily overlaid in raster format. Figure 4 describes an example of how O’Connell and Keller coded participants’ ideas and thought as polygon forms, and Figure 5 shows an example of spatial distribution of average responses by aggregating participants’ responses in GIS.

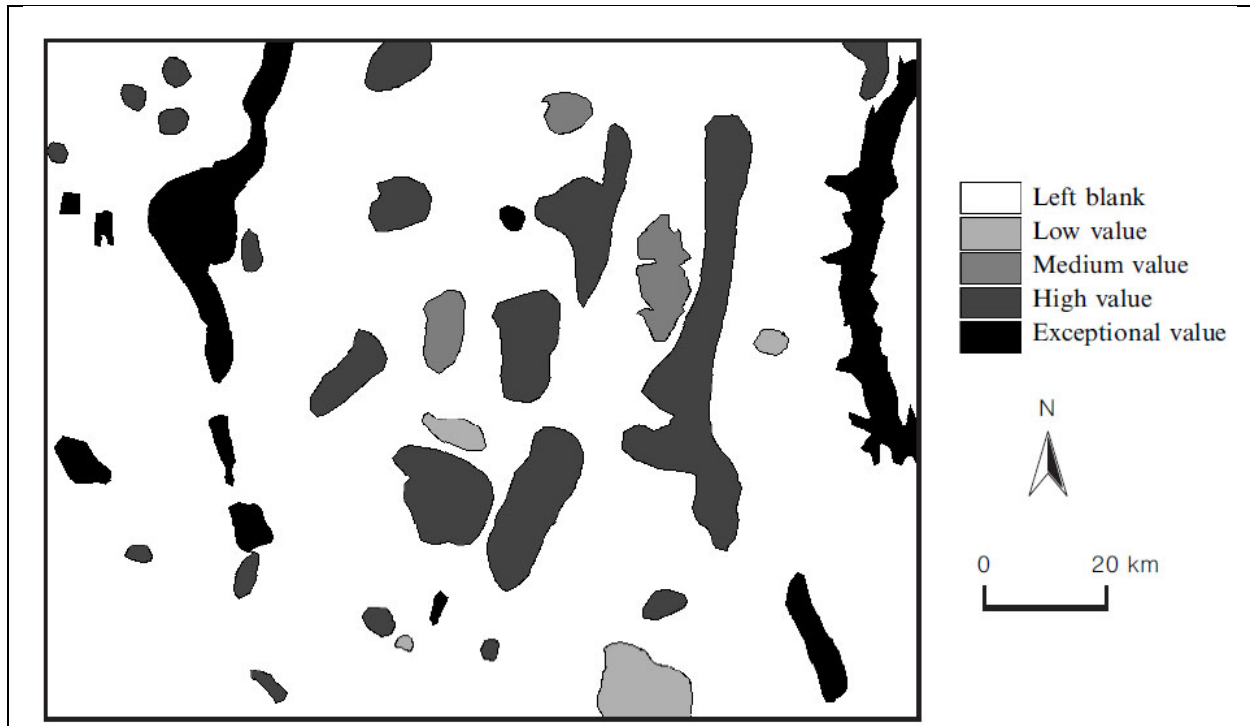


Illustration 4. Example of coded polygons of perceived equal land value (source from O'Connell & Keller, 2002, p. 612). Permission granted by SAGE Publications

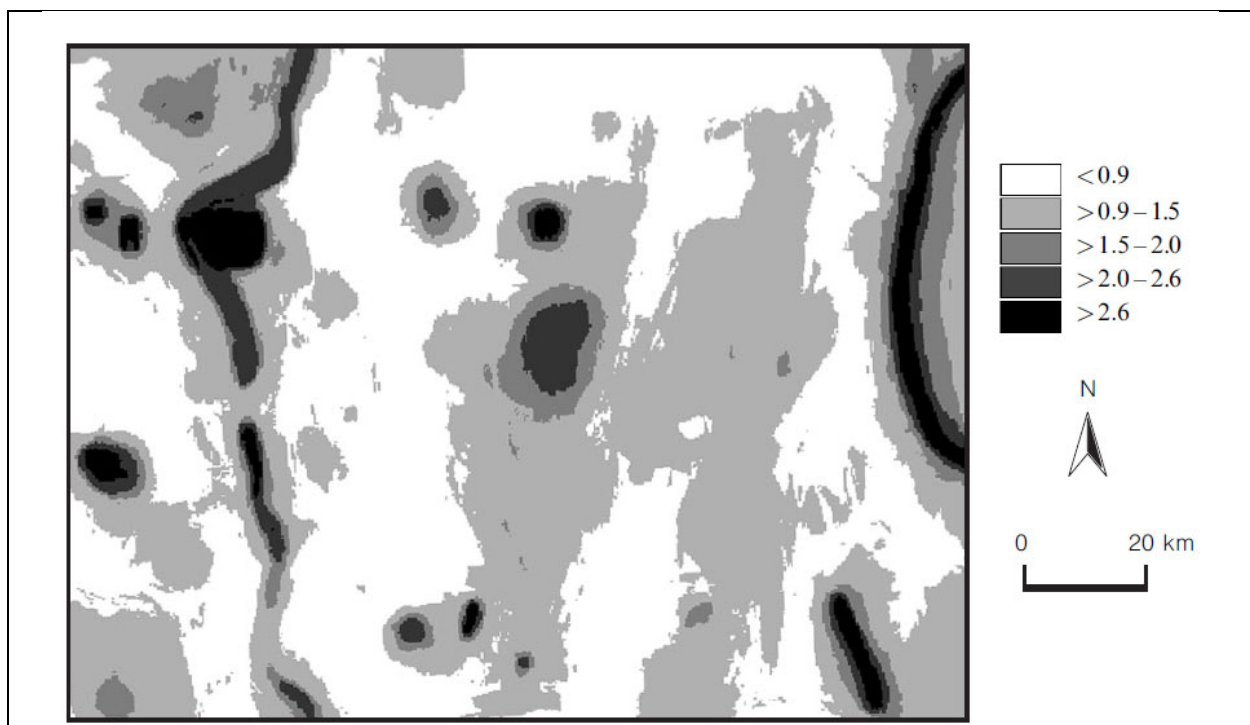


Illustration 5. Example of spatial distribution of mean class (source from O'Connell & Keller, 2002, p. 616). Permission granted by SAGE Publications

O'Connell and Keller's (2002) methods minimize the several of the limitations of

cognitive mapping. Through overlapping individual responses in GIS, they could identify public images within a reasonable timeframe. Furthermore, participants could easily compare their perceptions and ideas – in this case homogeneous land values determined by individual judgements – with the average responses. Another advantage of this method could be to minimize the intervention of researchers' biases. In the processes, basic training helped participants understand the data entry processes. It could also help participants use their own judgements for identifying homogenous land valuations and minimize interventions from researchers.

Another example of completion mapping in GIS could be found in Kohm's research (2009) about the spatial dimensions of fear in Winnipeg's Spence Neighbourhood based on a GIS methodology developed by Platt (2005). Surveys have been the conventional means to measure fear of crime and disorder in criminology (Kohm, 2009). However, there are limitations in how they might be applied understand how fear, which is considered as emotional and physiological behaviour, influences individuals' day-to-day lives in spatial dimensions. This is because surveys typically use "questions that ask people to conduct a risk assessment (how worried are you about...?)" (Kohm, 2009, p. 3). It allows the information collected from surveys to be quantified in numeric manner, but it is hard to demonstrate relationships between fear, crime, and the areas where people interact.

In these contexts, Kohm (2009) employed a GIS methodology developed by Platt (2005) to identify areas in which people had high levels of fear of social disorder and crime. He interviewed about 400 residents living in Spence Neighbourhood, and 157 participants agreed to draw circles on topographic maps to represent the areas where they have felt or experienced social disorder. The collected information was digitized and analyzed in GIS to identify "the

highest density clusters of fear associated with social disorder” (Kohm, 2009, p. 19)⁶.

Kohm’s research demonstrates the strengths of completion mapping associated with GIS in analyzing captured perceptions. More specifically, this method⁷ shows a way of quantifying intangible information through overlaying participants’ perception in GIS. Although the approaches have similarities with methods that O’Connell and Keller have used, a major difference can be that he used the analyzed maps to identify specific areas that require policy interventions in decreasing fear related disorder. That is, it shows another example of using completion mapping for the purpose of supporting planning decision-making in a small-scale neighbourhood.

⁶ Kohm (2009) described an example of the highest density of fear related to social disorder in his research, and it is concentrated on Sherbrook and Young Streets on Sargent Avenue, which is one of major commercial areas in Spence. See page 21 in his article.

⁷ The method used in Kohm’s research was developed by Platt (2005).

3. Research Method

This chapter explains methodology used in this research and how it is designed and managed to collect participants' perception and knowledge. Even though many community organizations are harnessing the potential of vacant lots to create community gardens, there may be different approaches to strategically identifying appropriate locations for community gardens. For example, if residents are allowed to participate in planning processes, their experiences and perceptions about their community can be shared and addressed. It helps develop better strategies to identify future community garden sites. This practicum research explores the possibilities of GIS as a participation tool to capture community members' perceptions and how the captured information can be used to identify strategic areas for future community gardens within the catchment area of the Daniel Macintyre St. Matthews Community Association (DMSMCA).

Four research questions frame this work:

1. What would be advantages to engaging with residents on mapping exercises to capture their perceptions of a neighbourhood?
2. How can the collected local knowledge help identify community priorities, such as housing improvements and creating a safe neighbourhood?
3. What are challenges and opportunities associated with GIS when developing a model for strategically siting interventions (in this case, the suitable areas for future community gardens in an inner-city neighbourhood)?
4. How can community organizations in inner-city neighbourhoods use residents' perception to support their community plan, and what would be the roles of GIS in its processes?

More specifically, the first two questions are addressed by observing how participants

react to paper-based mapping exercises and how they respond to questions about positive changes and areas for improvements and future community gardens in two field surveys. This is because the research uses paper-based mapping exercises to invite a broader range of participants and to capture people's perception with less reliance on their drawing skills. Furthermore, overlaying individual's perception in GIS can introduce which areas are emphasized by participants, and it could encourage discussions in a workshop.

The last two questions are addressed by a workshop, which aims to collect perception from community association staff members and to get feedback on the results of surveys. That is, participants in a workshop have opportunities to compare their responses with the results of surveys and to share their ideas and thoughts. Furthermore, the collected responses and feedback will be analyzed to find answers for the questions.

In GIS analysis, this research aims to use an expert-facilitated community GIS approach. Gubrium and Harper (2013) state that participatory GIS can be classified into two categories: "GIS upskilling" and "expert-facilitated community GIS" (p. 155). GIS upskilling generally refers to ongoing capacity building used by organizations to develop and sustain their GIS systems that are used to address community goals and concerns. Although the approach enables community organizations frequently update local knowledge and other information, it would require spending more time and consistent attention to GIS system. Furthermore, in order to create longer-term and community-based GIS, it is essential to have staff dedicated to its management and analysis.

On the other hand, expert-facilitated community GIS is a more efficient approach to creating community-driven maps within a short or reasonable timeframe. Gubrium and Harper (2013) state that the approach is "an efficient way to develop alternative maps that community

organizations may use to strengthen their position, credibility, and inclusion in policy settings” (p. 154). Therefore, the principal researcher performs a role as a GIS facilitator to prepare preliminary GIS analysis and maps as well as to encourage community discussions in surveys and a workshop.

3.1. Survey with Completion Mapping

Fink (2006) defines a survey as a research method to collect information that researchers use for describing, comparing, or explaining “individual and societal knowledge, feelings, values, preferences, and behavior” (p. 1). That is, a survey could be a means to collect direct participants’ responses within a reasonable timeframe. Zeisel (2006) states that when a researcher uses the same set of questions, it helps identify “regularities among groups of people by comparing answers” (p. 257). This practicum includes two field surveys in order to collect residents’ perceptions and experiences about their community and community gardens. The questionnaire consists of five questions:

1. Do you participate in a community garden?
2. What street do you live on?
3. Where are the top three areas/places that you think there are positive changes in this neighbourhood over the last five years and why?
4. Where are the top three areas/places that you think there are negative changes/ a lack of improvements in this neighbourhood over the last five years and why?
5. Where are the top three places that you think suitable for establishing new community gardens and why?

Question number one and two were used for identifying whether participants were using community gardens and whether they were living within Daniel McIntyre and St. Matthew

communities (DMSM). In order to capture participants' perceptions, questions number three to five incorporated completion mapping. In these processes, participants were asked to draw circles on a base map – a level of drawing skill that was accessible to all participants – to illustrate their answers.

There are a variety of ways to deliver questionnaires, such as mailing, telephone interview, online survey tools, and face-to-face interview. In this practicum research, face-to-face interviews were used for capturing residents' perceptions about their community and community gardens. This is because mailing or inviting people to participate in online survey could be easily disregarded by local residents because some of people do not have internet accessibilities or simply consider it as a commercial advertisement. However, face-to-face interview allows the principal researcher to provide clearer directions for participants as they complete the mapping exercises in question three to five, and to manage the quality of data in its processes.

More specifically, in completion mapping exercises, the principal researcher's assistance is necessary in order to encourage a broader range of participation. As discussed in Chapter 2, cognitive mapping research often relies on participants' cartographic and drawing skills and the understanding of symbology that needs high effort levels and time to train participants. Even though the use of completion mapping could minimize the limitations, marginalized people having language barriers or a lack of skills to read topographic maps, such as new immigrants or elders, need supports from researchers. Furthermore, Friedmann (1993) states experiential knowledge can be identified when planners have face-to-face transactions with people affected by their plans (p. 484). Therefore, this research used face-to-face interviews to invite more participants and to effectively collect their perception in two field surveys.

3.1.1. Field Surveys and Data Collection

In order to collect information from local residents living in or close to the Daniel McIntyre and St. Matthews communities (DMSM), this research included two field surveys. The first survey was at the West End Community Market on September 16, 2015, which was the event that invited residents living in the West End neighbourhoods, including those from West Broadway and Spence neighbourhoods, as well as the DMSM, to provide fresh groceries with reasonable prices. In order to survey people, the principal researcher contacted DMSMCA at least two weeks before the event started and obtained support from them. For example, when the first survey was conducted, a community association staff member informed people that surveys would be voluntary and used for the principal researcher's practicum. After the notification, the principal researcher explained the purpose of research and asked whether or not people wanted to participate in surveys. Ten people agreed to participate.

