URBAN GEOSPATIAL DIGITAL NEIGHBORHOOD AREAS: URBAN GEODNA

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ABSTRACT OF THE DISSERTATION

Urban Geospatial Digital Neighborhood Areas: Urban GeoDNA

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This dissertation examines the dynamics of Urban Geospatial Digital Neighborhood Areas (Urban GeoDNA) and their impact on local information discovery. It analyzes the demand and supply sides of information from a community perspective to understand how variations in local boundaries condition the type of resources users can discover geospatially through geographic libraries (geolibraries). Based on a mixed methods research design, the study combines primary data obtained through interviews with bottom-up participants from local Community Based Organizations (CBOs) and libraries with secondary data gathered from top-down public agencies. Datasets are analyzed using a Geographic Information System (GIS) and results are loaded into a GeoDNA database developed according to current Geospatial Information and Mapping Policies (GIMPs).

Using a set of seven selected neighborhoods in Bronx County, NY, the study integrates top-down and bottom-up boundary definitions to test the role urban GeoDNA plays for discovering information to conduct community development and environmental planning activities at the local level. In addition, a group of census variables are examined to determine if such boundary variations are related not only to information discoverability but also to the socio-demographic characteristics found within these neighborhoods. Finally, the study evaluates the use of combining top-down with bottom-up geospatial information by appending different neighborhood boundary files and testing their aggregate usability to discover local resources.

Results from the study suggest that, by combining geospatial definitions from different sources, new and extended neighborhood boundaries can be created to georeference resources without altering the ranking of materials found through geospatial searches. Therefore, an aggregate boundary approach can be used to enrich the fundamental essence of urban GeoDNA to allow users to discover simultaneously information that carries both geographical and ontological knowledge about local neighborhoods.

The study also provides insights for communities to become more proactively involved in the dissemination of knowledge because, by publishing metadata about local resources with aggregate geospatial definitions, the chances for their discovery are increased. Moreover, the study contributes to the body of literature on Public Participatory GIS (PPGIS) by providing opportunities for participants to add value to local information from the bottom up to make them discoverable.

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CHAPTER 1

Introduction

This study examines the dynamics of Urban Geospatial Digital Neighborhood Areas (Urban GeoDNA) and their impact on local information discovery. It analyzes the demand and supply sides of information from a community perspective to understand how variations in local boundary definitions condition the quantity and quality of informational resources users can discover geospatially through geographic digital libraries (geolibraries) to plan urban neighborhood environments.

Urban neighborhoods have long been among the most important geographies used by individuals and organizations engaged in community development and environmental planning activities. Most recently, rapid advancements in computing and the geospatial sciences have expanded the use and versatility of these geographies prompting them to become key elements for georeferencing local information within digital collections that are accessible through geolibraries. Their newly redefined scope and usability position these once contested objects into highly coveted geographies, and makes them essential for the discovery of valuable information across the sciences.

A variety of geospatial technologies are nowadays being used by increasing numbers of individuals and organizations to collect, transmit and disseminate information that carries local knowledge around the world almost instantly. As a result, geolibraries, clearinghouses, and warehouses are employing new and more sophisticated methods and tools to georeference resources archived within important collections about local urban neighborhoods to facilitate their rapid worldwide discovery. Using a group of selected urban neighborhoods in Bronx County, NY, this dissertation integrates top-down and bottom-up boundary definitions to test the role their GeoDNA plays for the discovery of local neighborhood information useful for community development and environmental planning within the study area.

Specifically, the study compares three different neighborhood boundary versions to assess their effects on the quality and quantity of local information users can discover through geolibraries. In addition, the study examines a group of selected socio-demographic variables at the census tract level to determine if such boundary variations are related not only to information discoverability but also to the particular characteristics found within different types of neighborhoods. Finally, the study evaluates the use of combining top-down with bottom-up geospatial information by appending three different versions of local neighborhood boundaries gathered during the research from different sources to test their aggregate usability for discovering relevant resources to conduct planning activities at the local level.

1.1 Main Study Findings

While small variations were observed in the ranking scores of the information discovered for several neighborhoods, no consistent relationships were found to exist by neighborhood type. Specifically, the study did not find any relationships concerning the quality and quantity of information discovered geospatially and the local social characteristics of the neighborhoods studied. Except for West Farms, which had the most disparate boundaries, no specific relationships were observed between the geospatial characteristics (centroid dispersion, shape form, Minimum Bounding Box, and Bounded Box Factor) and the various levels of information discovered for each particular neighborhood.

Results from the study suggest that, by combining definitions from top-down and bottom-up sources, new and extended neighborhood boundaries can be created and used to georeference local resources without altering the ranking of materials that can be found through geospatial searches. Therefore, an aggregate boundary approach can be used to enrich the fundamental essence of urban GeoDNA to allow users to discover simultaneously information that carries both geographical and ontological knowledge about urban neighborhoods.

In addition, the study provides insights for community users to become more proactively involved in the dissemination of information about their resources, including local plans and other planning materials, because by creating metadata with elements that reflect aggregate geospatial definitions, the chances for their discovery can be increased. Moreover, the study contributes to the body of literature on Public Participatory GIS (PPGIS) by providing opportunities for participants to add value to local information from the bottom up to make them discoverable.