The second survey was collected on streets within the boundaries of DMSM communities on October 14, 2015. In its processes, the principal researcher also informed the community association two weeks before the survey proceeded. The reasons that survey was conducted on streets were not only to invite random people to participate, but also to survey people, who might not have been be at the West End Community Market or interested in other community events. For example, one of participants of the first survey mentioned that the Community Association has provided great programs, such as a Garden Club, for people who want to learn gardening. However, the person recognized those same people generally attended the programs. It means, if surveys were only conducted at community events, they might only reach those people who regularly or often participate in such events. The second survey solicited people who were sitting outside or walking on streets. In its processes, six additional people were able to

participate in the survey.

Before starting both surveys, the principal researcher explained the purpose of research to participants, and they read a survey package including the Informed Consent Form (see Appendix B and C) and five questions with three paper maps. After that, participants were asked to sign the consent form acknowledging that they agreed to participate in survey.

For mapping exercises that required people to draw circles on topographic paper maps in the surveys, existing schools and street names were marked on the map. Participants could use them to orientate themselves when noting areas that they perceived as having shown positive changes, areas that need improvements, and potential areas for future community gardens over the last five years in the DMSM communities. Even though each question in the mapping exercise asked participants to draw their top three areas and to share reasons why they chose them, participants could also leave the map blank or draw fewer than three circles or more. This was because some of participants were not familiar with the other part of community except areas that they often walked around or visited, or had only recently moved in the community from other neighbourhoods in Winnipeg or other countries. In order to minimize the challenges and encourage participation, the principal researcher explained that there were no right and wrong answers, they could skip questions, and participants could draw as many circles as much as they wished.

The information collected through the two field surveys was digitized in AutoCAD and overlaid into a GIS program to produce images that represent the positive changes, areas for improvements in DMSM communities over the last five years, and suitable areas for future community gardens. The maps were used to encourage discussions during a workshop.

3.2. Workshop

Sanoff (2000) defines workshops as a participatory tool in which citizens “engage in experiences that provide an opportunity for learning about human relations” (p. 80). Morgan (1997) also states it is “a way of listening to people and learning from them” (p. 9). That is, workshops are a means that allows people to learn from each other and to pursue common goals and address challenges by sharing ideas and understanding of their differences. Furthermore, Wates (2000) states, when workshop participants engage in diverse activities, such as modeling and mapping, they can encourage opportunities for “professionals and non-professionals to work creatively together developing planning and design ideas” (p. 50). Morgan and Guevara (2008) also emphasize using maps in workshops enables “participants to be more closely involved with analyzing and interpreting key topics” (p. 109). Therefore, this practicum research includes a workshop with a mapping exercise.

The workshop in this research is intended to collect and interpret community members’ perspectives about their community. The information gathered will be used to identify a way of strengthening planning strategies for locating community gardens in ways that enhance the goals of the community. In order to collect information and encourage discussions and sharing ideas amongst participants, this workshop consists of two sections (A and B) and asks six questions:

Section A

1. Where are the top three areas/places that you think there are positive changes in this neighbourhood over the last five years and why?
2. Where are the top three areas/places that you think there are negative changes/ lack of improvements in this neighbourhood over the last five years and why?

3. Where are the top three places that you think suitable for establishing new community gardens and why?

Section B

4. Do you feel this analysis adequately represents your opinions and realities in this community?

Probe 1: if yes, which ideas are accurately represented here?

Probe 2: if your experience is different to the result of two field surveys,

Probe 2-1: what are differences, or do you want to change your answers that you provided?

Probe 2-2: what needs to be improved to make the results more informative and to articulately represent residents' perceptions and experience about their community?

5. What should be considered to make the collected information more accessible to and interactive with residents as a long-term approach?
6. Can the collected information be used for supporting other community priorities?

Probe: if yes, which community priorities can be supported through the analysis?

Probe: if no, what needs to be improved to make it supportive for other community priorities?

Section A asks the same questions that were used in the two field surveys, which included completion mapping exercises. This is because the questions aim to not only collect additional information from participants, but also to encourage them to think about the research topic and to share initial thoughts and experiences about their community before Section B starts. Section B

is designed to encourage discussions and the sharing of ideas between participant. More specifically, question number four is used for validating the information collected through two field surveys. Question five and six focus on identifying a way of using captured perception for future community plan. Even though the questions for Section B are prepared for validating collected information and exploring how it supports other community priorities; this section, aims to provide opportunities for participants to freely share ideas and experiences rather than focusing on responses to the questions.

In order to ensure the accuracy of participants' responses, a voice recorder was used after they signed the Informed Consent Form, which informed the necessity of using the instrument and asked their agreements.

3.2.1. Workshop and Data Collection

As the first step in early December, the principal researcher had a short meeting with a staff member of the Community Association (the same person that helped facilitate the two field surveys) to arrange a time and a place for the workshop. With support from the staff, December 17, 2015 was decided as a date for a workshop. This was because there was a staff meeting that day and this would ensure that at least five people would participate and use DMSMCA's space. The initial intention was to post invitations on DMSMCA's website to invite residents living in the communities. However, the workshop could not invite residents – the staff highlighted difficulties due to the weather conditions and time, which was close to the end of year. Even though there are challenges to invite local residents, the five staff members, who participated in a workshop, had strong knowledge and understanding of the communities, so this workshop could collect valuable information and ideas.

Before starting Section A, the principal researcher explained the purpose of the research

and provided a package including an Informed Consent Form and three questions incorporating the mapping exercises. The principal researcher also informed participants that a voice recorder would be used in the workshop to ensure that participants' responses were accurately noted. In Section A, participants were asked to draw circles on the maps to answer the question, and they had chances to think about their community before Section B started.

After Section A finished, the principal researcher provided maps that were analyzed in GIS and explained the results and initial findings of two field surveys. The maps described areas that were highlighted by two field surveys' participants. They also included additional information provided by DMSMCA and the City of Winnipeg, such as the location of existing community gardens and vacant lots owned by the local government or by private individuals. Its details and procedures of analysis are in Chapter 4. The reason that sharing the results of two field surveys after Section A was not only to minimize that participants were biased by the principal researcher's findings, but also to provide the opportunities that they could compare the maps with their responses.

In Section B, participants were encouraged to share their thoughts about the analysis and the principal researcher's findings through asking three open-ended questions. In the processes, participants discussed about the benefits and challenges of its analysis and PPGIS in a scope of community plan.

The information collected from Section A were digitized in AutoCAD, and GIS was used for its coding and analysis. Discussions in Section B were transcribed for analyses to strategically identify areas for future community gardens and to answer the research questions described in introduction of this chapter. The findings of two field surveys were presented in Section B in order to obtain feedback and to identify future directions of this research.

4. Analysis

This chapter describes how captured perception through two field surveys and a workshop is analyzed and what findings are. AutoCAD 2016 was used to digitize participants' responses in mapping exercises, and ArcMap10.2 was used as data coding and analysis tools to more accurately analyze captured perception (see Appendix D). The first section explores residents' perception collected by two surveys. It identifies areas with high response rates and examines how residents perceive the areas in a range of positive changes, areas for improvements, and areas for future community gardens. The second section discusses participants' feedback about the results of the surveys as well as their ideas and thoughts about the potential uses of captured perception for their community plans. The last section suggests a scenario for future community gardens in Daniel Macintyre St. Matthews Communities and discusses how captured perception in GIS can be used as a participation and supporting tool in community plan.

In order to effectively compare among the results of surveys and a workshop in this Chapter, both two and three dimensional maps are used, and heights on the three dimensional maps represent participants' response rates as a percentage.

4.1. Field Survey Analysis

In order to collect residents' perception about positive changes, areas for improvements, suitable areas for future community gardens, two field surveys were conducted within the boundaries of DMSM. In these processes, 16 people participated, and the collected information was digitized and analyzed by data coding processes that described in previous section. This section explores which areas were emphasized through mapping exercises, how participants perceived the areas, and findings from two field surveys.

4.1.1. Areas of Positive Changes

After two field surveys, this practicum research identifies three areas with high response rates about positive changes over the last five years in DMSM (Figure 2). In order to describe the proportion of responses, this analysis used percentage values, so a number of collected responses in each area divided by total number of participants.

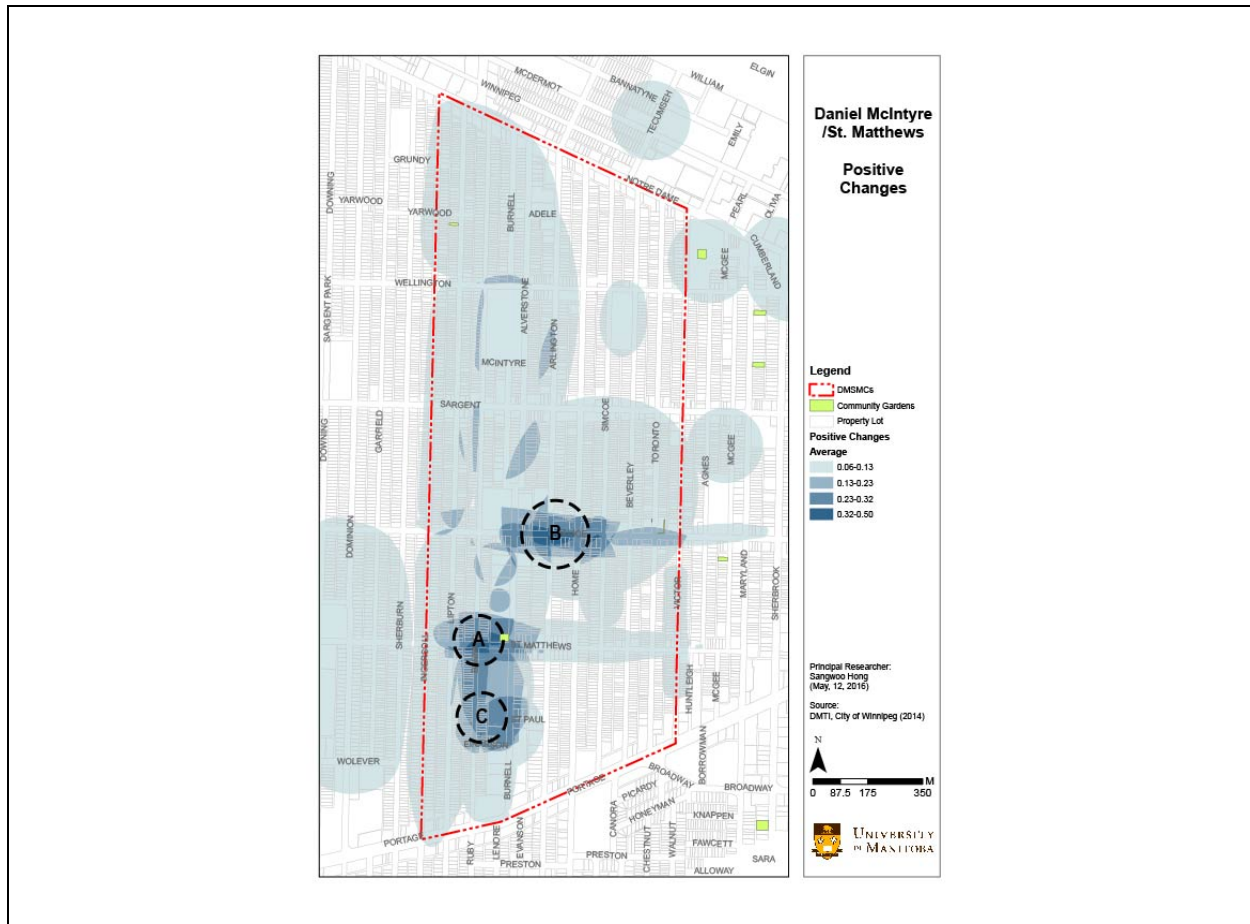


Figure 2. Positive changes over the last five years in DMSM

A cluster with the highest values (A) is on the west of St. Matthews Avenue, where Orioles Community Garden and Bike Cage⁸ are located. Some of participants already noticed there were community services, such as a community garden and a bike cage, and considered

⁸ Orioles Bike Cage is a community bike resource centre that provides bike repair services and advises for all, and it is volunteer-run and managed by DMSMCA. More information can be found at <http://www.dmsmca.ca/bike-cage>

new the bike path built in the area as positive changes. The area is perceived as the most positive effected by changes over the last five years in this community. The second cluster (B) is in the middle of Ellice Avenue, where the DMSMCA office is located. Participants perceived the area had good walkability, housing and street improvements. The third cluster (C) is on Banning Street between St. Matthews Avenue and Einarson Avenue, in proximity to Greenway School. Even though some of participants refused to share reasons why they highlighted the area, a couple of them stated there was good walkability.

4.1.2. Areas for Improvements

The analysis also identified top three areas for that were in need of improvements in DMSM communities (Figure 3).

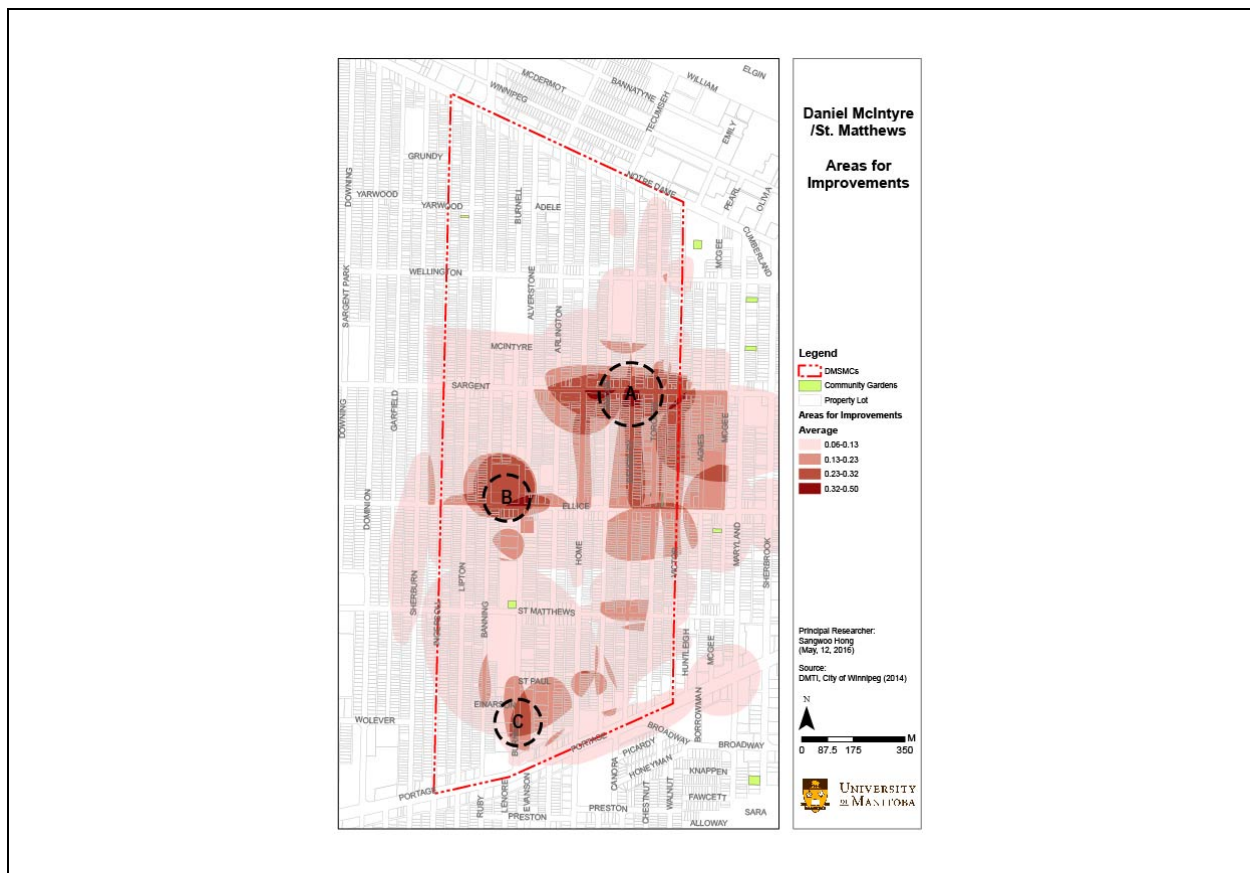


Figure 3. Areas for improvements in DMSM communities over the last five years

A cluster with the highest values (A) is on east of Sargent Avenue. Some of participants mentioned there were a lack of safety, poor housing conditions, and anti-social behaviour, such as drug or alcohol users. Most of participants perceived the area was in need of improvements. The second cluster (B) is at the western end of Ellice Avenue, quite close to the second cluster of positive changes and the DMSMCA offices (see Section 4.1.1. above). However, the cluster of positive changes is mostly located on the east side of DMSMCA, whereas the areas in need of improvements are closer to General Wolfe School. It means even though some of people considered this area as positive changes, there are still concerns for improvements, such as safety and housing conditions. The third cluster (C) is on Burnell Street where is close to Portage Avenue, and encompasses a large vacant lot and a former Canada Bread plant that have been abandoned for years. Some participants commented that better police patrols were needed and the area needed to be improved for children activities. Figure 4 describes how people differently perceive parts of neighbourhoods by comparing the clusters for improvements with the areas of positive changes. In order to effectively visualize participants' responses, they are converted to three dimensionalities, and their heights represent participants' average responses.

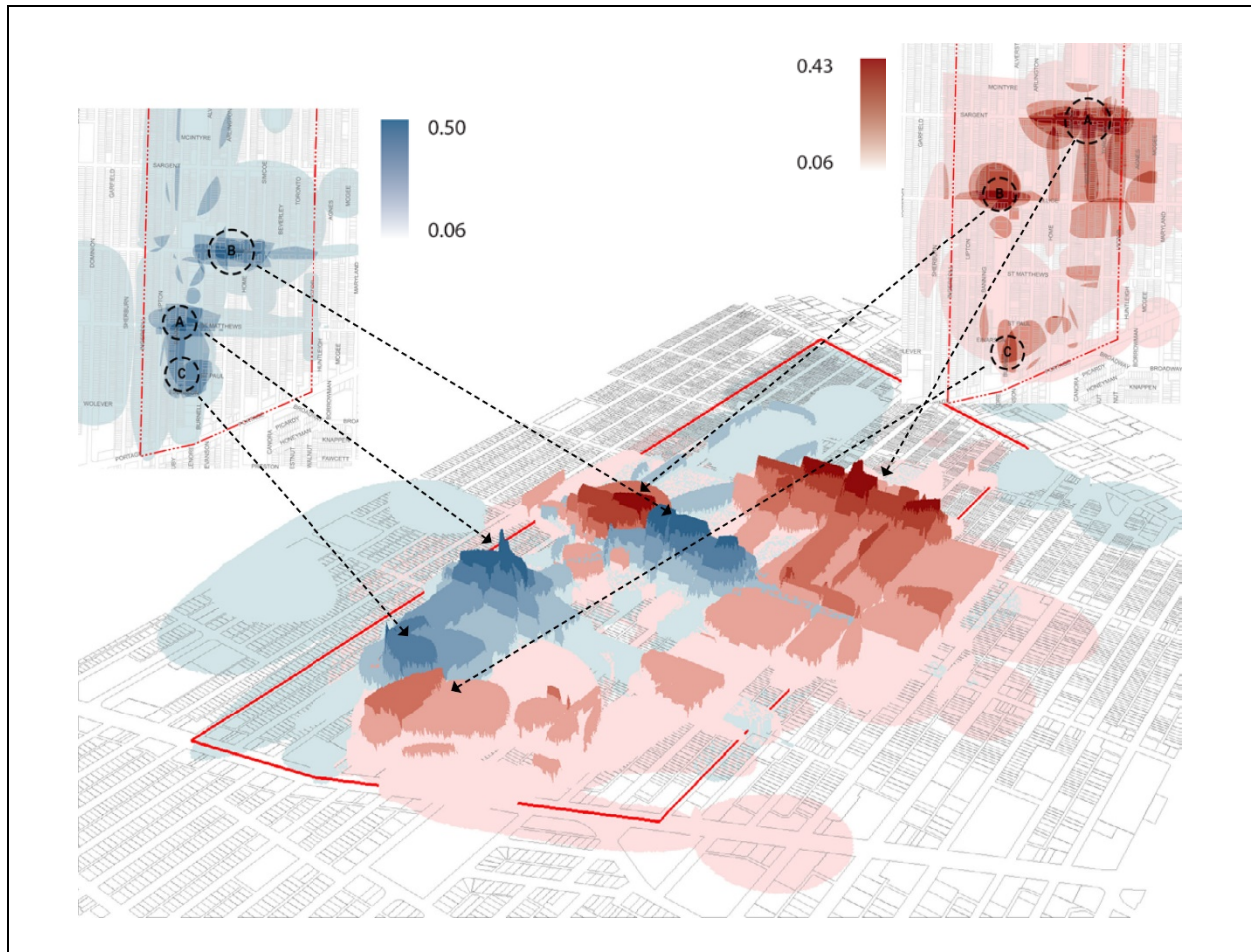


Figure 4. Positive changes vs. areas for improvements

Furthermore, when participants' responses about areas of positive changes compares with areas in need of improvements, it helps understand what factors influence participants' perception. As illustrated in both previous and this section, participants' perception about positive changes tend to rely on physical improvements that people can easily visualize in their mind and recognize its changes. However, perception about areas for improvements is more linked to their emotional sense, such as a lack of safety or atmosphere of specific areas. For example, when some of participants drew circles to identify areas for improvements, they mentioned unsafe feeling of the area or bad experience they were faced. Furthermore, concerns for safety and housing improvements were often emphasized through the surveys. On the other hand, when participants described positive changes, they generally recognized community

service improvements or physical changes, such as repaired streets, pavement improvement, and a bike cage. That is, the different response patterns between positive changes and areas for improvements prove using perception in community plan help to identify how physical interventions transform residents' emotional perception about targeted areas that require more attention.

4.1.3. Areas for Future Community Gardens

In terms of areas for future community gardens, identified areas are somewhat scattered rather than creating clusters like analysis for positive changes and areas for improvements (Figure 5). Areas identified from the mapping exercises tend to be around existing schools. This is because some of participants used schools as landmarks in their community, and also they considered schools as areas having possibilities of creating new community gardens.

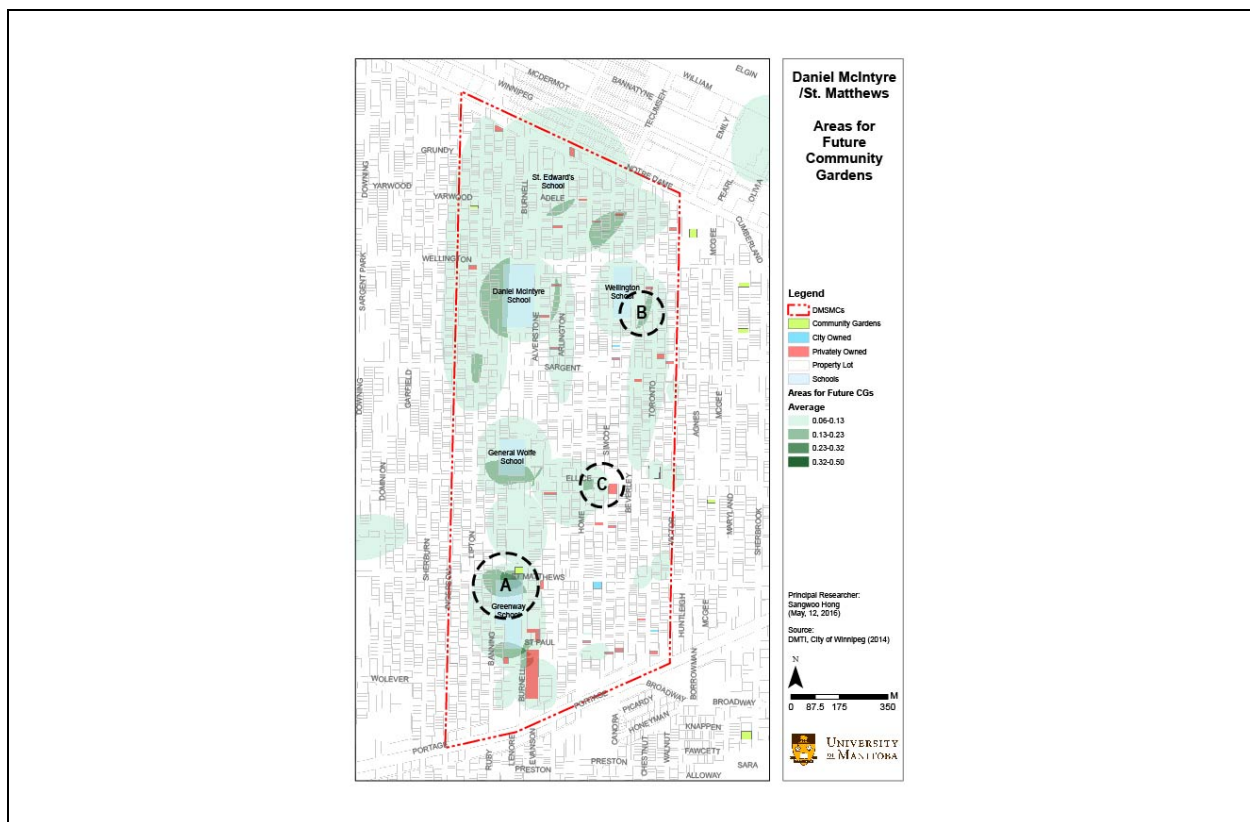


Figure 5. Areas for Future Community Gardens

Although an area around Greenway School was identified as a cluster that participant perceived as the most potential place for future community gardens (A), a community garden (Orioles Community Garden) is already located and being used. This means participants have a strong desire for adding more garden plots in this area, they recognize them as a good place for gardening, or some of people, who are not interested in community gardens, do not recognize existing community gardens in this neighbourhood. Even though surveys asked reasons why participants highlighted the areas, it was voluntary, so most of participants left it as a blank. However, a participant explained the school had an underutilized lot that could be used for gardening. Although there was a response, it is not alone enough to prove why many participants placed emphasis on the area. However, the collected responses could be analyzed when it compares with areas of positive changes (Figure 6).

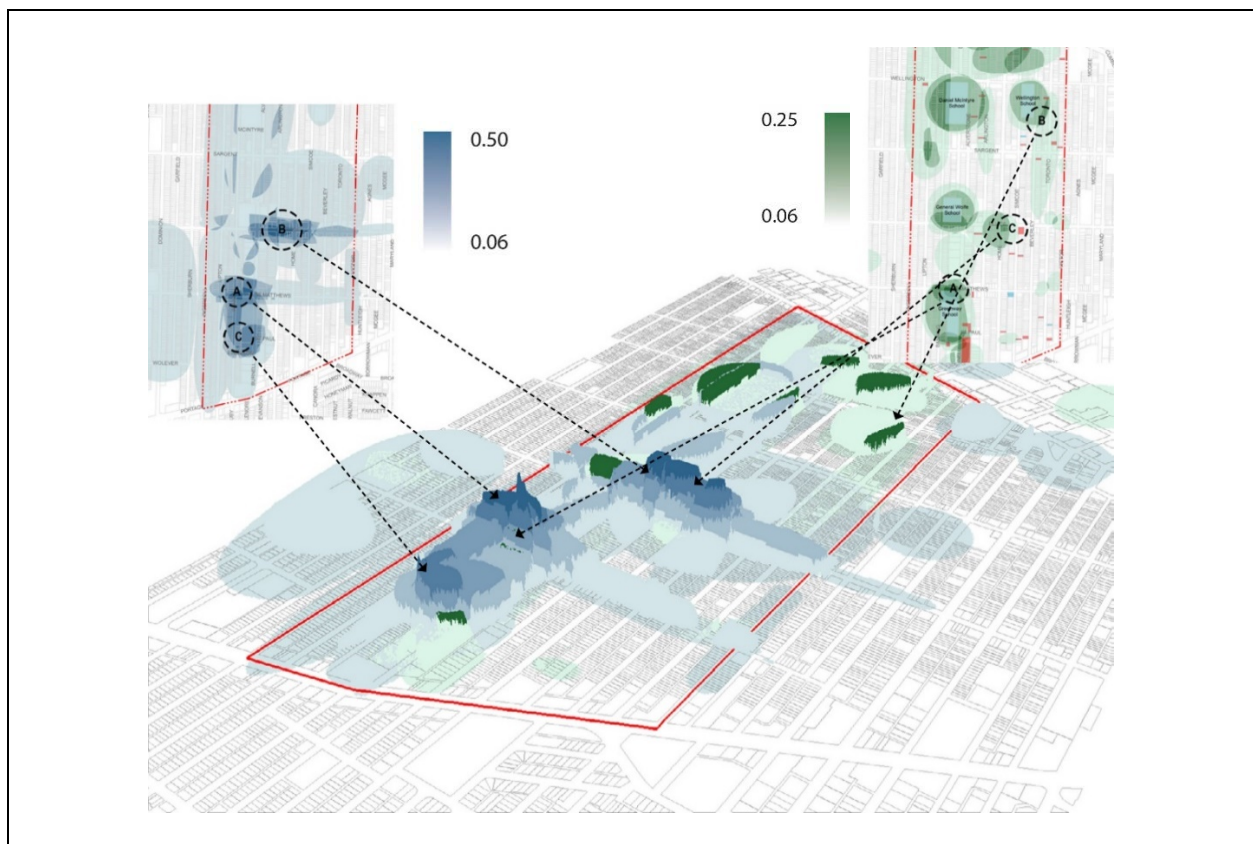


Figure 6. Positive changes vs. areas for future community gardens

As Figure 11 describes, cluster A and C in areas for future community gardens are well overlaid with areas of positive changes (A and B). More specifically, cluster A overlapped an area identified as the most positive changes (A) in DMSM. It describes that participants recognize community's efforts to creating community gardens and their service improvements, and they consider the area can be more improved through creating or expanding community gardens.

Another cluster identified from the surveys locates on Toronto Street (B). The area is well overlaid areas for improvement (Figure 7), and a vacant lot owned by City of Winnipeg closely locates from it. That is, the vacant lot zoned for residential use and owned by the City could be used for creating a community garden through a long-term lease agreement.

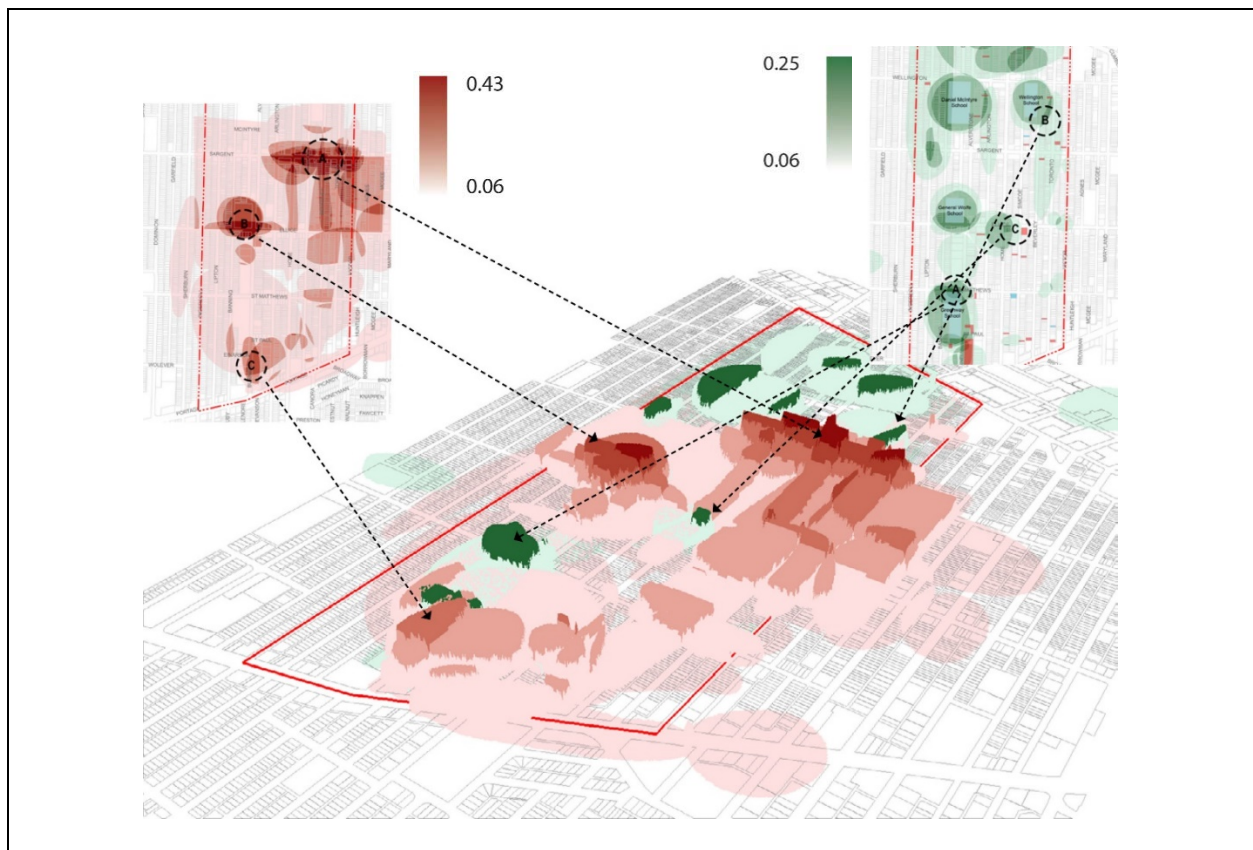


Figure 7. Areas for improvements vs. areas for future community gardens

Third cluster is on Ellice Avenue (C) where DMSMCA is already working to create an urban park that encourages community engagement and experiences of urban agriculture. The area not only overlaps with one of areas of positive changes, but is also in close proximity to an area in need of improvements. Some of participants, therefore, have already recognized that there is a vacant lot having potential for a future community garden.

4.2. Workshop Analysis

In order to increase the accuracy of collected information from the two field surveys and to obtain feedback about the results discussed in the previous section, this workshop invited the participation of Daniel Macintyre St. Matthews Community Association (DMSMCA)'s staff members, who have broad insight and knowledge about the communities. In the processes, five staff members participated.

The collected perceptions of only five members of staff in the workshop might not be alone enough to identify positive changes, areas for improvements, and suitable areas for future community gardens in the Daniel Macintyre and St. Matthews communities. However, when the responses are compared with the results of the two field surveys, it helps verify findings from the surveys and identify their similarities and differences that need to be addressed in this research.

More specifically, even though most of responses collected from a workshop were similar to areas identified from surveys, there are different patterns (Appendix E). For example, staffs' responses on positive changes tended to focus on areas where the community organization's efforts have already intervened. When they shared reasons why they highlighted specific areas on the maps, existing community gardens and programs offered by the Community Association were often mentioned, such as programs for youth in the DMSMCA office and community gardens at Winnipeg Centre Mosque and Lipton Tot Lot.

Furthermore, when they discussed areas for improvements, the response patterns also differed from that of the surveys. For example, areas for improvements identified from surveys were significantly concentrated on east of Sargent Avenue and often noted for their lack of safety. However, participants in a workshop looked for specific places that could be upgraded or restored by physical interventions, such as abandoned condos and the deteriorating former Canada Bread Plant. This contrast makes it clear that residents and community staff have slightly different perceptions about safety of this neighbourhood and the areas in need of improvement. But the process also illustrates the strength of using captured perception as a supporting tool:

I can look at the map. It tells me right away. I can go with what they're talking about. Most interesting one is how it [areas for improvements] is concentrated. ... That is kind of interesting to see bunch of people kind of see one single area. It's not site specific. Site is easy to understand. Get some like this? Just general geographical area? It's interesting to see (Participant 1).

It also encouraged participants to share a more specific comments on the area that needs improvements on Sargent Avenue:

[There] is the last park, Sargent and Home Street Park. That is the last park in this neighbourhood that City has not done any upgrades to. It needs to be upgraded. It also needs new lighting. It means like even stuff as simple as paint job makes really big difference to people's impression of things. ... It makes me think what would happen when the City actually put some resources into that park? (Participant 2)

Likewise, the results from surveys became a catalyst of sharing ideas and thoughts, and that made participants identify for themselves areas that need more attention. That is, narrative and informal information collected from residents' perceptions can be a strong means to identify areas that need more improvement and require community's strategical actions to resolve the challenges.

In terms of areas for future community gardens, discussions during the mapping exercise helped to identify challenges that the Community Association was facing. The identified areas

for future community gardens, which were illustrated in the previous section, were shared with participants in the workshop, and they pointed out the difficulties of creating community gardens on vacant lots designated as residential and owned by the City:

It is much harder [to build on City-owned lands]. Spence [Neighbourhood] has built community gardens on City-owned lands, and they lost a bunch, especially on St. Matthews [Avenue] that they are on City lands. Because, lot's worth is a lot of more. ... the agreements that want you sign, they basically give you 30 days from they decided to sell the lot or they sell it. Thirty days make it impossible for an organization like us. When you have to move boxes, there is no way. They won't let you do in ground anymore. It's complicated. (Participant 2)

That is, even though the *Community Garden Policy* (City of Winnipeg, n.d.) states “community gardens as an acceptable land use on appropriate City-owned land” (p. 2) in its potential strategy to sustain community gardens, there is still community concern that additional support is required from the City. More specifically, when community organizations use City-owned lands for creating community gardens, they have to utilize raised garden plots. Furthermore, when the City decides to sell the properties, organizations only have thirty days to clean up the lands. It means even though the City understands the benefits of community gardens “in supporting healthy communities and improving the quality of life” (City of Winnipeg, n.d., p. 2), the *Community Garden Policy* needs to consider what community organizations’ concerns are and what make easier for them to maintain and sustain their gardening activities.

One participant also described how increased property values influence property owners’ interest in creating community gardens on their vacant lands:

Price of the lot has gone up so much. When previously ten-fifteen years ago, private land owners just sit on the vacant lot because they can't make any money in selling it. They just sit on it and hope that values go up. Now [it] costs a lot and they can get much higher. They much less willing to use the lot for that, and they much like to sell it. (Participant 2)

Likewise, increased property values and needs of comprehensive supports from the City become

challenges in creating and sustaining community gardens.

4.3. Findings from Analysis

This section explores a scenario for future community gardens developed by this analysis and lessons that should be considered in perception research integrated with GIS in a scope of community plan in inner-city neighbourhoods.

4.3.1. Scenario for Future Community Gardens

In order to identify strategical areas for future community gardens, captured perception about areas for improvements and vacant-lot data provided by the City of Winnipeg are compared with identified clusters for future community gardens (Figure 8). In the processes, captured perception from surveys and a workshop is aggregated, and 32 vacant lots locating within a range of areas for improvements were used. Heights of both privately- and city-owned vacant lots indicate degree of areas for improvements. In the processes, three areas are identified as strategical areas for future community gardens, which fulfill two variables: 1) vacant lots within areas for improvements, 2) vacant lots closely locating areas for future community gardens.

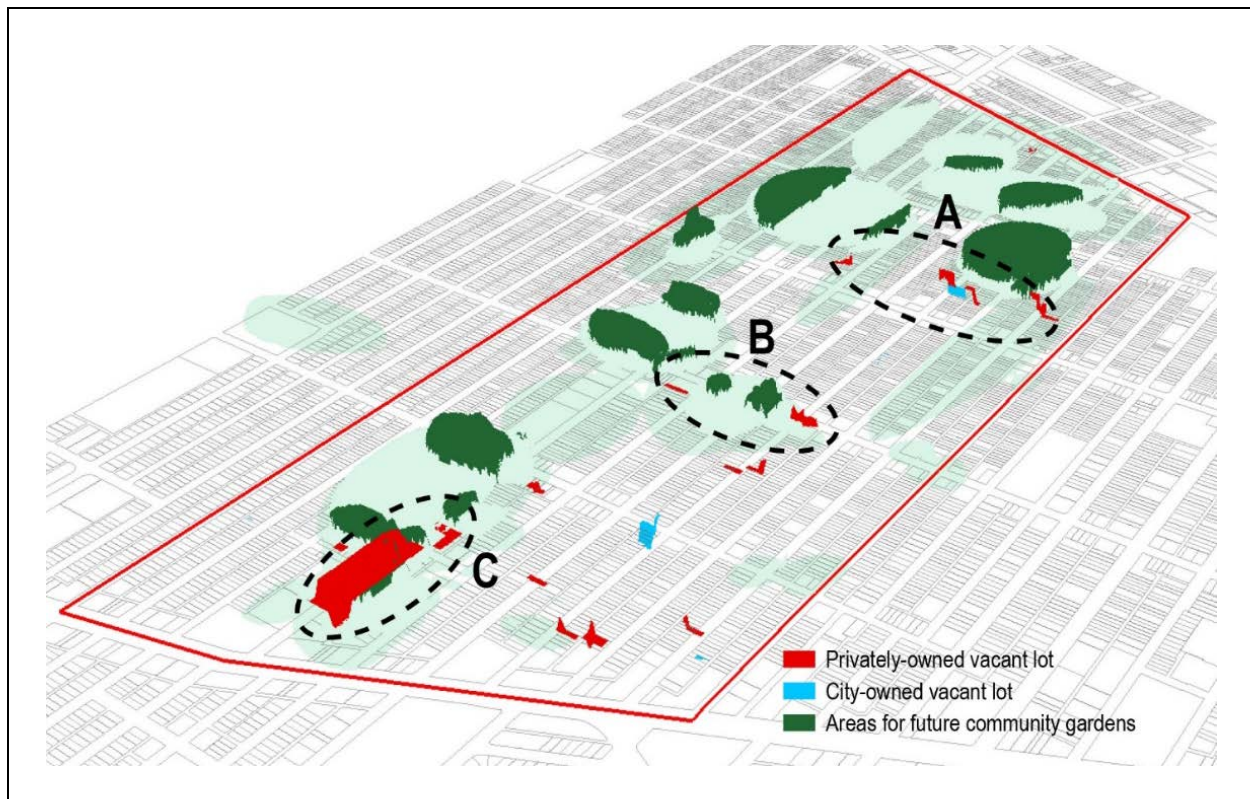


Figure 8. Strategic areas for future community gardens

Area B is identified as a short-term goal. This is because community association is planning to purchase a privately owned vacant lot for future community gardens and encouraging urban agriculture experience in its community. As a mid-term goal, Area A is identified, where a city-owned vacant lot locates. Even though participants expressed the importance of supports from the City and challenges of creating community gardens on city-owned lands, there is still a possibility of making a long-term lease agreement with the City. As discussed in Chapter 2, Milburn and Vail (2010) consider creating partnerships with the City as a component of successfully implementing community garden programs. Although the government usually prefer to commit to short-term leases of one to two years for community gardens, they suggest that partnerships could encourage opportunities of obtaining technical and legal supports from the government. Furthermore, it makes the government sustain interests about significant concerns for open spaces and community gardens in inner city neighbourhoods.

Finally, Area C could be chosen as a long-term goal for future community gardens because the cluster indicates that participants consider the area is suitable for future community gardens and needs more improvements. However, there are still many challenges that the community association should overcome. Purchasing privately-owned lands in the area might be difficult due to its increased property values as participants discussed in the workshop. However, community gardens can be built in the area when more residents are aware of importance of community gardens and when community organizations build broader networks with other organizations, and institutions such as schools.

Sustaining interests from community members is one of key components in successfully implementing gardening programs (Milburn & Vail, 2010; Lawson, 2004). If the community organization consistently builds interactive relationship with community members, it could increase more opportunities to create community gardens in the area. More specifically, if community association staff build a strong relationship with Greenway School, which closely locates to area C, the school could provide a space for creating community garden plots. This strategy already has been used by DMSMCA, and they built garden plots through working with Greenway School. However, they have lost connections and control over the garden plots because teachers, who worked with the association, left the school. From these perspectives, if the community association rebuild a relationship with Greenway School, the area could be another potential area for future community gardens.

4.3.2. Capturing Perception in GIS as a Participation Tool

As discussed in Chapter 2, encouraging marginalized groups and individuals' participation is a key component to achieve empowerment in decision-making processes. Furthermore, many scholars in cognitive and GIS research argue requiring participants' technical skills and

knowledge of GIS can hinder marginalized people's participation. From these perspectives, using paper maps for capturing perception can successfully minimize the limitations. More specifically, asking participants for drawing simple circles to share their perception could encourage a broader range of people's participation in DMSM communities, which is one of inner-city neighbourhoods having high population of immigrants (about 36 % of total population) in Winnipeg.

When completion mapping was used with face-to-face survey, this research could invite people having diverse backgrounds, such as immigrants and international students. For example, when the principal researcher asked immigrants living in DMSM communities for participating in a survey, they often disregarded because of language barriers or hesitating participation. However, when they understood there were no right and wrong answers and the survey only asked for drawing simple circles on maps to share their perception, some of participants started sharing their thoughts. Likewise, completion mapping with assistances from researchers and less reliance on technical understanding and skills can increase opportunities that marginalized people participate in and influence decision-making processes.

In order to use the captured perception in GIS as a more accessible and interactive tool to community members, consistent interest from community organizations is a key component. For example, the Community Association has built a Neighbourhood Green Map through working with Manitoba Eco-Network, which shares the knowledge of community assets and green infrastructures. However, it is only maintained by Manitoba Eco-Network, and the Association has lost detailed information, such as addresses, pictures, and descriptions of each amenity. It means community organizations need a staff who routinely collect residents' perception and maintain the information and analysis.

Furthermore, the information should be shared with community members when community organizations use it for their community plans or as a measuring tool to evaluate the successes and failures of community efforts. As discussed in Chapter 2, if community organizations use GIS as a participation tool, it should encourage two-way communication. From these perspectives, the community organization can share the captured perceptions through their communication tools, such as website or printed maps. Therefore, community members can see how their perception has been analyzed and used for other community plans.

4.3.3. GIS as a Supporting Tool for Community Plans

As discussed in Workshop Analysis section, collecting and analyzing residents' perception about positive changes and areas in need of improvements can be a tool to measure how community efforts and interventions successfully transform their community. More specifically, identified clusters in the analysis for areas of positive changes demonstrate people recognize improvements when community programs increase opportunities that residents can engage and community infrastructure is upgraded. This analysis also identifies community garden programs as a physical intervention to create positive atmosphere and to change residents' perception about their community. This is because areas, where Orioles Community Garden and Orioles Bike Cage locate in, are considered as the most positive changes that about 50 % of participants highlighted although 6 out of 21 participants answered they do not participate in community garden programs.

Furthermore, workshop participants shared potential strategies that they can use for creating community gardens and how they might utilize the captured perception to support other community goals. A participant mentioned creating community gardens around school areas. More specifically, DMSMCA already has built garden plots at Wellington School and Greenway

School and maintained them during the summer. However, they had since lost connections with the people who had worked on the project. This highlighted the need for consistent and collaborative relationships with schools as key component in sustaining and succeeding with the community garden programs.

Furthermore, analyzed perception in GIS can be a measurement tool to evaluate how community efforts change people's perception about their community. When participants discussed how perception about their community could be utilized, a person expressed strong interests in using the information to support other community goals:

[It would be] great to have an organic version of this map and like to see how perception changes. So, we can see the little things that the Community Association does can have impact, and also interesting to see little stuff that we do, we do bunch of BBQs there, could make differences. And, look back a year later and see perception changes that people lived in the area [on Beverley Street between Sargent and Ellice Avenues]. (Participant 1)

As the description shows, captured perception as informal and local knowledge can be a means to measure the successes and failures of an organization's efforts and to identify specific areas that need social and physical interventions in its community. For example, if community organizations yearly collect residents' perception about positive changes and areas for improvements, they can assess how their goals are achieved and identify which areas need more community interventions.

Furthermore, a participant stated a possibility of using the captured perceptions for strategically distributing their grant funding for housing improvements:

What if we say, we're going to take all over our 35 housing grants next year? We are going to give them all out on Beverley Street between Sargent and Ellice Avenues. ... They are all external fix-up grant, so if painting and fixing the roofs, and people saw all this activity and saw people's houses being painted up. ... It would need to look and see if may be over time as people are we interviewed or you interviewed new people whether that makes difference? (Participant 1)

That is, the captured perception could be used as a supporting tool to strategically determine how the Community Association can distribute their grant funding for housing improvement.

Furthermore, they can analyze how residents' perception and atmosphere of the targeted areas change by time passes, and in response to initiatives. In the processes, the captured perception in GIS can support building strategies for areas in need of improvements identified by residents. It can be also a rationale in which community organizations strategically distribute their funding; such as grant funding for housing improvements. Likewise, the analysis shows the collected and analyzed perception can be strong rationale to support other community goals and plans.

5. Conclusion

This chapter consists of three sections: discussion, recommendations for future research, and conclusions. By revising the research questions of this practicum, the discussion section describes findings of this research and suggestions for community organizations in inner-city neighbourhoods. The second section explores the limitations of this research and makes recommendations about needs to be addressed by future research. Finally, the conclusions section addresses lessons learned from the research.

5.1. Revisiting Research Questions and Discussions

This practicum research was framed by two types of research questions. The first type of question was addressed by observing participants' responses in two field surveys. The second was explored in a workshop to identify benefits and challenges of GIS as a tool supporting participation in inner-city community planning. By revisiting the research questions, this section discusses the findings of this research.

Question 1: What would be advantages to engaging with residents on mapping exercises to capture their perceptions of a neighbourhood?

As explored in Chapter 2, many scholars argue the importance of marginalized people's participation in decision-making processes (Abele et al., 1998; Day, 1997; Woodford & Preston, 2011). The degree of their participation and influence on decision-making are often considered an indication of how democratic approaches planning processes are (Arnstein, 1969; Rocha, 1997). Even though this research does not address the degree of marginalized people's influence on decision-making processes, the success of paper-based mapping exercises suggest that it encourages more interactive communications with marginalized people in perception capturing

processes.

Research related to public participation has found that marginalized people's participation is hindered by mistrust between decision makers and citizens, and has highlighted how conventional processes rely heavily on objective and formal information in decision-making processes (Bunting & Guelke, 1979; Woodford & Preston, 2011). In order to minimize the limitations, scholars emphasize the need to build consistent relationship with marginalized people and to understand what their concerns are in the processes (Halseth & Doddridge 2000; Woodford & Preston, 2011). From these perspectives, one of the advantages identified from the paper-mapping exercises was the possibility of building informal relationships with participants, and how the exercises can encourage active story sharing in perception capturing processes.

As Wates (2000) states, maps can effectively encourage communications and identify participants' understandings and experiences about environments that they are interacting on a daily basis. More specifically, this research illustrates how paper maps help participants effectively share their stories, and it can be a means to encourage informal communications between researchers and participants. Indeed, when people agreed to participate in surveys and understood questions asking about their general experience and perception about their communities, maps reminded them about spaces that they have experienced, and participants started sharing their stories. That is, the mapping exercise by itself can be a tool to more naturally build informal relationships between participants and researchers, and it helps develop an understanding of people's concerns about their communities.

Another benefit is that asking people's ideas and thoughts by itself increases a sense that they are valued in their community and makes them more supportive for community plans and changes. Indeed, when participants were asked to share their experience and concerns about their

community on a map, they identified areas in needs of safety and housing improvements and shared their stories. That is, one of differences with other participation tools, such as surveys and interview, is that the mapping exercise used in perception capturing processes help people highlight specific areas linked to their concerns, feel they are more engaged in the processes, and identify areas that need more attentions from community.

A paper-mapping exercise as a method to capture residents' perception can minimize limitations that cognitive mapping research has had. Cognitive mapping research places high reliance on participants' drawing skills, but this can hinder marginalized people's participation (Spencer, 1973). Furthermore, it requires extensive training so that participants learn the appropriate cartography and symbology skills. Paper-mapping exercises used in this research, however, can minimize the limitations because the mapping exercises asked participants to draw simple circles on topographic maps that included basic information to help them navigate the two-dimensional representation of their communities. That is, this research could minimize training time, and it allowed participants to focus easily on the survey questions without having to worry about a lack of their drawing or cartographic skills. They could concentrate on their own thoughts and perception about the communities.

Even though this research indicates that there are some advantages to paper-based mapping system in perception capturing processes, there a few concerns arose including challenges in encouraging more participation and aggregating collected information. Although surveys associated with mapping exercises helped this researcher effectively collect residents' perception within a reasonable timeframe, there were limited opportunities to invite more participants. This was because only one researcher surveyed people in open and public spaces, such as community events and streets. Indeed, many scholars state larger number of participants

in perception research enable the creation of more accurate analysis and identification of better public images representing community challenges and priorities (Lynch, 1990, Platt, 2005).

If community organizations intend to collect more information and perceptions, volunteer opportunities for youths or students could increase the total numbers of participants in perception capturing processes. When youths and students are involved in the processes, they can have opportunities to build the better understanding of communities, and established relationships with their communities and families can invite more participants. Furthermore, youths and students themselves can be participants. As Halseth and Doddridge (2000) state, typical decision-making processes provide insufficient opportunities for professionals to learn about how youths perceive their environments and communities. Although this research encouraged seniors and international students to participate in perception capturing processes, it could not invite youths. Increasing volunteering opportunities for youths in the processes could encourage their participation.

Aggregating collected information can be another concern when community organizations extend this research. As Appleyard (1974) states, aggregating captured perceptions requires extensive time and efforts. Even though collected information on paper maps was analyzed by the principal researcher as a GIS facilitator, the community organizations need to consider how they may build their own capacities for GIS, and it could be achieved by building relationships with institutions having the capacity to undertake GIS analysis. In the processes, GIS does not need to be ArcMap program. Community organization can use alternative or free online tools, such as Google Fusion Tables or QGIS (Quantum GIS), to analyze captured perceptions. Furthermore, building relationships with institutions could help community organizations develop their own capacity of GIS. For example, project-based or studio courses

associated with GIS at the universities could help community organizations to analyze data. At the same time, students could have opportunities to work with inner-city communities and to build the better understanding of community's concerns and priorities.

Question 2: How can the collected local knowledge help identify community priorities, such as housing improvements and creating a safe neighbourhood?

Many studies in planning and PPGIS have emphasized the importance of including local knowledge in decision-making processes. Even though many GIS practices have tried to encourage people's participation in their processes, there are not many studies addressing community perceptions and using them to identify and support community priorities and plans. This is because GIS practices in planning generally focus on socio-economic and geographical information that support professional's decision making rather than incorporating local knowledge into their processes (Talen, 2000). Other scholars argue that including residents' narrative and informal knowledge helps identify what has meaning to their community and provides directions for planners and decision-makers to address specific challenges that community members are facing (Casey & Pederson, 2002). From these perspectives, this research collected and analyzed residents' perceptions in GIS to identify and build the better understanding of community's concerns in the Daniel McIntyre and St. Matthews communities (DMSM).

Community priorities are identified by quantifying residents' perceptions and information that is often considered as informal and subjective knowledge in conventional GIS practices. More specifically, when residents' responses are overlaid in GIS, clusters of their perception can be visualized on maps. The identified images help community organizations build a better understanding of how residents perceive their communities and their priorities. In the process,

this research identified concerns residents had when considering housing and safety. They also perceived physical interventions and service improvement initiatives within the neighbourhoods as positive changes. Furthermore, through collecting and analyzing residents' perception about positive changes, areas in need of improvements, and areas for future community gardens, this research illustrated how residents differently perceive parts of their neighbourhoods (Appendix E).

Likewise, the analysis shows perceptions captured in GIS can help identify the spatial distributions of community concerns. More specifically, the GIS aggregated maps make it easier for the community to pinpoint and identify problem locations, such as streets, houses, and parks. As discussed in the Chapter 4, aggregated maps representing residents' perception help participants in a workshop re-think about the areas in concerns and re-interpret what physical interventions are around the highlighted areas by residents and what needs to be improved. That is, the analyzed local knowledge in GIS can be informative to other community members, and it gives a sense of where and what residents' concerns are, which should be addressed when community organizations develop their plans and priorities.

However, if community organizations intend to use this analysis to identify and support their community priorities, they need to consider increasing accuracy in perception capturing processes and using the results to encourage residents' discussions. The scales and locations of individual responses could be inaccurate enough. This is because residents' perceptions rely heavily on their personal experiences and memories. It means participants might misremember locations or areas that they highlight on maps. In order to minimize the challenges, process facilitators need to ask why participants have chosen to highlight specific areas and to increase total number of participants in survey processes. This is because if more residents participate and

share their experiences and stories, it helps increase the accuracy of analysis.

Another point is participants need to have opportunities to compare the differences between their responses and overall results. This can encourage another discussion and remind people about something that needs to be addressed in community plans. Even though the workshop included in this research encouraged participants to compare their responses with the results of surveys, there was insufficient time to invite larger numbers of residents to participate. Community organizations need to use a variety of approaches to invite more residents to share their ideas and thoughts. For example, the organizations can share maps, which represent the results of surveys, with residents at existing community events, or posters can be installed at community organizations' offices. Therefore, residents freely share their comments, and the collected information and feedback from them can be incorporated into GIS models to more accurately represent public images and effectively support future community plans.

Question 3: What challenges and opportunities are associated with GIS when developing a model for strategically siting interventions (in this case, the suitable areas for future community gardens in an inner-city neighbourhood)?

Many scholars in Public Participatory GIS (PPGIS) emphasize integrating spatial information with individuals' voices and narratives when developing GIS models (Knigge & Cope, 2006; Preston & Wilson, 2014). This is because the ideas of using GIS as a participation tool aims to overcome challenges that conventional GIS research has had, such as high reliance on legitimated data, and a lack of understanding of technical and GIS skills in its processes within many marginalizing communities. From these perspectives, this practicum research used GIS to test and develop a model that represents residents' ideas about future community gardens in DMSM.

More specifically, a GIS model was developed by aggregating residents' ideas and thoughts, which were collected from two field surveys and a workshop. This model identified three potential areas for future community gardens by comparing captured perceptions and vacant lot data provided by the City of Winnipeg. As described in Chapter 4, the GIS model shows possibilities that residents' ideas and perception can be integrated and compared with quantitative data, in this case the information of vacant lots. Furthermore, the model can be improved when residents have opportunities to reassess and reinterpret.

Another benefit associated with the GIS model is to help the community understand which opportunities to pursue at which location. Aggregated residents' perception represents ideas of where people wish to see future community gardens. Regardless of whether community gardens can actually be developed in the highlighted areas; it gives community a sense of where community efforts should be directed. When the aggregated perception is compared with quantitative data, in this case vacant lots having potential to develop community gardens, it could give the community specific direction and identify opportunities they could pursue. Likewise, the perception mapping integrated and compared with quantitative information can help community understand where community services and improvements are needed and identify directions for future community plans and interventions.

This practicum research focused on how residents' perception can be analyzed in GIS and how can support community goals and plans rather than seeking a way of making the GIS model more accessible to the residents. This is because this research used paper-mapping exercises as a part of GIS analysis and assumes it encourages the participation of marginalized people. While this research successfully analyzed residents' perception and identified areas that need more attentions from DMSMCA, the model and results need to be re-shared with residents. This is

because the possibility of successfully implementing PPGIS is increased when people participate from the beginning of its processes and they have opportunities to review the results (Talen, 2000). Furthermore, when marginalized people have enough power to manage and influence decision-making processes, it could achieve empowerment in the processes (Arnstein, 1969). Therefore, if community organizations extend or use the GIS model to support their community priorities and plans, results identified from this research should be shared with residents. In the processes, residents can share feedback on the model and results, and it could make people to think that their participations actually transform their communities and influence decision-making processes.

Question 4: How can community organizations in inner-city neighbourhoods use residents' perception to support their community plan, and what would be the roles of GIS in its processes?

This research explored potential ways to analyze residents' perception and use it as a participation tool to support community plans in inner-city neighbourhoods. Community organizations can use the analysis to develop strategies for areas in need of improvements and to identify what strengths their communities have. The analysis associated with GIS can also identify the spatial distributions of community concerns. Indeed, this can be a strength of using GIS as a supporting tool for community plans. This is because the GIS model can simultaneously describe where and what communities' concerns are, and it can encourage more effective discussions with community members.

As described in Chapter 4, when DMSMCA staff members had chances to see the maps representing residents' concerns and ideas, it brought more interactive discussions and encouraged them to share their thought and ideas to find potential resolutions of areas in need of

improvements. Furthermore, the maps helped staff members understand how residents perceived their communities and encouraged discussions to develop strategies to overcome the identified challenges. That is, the analysis in GIS can visualize intangible and narrative ideas driven from residents, and it persuasively conveys the information to community. It means, as a communication tool, maps make people easily express their thoughts, such as they agree or disagree with the perception. Furthermore, when many residents' perceptions are aggregated into a map, it not only represents common concerns about their communities, but also prevents the few loud voices from driving the agenda.

Likewise, GIS can have strengths to aggregate and analyze residents' knowledge and to support future community plans. When community organizations intend to extend or adopt this research for their community plans, they need to consider how GIS can be a communication tool. As discussed in Chapter 2, Talen (2000) argues GIS effectively visualizes spatial complexities, and helps participants understand how the complexities connect to each other. This is because GIS can help people simultaneously see a variety of spatial factors that influence their communities and challenges. That is, it can remind people to think about details that need to be addressed in community plans, which may lead to the more effectively sharing of thoughts and ideas with experts. An example that community organizations can easily use is to share the results and findings of this research on their website. Even though posting information on a website has many limitations (such as a lack of residents' internet accessibility) it is still being used by many community organizations as an information sharing tool. That is, community organizations need to consider an effective means to re-share the results and findings with their residents.

Another role of GIS can be a measurement tool, which helps evaluate the successes of

community organizations' efforts and track changes over times through a repeated use of GIS processes. When organizations yearly collect and analyze residents' perception and experience about community, they can identify what has been improved and how people's perception has changed. In order to use GIS in this way, community organizations should sustain leadership and community members' interests in perception research associated with GIS. This is because when leadership changes, it could influence community's priorities. That is, the community leaders need to be the initiators to encourage residents' participation and to sustain their interests in the processes of identifying community's improvements and challenges.

In order to sustain the community's interests, the leadership should encourage residents to trust their participations and to initiate the community's improvements and changes. Woodford and Preston (2011) state mistrust between experts and people hinders active participations in decision-making processes. That is, community's interests can be sustained when people trust their participations actually influence their community. Therefore, community leadership should ensure that residents have opportunities to understand and reassess how their perceptions influence community priorities and how it initiates community changes.

5.2. Recommendations for Future Research

This practicum research has demonstrated how residents' perceptions can be analyzed in GIS as a participation tool and how this process can support future community plans. However, there are limitations that need to be addressed by future research, such as increasing total number of participants, extending quantitative and qualitative information in its analysis, and building community organizations' capacity of GIS.

This research used paper-based mapping exercises to encourage marginalized people's participation – 21 people participated. However, even though the number of participants are

sufficient to identify community's concerns and strengths, they might not be alone enough to represent the public image of an inner-city neighbourhood. In order to minimize the limitation, future research needs to consider a variety of approaches to invite more participants and to determine appropriate sample sizes. Surveys related to statistical analysis generally suggest that a survey should have at least 30 samples in order to estimate enough means and deviations for its analysis. However, there is no definitive answer to determine sample size. In 1990, Lynch revisited his cognitive mapping works from the *Image of the City* (1960), and he admitted that 30 participants were far too small to represent the public image of a city (Lynch, 1990, p. 249). Furthermore, Fowler (2002) suggest "increasing sample size" can be a way to "increase the reliability of survey estimates" (p. 36). Therefore, even though 30 samples can be used for the future research, encouraging more residents' participations would be more critical in using GIS as a participation tool to support community planning and plans. From this perspective, future researcher could use a variety of participations tools to increase the total number of participants. For example, it could use both online and field surveys to increase the total number of participants, and it could give researchers opportunities to identify how participants' perception can be captured in different environment and what would be more effective perception capturing processes.

Another recommendation for future research is to include quantitative and qualitative information in GIS analysis. Even though this research developed a model for locating future community gardens by analyzing and comparing residents' perceptions and vacant lot data, more diverse information can be incorporated in the analysis. For example, demographic and property-value changes as quantitative data can be used. If the data is incorporated into the GIS models, it could identify, for example, census dissemination areas that have high populations of seniors that

might need to be addressed to assess proper walking distances to community gardens. It can also help community organizations identify how property values change and which lots have the potential to accommodate future community gardens.

In the processes and in order to increase representativeness of community concerns, the results of aggregated maps should be re-shared with residents for further discussions. This re-sharing process can increase opportunities for residents to reinterpret and re-think their perceptions about communities. This may, in turn, lead to an increase in the accuracy of research results and also encourage residents to trust their participations initiate community's improvements and changes.

Future researcher can also incorporate the different form of qualitative information to extend this research. Even though this practicum assumes residents' perceptions, as local knowledge, need to be addressed in community plans, future research could also address the different types of local knowledge. For example, future research can ask participants to point out what has historical and aesthetic meanings to them and their communities. This could be typical asset mapping exercises. However, when it is incorporated with captured perceptions and quantitative data in its analysis, it could help identify specific locations that communities need to protect or improve.

The last suggestion is to explore a way to build the capacities of communities to use GIS. This research suggests sustaining leaderships and building relationship with other organizations help communities build their GIS capacity. However, future research can explore how the networks can be extended and what tools organizations can use. For example, researchers could interview different organizations to find directions and strategies to extend community networks and how it can increase opportunities to build GIS capacity. This is because if community

organizations have their own GIS technician, community groups can more easily collect data using maps over times through a repeated use of perception capturing exercises. For example, community volunteers can collect residents' perceptions on paper maps, and the hard copies can be delivered to a community GIS technician for digitization and aggregation. In this way, community organizations can conduct their own surveys and aggregate maps that can assist with the develop of their community planning and plans.

5.3. Conclusions

With the increased desire to provide affordable housing and economic development opportunities in inner-city neighbourhoods, the need for public spaces is often overlooked in planning and decision-making processes. Even though public spaces are frequently addressed as one of factors in urban revitalization strategies or plans for community sustainability, it rarely gets support and interest from developers or politicians in comparison with the other types of development or expenditures (e.g. building new apartments or repairing existing streets). In order to compensate for this lack of public spaces and to provide healthier life options for residents, many inner-city neighbourhood associations in Winnipeg have focused on the creation of community gardens, often built on vacant or underutilized lots. This practicum research explored different approaches to strategically identifying appropriate locations for community gardens and to use residents' perceptions to support future community plans and goals.

A lesson from this practicum research is paper-based mapping exercises can be a strong GIS and participation tool in perception capturing processes. High reliance on participants' drawing skills in cognitive mapping research often hinders participation. Furthermore, when GIS is involved in the process, it makes more difficult for people to participate in planning and decision-making processes. This is because GIS is typically recognized as a tool requiring

advanced expertise and high costs to maintain the system. However, this research explored how mapping exercises minimized these limitations and how it could be a communication tool in perception capturing processes. Indeed, without interventions from the high technology in the processes, this research could encourage the participations of people having a variety of backgrounds, such as immigrants, seniors, and international students. Furthermore, it suggested that people who have insufficient drawing skills and face language barriers could still effectively share their thoughts and ideas in the processes.

Another lesson is the perception research associated with GIS can support future community plans. Even though many cognitive mapping studies state there is insufficient evidence that perception mapping can be applied to actual planning and decision-making processes, this research could identify an alternative means that inner-city neighbourhoods can use residents' perceptions to support their future community plans. More specifically, aggregated and analyzed perceptions in GIS could help community staff members understand how residents perceive their communities and identify where and what their concerns are. Furthermore, this research could increase communities' interests in perception mapping and discuss how community organizations could develop more precise and accurate public image of an inner-city neighbourhood.

The last lesson is that comparing aggregated perception maps with a variety of quantitative data could be a strong tool to support future community planning. This research compared participants' perceptions with vacant lot data to develop a scenario for future community gardens. However, if this model includes other factors, such as zoning, demographics, and land prices, the model could more effectively prioritize or eliminate areas to support future community developments. Therefore, in order to use captured perception in GIS

as a supporting tool, future researchers should consider which quantitative data can be compared with residents' perceptions and how it can support future community planning and plans.

Appendix A – Certificate of Ethics Approval



Research Ethics and Compliance
Office of the Vice-President (Research and International)

APPROVAL CERTIFICATE

September 4, 2015

TO: Sanwoo Hong (Advisor R. Milgrom)
Principal Investigator

FROM: Lorna Guse, Chair
Joint-Faculty Research Ethics Board (JFREB)

Re: Protocol #J2015:088
"PPGIS in planning for community garden: Building a strategy using GIS to identify new locations for community gardens in Daniel McIntyre and St. Matthews Community (DMSMC), Winnipeg"

Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only.**

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- If you have funds pending human ethics approval, please mail/e-mail/fax () a copy of this Approval (identifying the related UM Project Number) to the Research Grants Officer in ORS in order to initiate fund setup. (How to find your UM Project Number:)
- if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

The Research Ethics Board requests a final report for your study (available at:) in order to be in compliance with Tri-Council Guidelines.

Appendix B – Informed Consent Form for Field Survey



UNIVERSITY
OF MANITOBA

Department of City Planning
Faculty of Architecture



Research Project Title: PPGIS in Neighbourhood Planning: A strategy for inner-city community gardens, Winnipeg, Manitoba

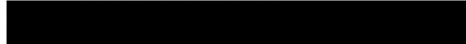
Principal Researcher and contact information:

Sangwoo Hong



Research Supervisor and contact information:

Dr. Richard Milgrom



This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. This form explains what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. Purpose of Research

With spatial information becomes more accessible and cheaper, interest of using Geographic Information System (GIS) has been increased in a variety of fields of urban planning and design. Even though GIS has been considered as a tool to provide geographically accurate information and maps, there are still underexplored questions about whether GIS is a tool to encourage or hinder active public participation in community planning practices and whether it only intensifies fact-based research methods instead of encouraging holistic approaches. In order to explore the possibilities of using GIS as a public participation tool, this practicum examines how GIS is useful to encourage public participation, how information and knowledge collected from residents can be applied to developing a GIS model and how it incorporates with community plan.

2. Procedures

You are being asked to participate in this field survey including five questions about community gardens in Daniel McIntyre and St. Matthews Community. This survey aims to collect your experience and knowledge about community gardens and its community. The information obtained from this field survey will be analyzed in GIS to identify the areas of positive and negative changes in DMSMC. This survey will take about ten minutes to fill out.

3. Recording Devices and Data Storage

To ensure the accuracy of given information from you, answers and feedback will be recorded by maps and written notes. All data will be stored securely. For example, written notes and maps will be stored in the principal researcher's private cabinet with a combination lock, and all collected data will be destroyed at the end of this practicum project (anticipated December, 2015).

I hereby provide consent to the researcher using written notes and maps for recording the survey? (Please tick the following box).

☐ Yes

4. Potential Risks and Benefits

You might share critical comments about its community and existing community gardens. However, the potential risks to you in this practicum will be minimized. This is because the survey is self-administered (pen and paper), and there are no personal identifiers on questionnaires. You are able to withdraw their answers and feedback at any time.

A benefit of participating in this research is to obtain experience as education as possible and share their ideas and knowledge with other participants at this survey.

5. Confidentiality

Your privacy is important. Only the principal researcher and supervisor of the research have access to data according to the Advisor-student agreement that is required by the Faculty of Graduate Studies. Any potential personal identifiers will be removed before data analysis so that this practicum ensures your anonymity and confidentiality. Furthermore, all answers collected from you do not contain any identifiable personal information. You are able to withdraw their answers and feedback at any time.

6. Credits or Remuneration

You will be voluntary. Therefore, there is no credit, remuneration, or compensation for your involvement in this practicum.

7. Debriefing and Dissemination

Dissemination may occur through scholarly presentations and publications. In order to fulfill the requirements of the Master Degree Project of City Planning, the results of this practicum will be disseminated to oral defense, digital online copy, and hard copy that would be stored at Architecture/Fine Arts Library at the University of Manitoba. For the purpose of knowledge proliferation, the result of this practicum will be shared with DMSMCA.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. If you choose to withdraw from the study, please contact the Principal Investigator Sangwoo Hong and/or his Supervisor Dr. Richard Milgrom by email listed above by prior to the publication of the practicum. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management/ Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC) [REDACTED] A copy of this consent form has been given to you to keep for your records and reference.

If you would like to receive a summary of findings of this research, please tick box.

I wish to receive a copy of the summary of findings:

☐ Yes and my email/home address is; _____ ☐ No

Your Signature _____

Date _____

Researcher's Signature _____

Date _____

Appendix C – Informed Consent Form for Community Workshop



UNIVERSITY
OF MANITOBA

Department of City Planning
Faculty of Architecture



Research Project Title: PPGIS in Neighbourhood Planning: A strategy for inner-city community gardens, Winnipeg, Manitoba

Principal Researcher and contact information:

Sangwoo Hong



Research Supervisor and contact information:

Dr. Richard Milgrom



This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. This form explains what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. Purpose of Research

With spatial information becomes more accessible and cheaper, interest of using Geographic Information System (GIS) has been increased in a variety of fields of urban planning and design. Even though GIS has been considered as a tool to provide geographically accurate information and maps, there are still underexplored questions about whether GIS is a tool to encourage or hinder active public participation in community planning practices and whether it only intensifies fact-based research methods instead of encouraging holistic approaches. In order to explore the possibilities of using GIS as a public participation tool, this practicum examines how GIS is useful to encourage public participation, how information and knowledge collected from residents can be applied to developing a GIS model and how it incorporates with community plan.

2. Procedures

You are being asked to participate in this community workshop asking questions about community gardens in Daniel McIntyre and St. Matthews Community. This community workshop will consist of two sections and aims to collect your experience and knowledge about community gardens and its community. Section A will ask you to draw circles on the maps, and you will be interviewed in section B. This community workshop will take about an hour.

3. Recording Devices and Data Storage

To ensure the accuracy of given information from you, answers and feedback will be recorded by an audio recorder, maps, and written notes, all data will be stored securely. For example, written notes, maps, and digital records will be stored in the principal researcher's private cabinet with a combination lock, and all collected data will be destroyed at the end of this practicum project (anticipated December, 2015).

I hereby provide consent to the researcher using a voice recorder for audio recording the discussion? (Please tick the following box).

☐ Yes

4. Potential Risks and Benefits

You might share critical comments about its community and existing community gardens. However, the potential risks to you in this practicum will be minimized. This is because this practicum will not include any personal and confidential information, and you are able to withdraw their answers and feedback at any time.

A benefit of participating in this research is to obtain experience as education as possible and share their ideas and knowledge with other participants at this community workshops.

5. Confidentiality

Your privacy is important. Only the principal researcher and supervisor of the research have access to data according to the Advisor-student agreement that is required by the Faculty of Graduate Studies. Any potential personal identifiers will be removed before data analysis so that this practicum ensures your anonymity and confidentiality. Furthermore, all answers collected from you do not contain any identifiable personal information. You are able to withdraw their answers and feedback at any time.

6. Credits or Remuneration

You will be voluntary. Therefore, there is no credit, remuneration, or compensation for your involvement in this practicum.

7. Debriefing and Dissemination

Dissemination may occur through scholarly presentations and publications. In order to fulfill the requirements of the Master Degree Project of City Planning, the results of this practicum will be disseminated to oral defense, digital online copy, and hard copy that would be stored at Architecture/Fine Arts Library at the University of Manitoba. For the purpose of knowledge proliferation, the result of this practicum will be shared with DMSMCA.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. If you choose to withdraw from the study, please contact the Principal Investigator Sangwoo Hong and/or his Supervisor Dr. Richard Milgrom by email listed above by email listed above by prior to the publication of the practicum. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management/ Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC) at [REDACTED] copy of this consent form has been given to you to keep for your records and reference.

If you would like to receive a summary of findings of this research, please tick box.

I wish to receive a copy of the summary of findings:

☐ Yes and my email/home address is; _____ ☐ No

Your Signature _____ Date _____

Researcher's Signature _____ Date _____

Appendix D – Data Coding Processes

This practicum captured perceptions about the DMSM communities and their community gardens through two field surveys and a workshop. In order to more accurately digitize and analyze the data collected, this research used AutoCAD 2016 and ArcMap10.2 as data coding and analysis tools. As discussed in Chapter 2, O’Connell and Keller (2002) mainly used raster-based GIS analysis to identify the spatial distributions of homogeneous land values for outdoor recreation. However, they digitized individual maps, which represented participants’ responses, to polygon forms in GIS in its data coding processes. This process takes a vector data form that consists of points, lines, and polygons unlike raster form, which is cell-based data. Therefore, they could efficiently digitize and analyze paper maps using lines, circles, and other geoprocessing tools in GIS.

Even though ArcMap 10.2 provides a variety of editing and digitizing tools, such as rectangle, circle, ellipse, and freehand, there are limitations to how well scanned images having irregular figures drawn by participants can be traced. More specifically, sharp or rounded edges are difficult to trace in GIS. This practicum research addressed this limitation by using AutoCAD 2016 to digitize captured perceptions drawn on topographic maps during the two field surveys and workshop.

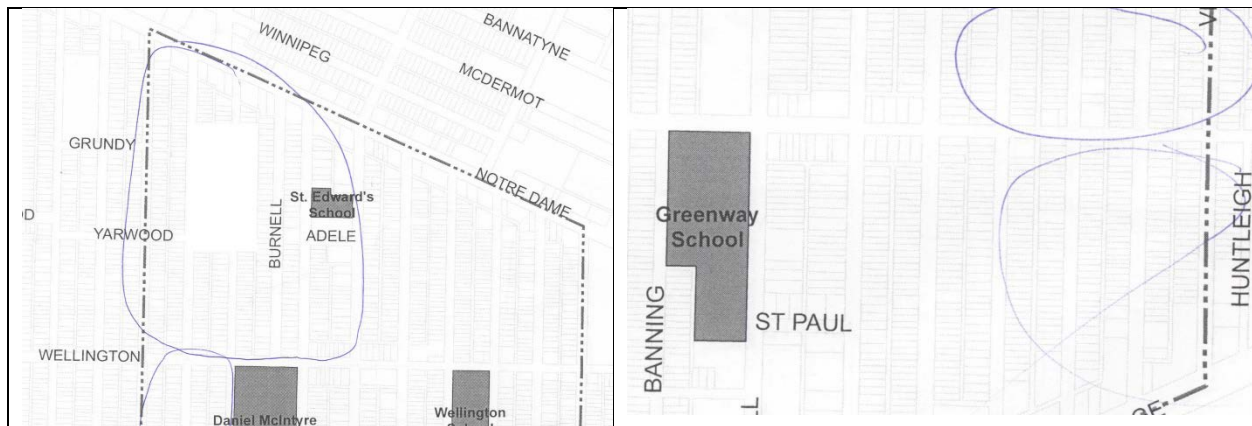


Figure 9. Examples of irregular shapes that participants drew in the two field surveys

In order to minimize error and increase accuracy in the digitizing processes, Spline, Pline, and Circle operations in AutoCAD 2016 were used. These tools allow the researcher to not only create smooth curves, but also to more accurately trace drawings with irregular shapes or sharp edges. After digitizing participants’ responses, the shapes were converted to feature class⁹ forms in GIS for overlaying and analyzing the collected information.

In the processes of identifying public images from overlaid polygons in GIS, each digitized response followed the ‘Topological Clean and Build’ operation. Platt (2005) describes the operation as a process that creates “a new polygon from each polygon intersection” (p. 113). The main reason of the operation is to identify polygons overlaid with one another and to assign values to them. This research considers overlapping polygons as areas that participants

⁹ ESRI, which is one of corporations that offers GIS software, defines a feature class as a set of geographic features that consist of a homogeneous geometry, such as points, polylines, or polygons. Its definition can be found in GIS dictionary provided by ESRI (<http://support.esri.com/en/knowledgebase/GISDictionary/term/feature%20class>)

emphasized. For example, if two polygons (A and B) overlapped each other, and if individual polygons are considered to represent a response having value one, the intersection should be considered as a separated polygon (C), and its value should be the combined values of polygons A and B. Therefore, polygon C can be identified as an area with the highest value in the processes (see Figure 10).

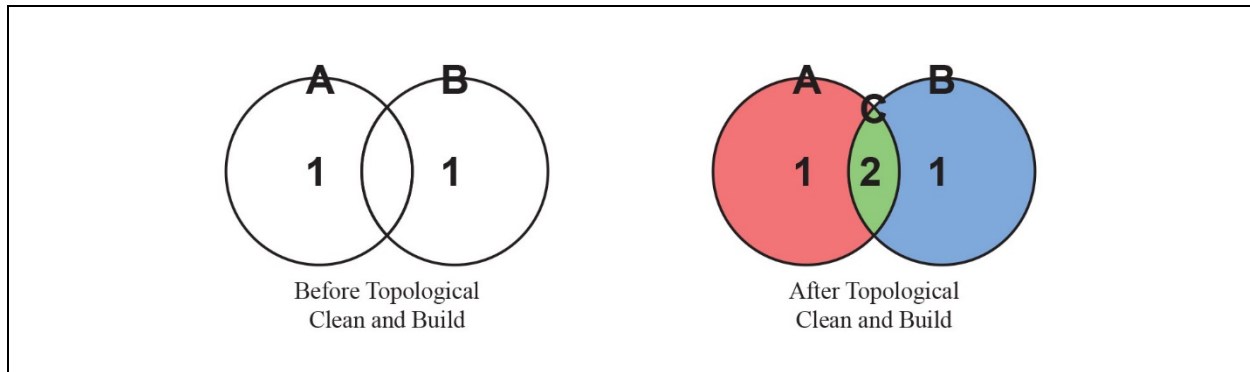


Figure 10. Examples of topological clean and build

In order to perform topological clean and build, this analysis used 'Feature to Polygon', 'Union', 'Feature to Point', and 'Spatial Join' tools in ArcMap 10.2 and followed processes described in Figure 11.

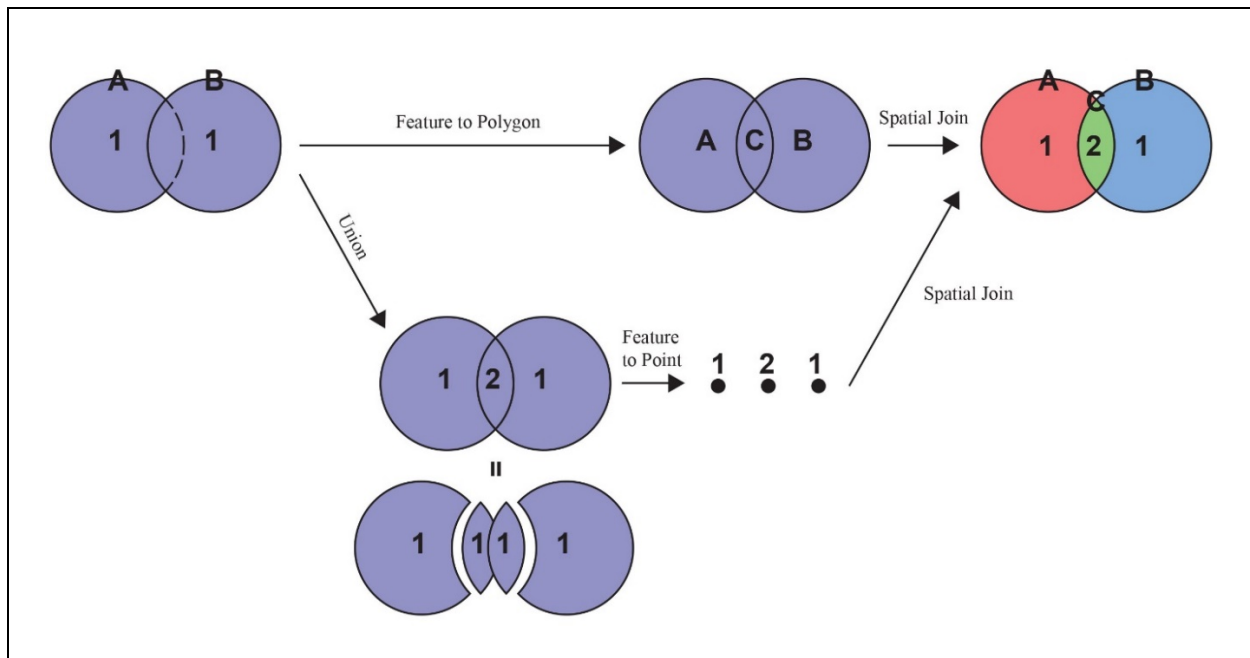


Figure 11. Analysis processes in GIS

First, a value of 1 was assigned to all of collected responses, and the *Feature to Polygon* tool was used for Topological Clean and Build operation. The tool, however, does not keep the values assigned to each response. In order to overcome this challenge, *Union* and *Feature to Point* tools were used. For example, if two polygons overlapped each other (in this case, individuals' responses), the *Union* tool splits them into four polygons (see Figure 12).

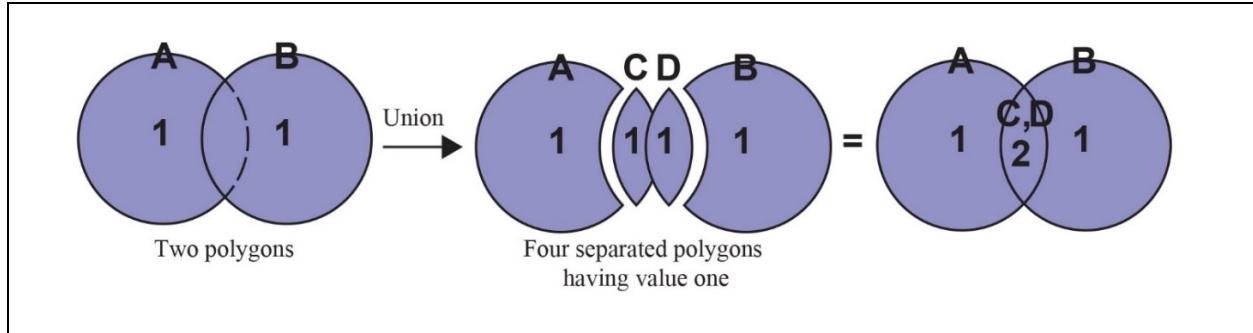


Figure 12. Examples of Union

Therefore, the intersection can have combined values, in this case the value is 2. *Feature to Point* were then used for extracting values from the segregated polygons, and the values were combined with polygons created from *Topological Clean and Build* through the *Spatial Join* tool. The results are in Figure 13.

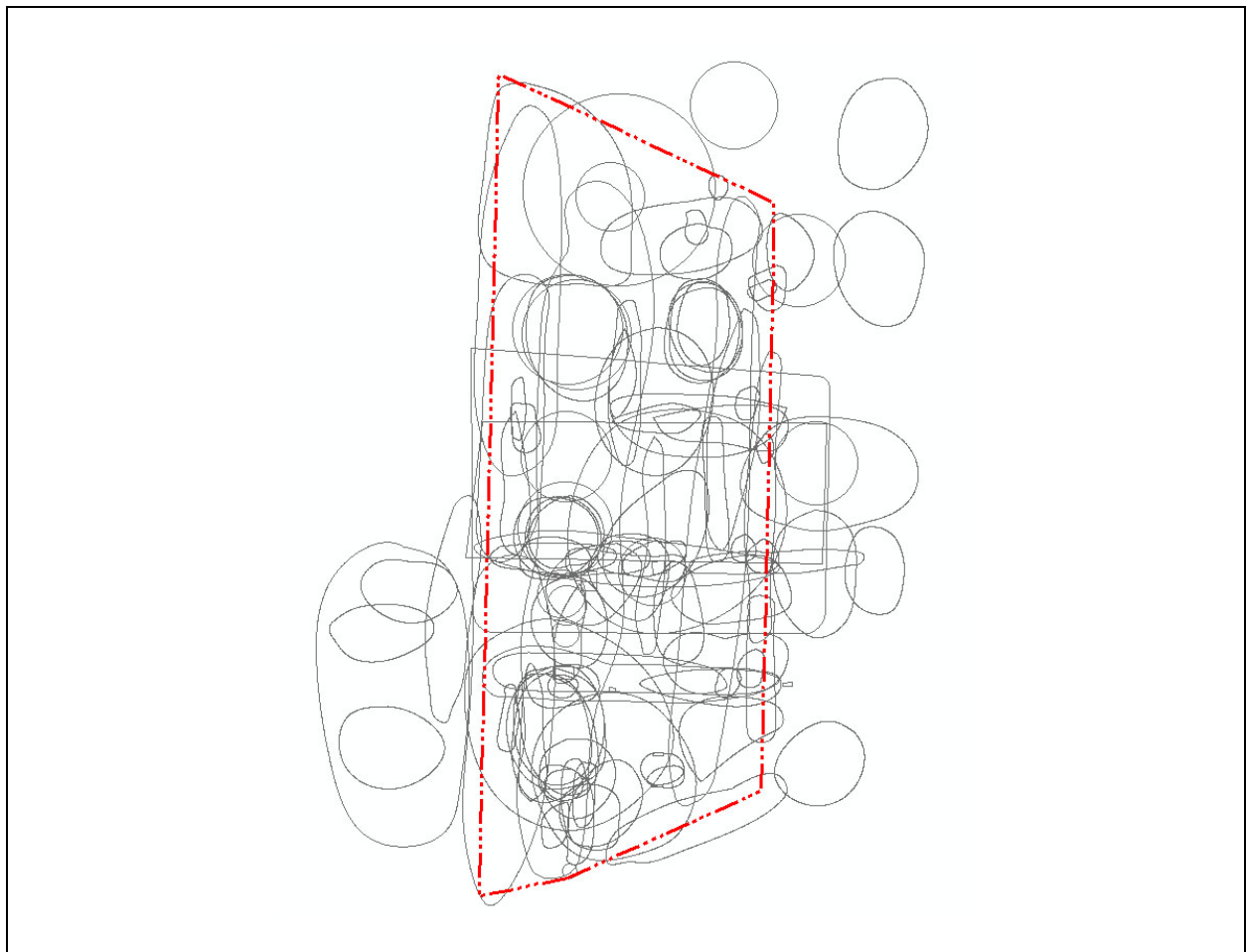
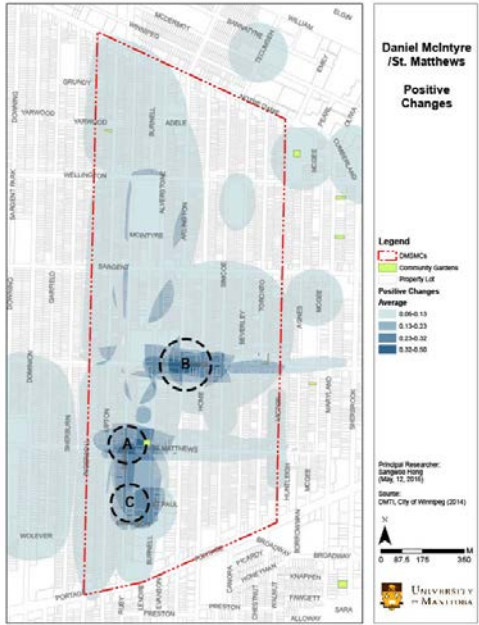
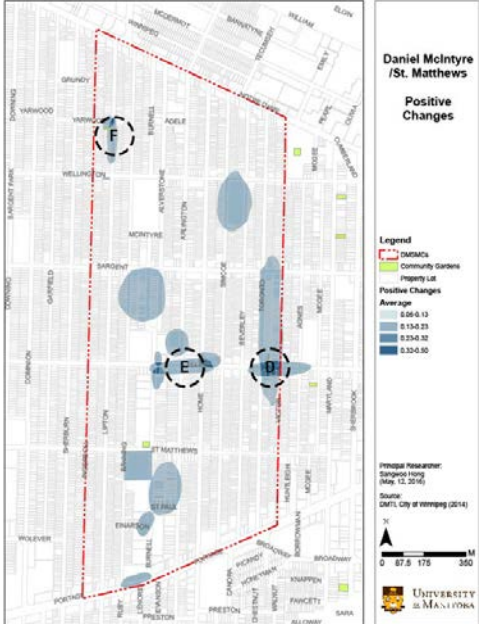
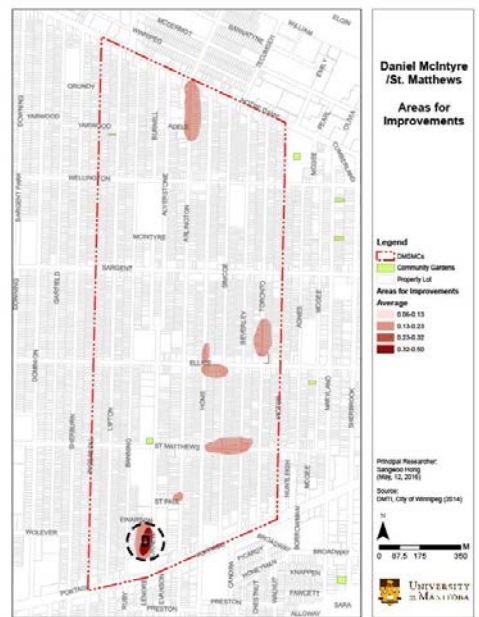
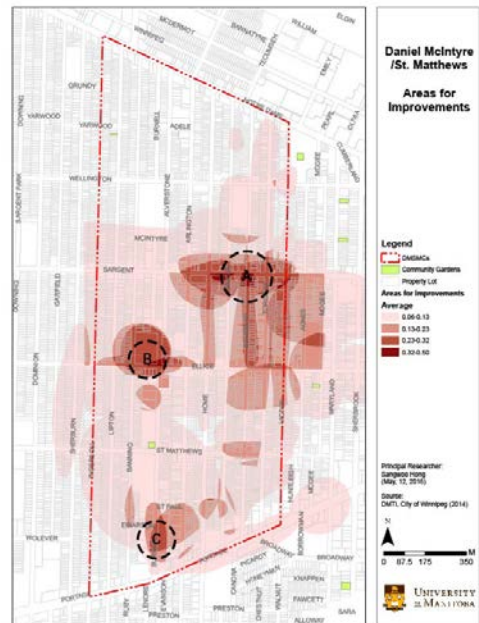


Figure 13. Overlaid participants' responses in GIS

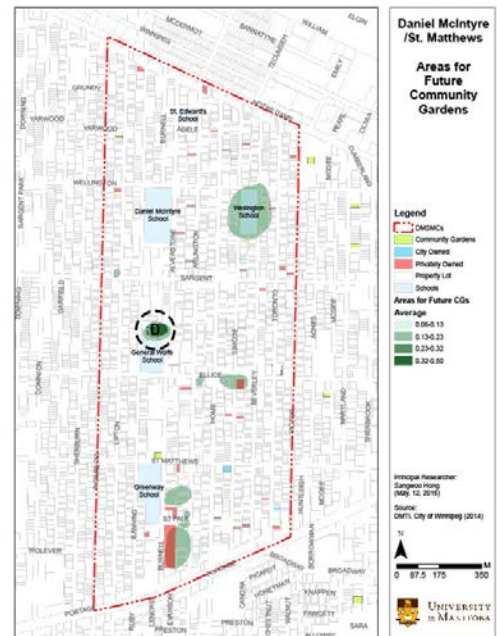
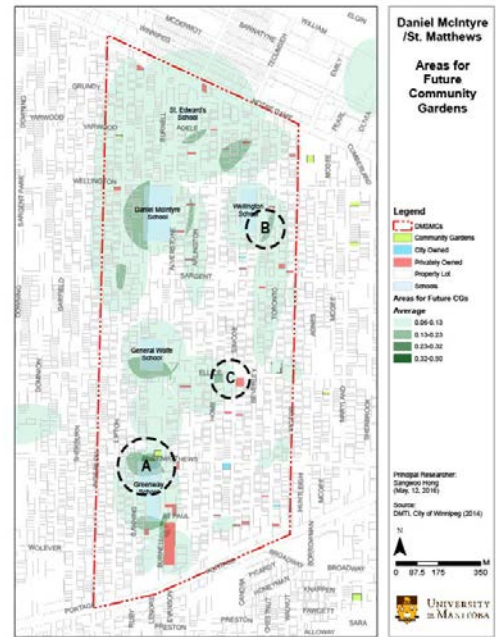
Appendix E – Collected Responses from Surveys and a Workshop

	Area	Collected responses on positive changes	
Survey	A	<ul style="list-style-type: none"> - Orioles bike cage - Orioles community garden - New bike path - Good walkability 	 <p>Daniel McIntyre /St. Matthews Positive Changes</p> <p>Legend DMSMCA Community Gardens Property List Positive Changes Average 0.00-0.10 0.10-0.20 0.20-0.30 0.30-0.50</p> <p>Principal Researcher: Daniel McIntyre May 12, 2016</p> <p>Source: DMSMCA, City of Winnipeg (2014)</p> <p>UNIVERSITY of MANITOBA</p>
	B	<ul style="list-style-type: none"> - Housing and streets have been improved - Street has been improved - Comfortable to walk around 	
	C	<ul style="list-style-type: none"> - Good walkability 	
	Others	<ul style="list-style-type: none"> - Influx of newcomers - Housing stock increased - Pavement improvement - Nice park - Back lanes have been improved 	
Workshop	D	<ul style="list-style-type: none"> - Less gangs and crack houses - Winnipeg Centre Mosque and community gardens - Roads repaired and improved 	 <p>Daniel McIntyre /St. Matthews Positive Changes</p> <p>Legend DMSMCA Community Gardens Property List Positive Changes Average 0.00-0.10 0.10-0.20 0.20-0.30 0.30-0.50</p> <p>Principal Researcher: Daniel McIntyre May 12, 2016</p> <p>Source: DMSMCA, City of Winnipeg (2014)</p> <p>UNIVERSITY of MANITOBA</p>
	E	<ul style="list-style-type: none"> - Apartment on Burnell St. - DMSMCA and more programs for youth created - Vietnamese restaurant opening - Shut down bad business 	
	F	<ul style="list-style-type: none"> - Lipton Community Garden 	
	Others	<ul style="list-style-type: none"> - New Playground (Structure and garden at Greenway School) - New cafe and bakery in a strip mall - Back lanes repaired - School zone speed limit - Good staffs at Wellington School - Some development, lighter street and safe to walk 	

	Area	Collected responses on areas for improvements
Survey	A	<ul style="list-style-type: none"> - A lack of safety - Anti-social behaviour (Drug & Alcohol) - Improper housing condition
	B	<ul style="list-style-type: none"> - Anti-social behaviour (Drug & Alcohol) - Rough pavement - Needs housing improvement - A lack of safety
	C	<ul style="list-style-type: none"> - Need to improve activities for children - Police patrol for children safety - Better police patrols with a lot of drunks
	Others	<ul style="list-style-type: none"> - A lack of safety - Needs housing improvement - High traffic volume - Vacant lot - Need new community garden
Workshop	D	<ul style="list-style-type: none"> - Canada Bread Plant abandoned and been deteriorating - Old bread, a lack of development and concrete plan
	Others	<ul style="list-style-type: none"> - Prostitution corner - Condo building burned down and still a vacant lot - Drivers making single lanes into 2 lanes - Residential homes in need of repairs



	Area	Collected responses on areas for future community gardens	
Survey	A	<ul style="list-style-type: none"> - Underutilized green space in school - Around school 	
	B	<ul style="list-style-type: none"> - Around school 	
	C	<ul style="list-style-type: none"> - A vacant lot 	
	Others	<ul style="list-style-type: none"> - Community garden for food raising - Around school 	
Workshop	D	<ul style="list-style-type: none"> - N/A 	
	Others	<ul style="list-style-type: none"> - SRI Centre Park - A vacant lot on Ellice Ave. - Former Grey Goose plant 	



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