Due to the lack of ‘official’ neighborhood boundaries in New York City, the study integrates unofficial top-down boundary definitions from the New York City Department of City Planning (NYCDCP) and bottom-up boundary versions created by online Wikimapia users. It is suggested that another set of local boundaries which has been defined and vetted by local users engaged in community development and environmental planning be used to test the urban GeoDNA theory hereby proposed.

1.2 Research Problem

This study examines the dynamics of Urban Geospatial Digital Neighborhood Areas (GeoDNA) and their impacts on information discovery. Based on a series of existing Geospatial Information and Mapping Policies (GIMPs), the study looks at how users from Community Based Organizations (CBOs) and libraries demand and provide geospatial information and other resources to support local planning activities.

Urban GeoDNA is an important area of research which overarches a series of interrelated fields. The literature and concepts reviewed have been organized into three interrelated threads that cover the *demand*, *supply* and *discovery* of local neighborhood information. The research involves the investigation of users' needs and demands, including datasets and other materials, as well as the tools, processes and methods used by suppliers to make local information discoverable through digital libraries.

Despite their fuzzy and unofficial characterization, urban neighborhoods play a key role in community planning and environmental sustainability. Generally connoted as 'ill-defined', such important geographies allow multiple players to produce and exchange local knowledge indispensable to formulate sound planning policy, while at the same time allowing them to actively participate within the multiple planning processes designed to sustain the much larger urban environment.

Despite the increasing amounts of geospatial information being produced through robust GIMPs, which have been developed to forge data sharing and usability, neighborhood information discovery occurs in an uncertain environment thereby limiting the opportunities users have to find relevant materials to participate within the already complex planning processes. Therefore, evaluation of neighborhood information discovery is an important area of research necessary to expand the methods and resources available for local users to conduct community development and environmental planning activities in an effective manner. In this context, the study examines the dynamics of local information discovery from a community perspective through a sequential series of interrelated analyzes to answer the primary inquiry relating to how information ***1) demand*** and ***2) supply*** affect ***3) discovery***.

1.3 Increasing Data Production

Based on current GIMPs and a series of robust and sophisticated new geospatial technologies, many libraries and other institutions are nowadays adding geographic value to materials found in their collections to make them more discoverable. For example, at the national level, the US Government Printing Office (GPO) provides access to information produced by all federal offices through approximately 1,250 depository libraries located nationwide.[1] The GPO Access webpage provides access to locations of depositories by state through its Federal Depository Library Directory (FDLD).[2] At the state level, many offices are developing and interlinking clearinghouses, warehouses, and digital libraries for users to query, discover, and access information geospatially. At the local level, city offices are producing geospatial datasets that are being used by libraries to georeference materials within their collections. Once metadata are populated with geospatial elements and distributed online, their contents become rapidly accessible to worldwide audiences through geolibraries and other spatial clearinghouses.

In New York City, information growth has reached such an alarming high level that City Council members and other officials have held public hearings to decide about

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[1] http://www.gpoaccess.gov/libraries.html
[2] The FDLD is located at http://catalog.gpo.gov/fdlpdir/FDLPdir.jsp

the future retention or destruction of millions of cubic feet of printed materials. On April 27, 2011, the City's Council on Governmental Operations Committee held a public meeting regarding the merger of the NYC Department of Records & Information Services (DORIS) with the NYC Department of Citywide Administrative Services (NYCDCAS). During this meeting, issues pertaining to the management and destruction of public records were commented on by librarians and other individuals who are interested in preserving important historical documentation for future generations.

On the other hand, large-scale projects by major commercial and large research and educational institutions are underway to create global geolibraries to act as repository of the increasing amount of informational materials currently being produced. For example, the Google Books Library Project, which is currently under litigation[3], now provides access to an increasing number of book references and full or partial textual views of both printed and digital materials. Harvard University Libraries most recently launched its Digital Public Library of America (DPLA)[4] project to create a national digital library to archive digital copies of public materials and to provide new and innovative tools for librarians and library users to discover and access information.

Moreover, currently about half of the fast-growing world's population is already concentrated in very densely populated urban places, where information production accompanies this growth and concurrently continues to increase. In the US, the most recent figures published by the Census of Population and Housing revealed that populations are becoming not only more concentrated in fewer cities but that such

[3] As of 2011/03/22, in The Authors Guild, Inc., et al. v. Google Inc., Case No. 05 CV 8136 (S.D.N.Y.), the Court denied parties' settlement approval request http://books.google.com/booksrightsholders/index.html
[4] Harvard's Digital Public Library of America (DPLA) proposal was launched in December, 2010. Information on DPLA is located at http://cyber.law.harvard.edu/dpla/Main_Page

concentrations are also composed of more ethnically diverse and economically disadvantaged individuals. In this context of rapid population growth and concentration, the study of urban GeoDNA becomes of paramount importance not only to support of information discovery, but also to document the ontological representations of such rapidly changing and complex local environments.

1.4 Theoretical Considerations

Increasing amounts of information about local urban neighborhoods are currently being produced and disseminated worldwide by many libraries and other institutions, as well as local participants. Aided by valuable contributions from both quantitative and qualitative scholarships, geospatial technologies are fueling groundbreaking, knowledge-producing research valuable to conduct community development and environmental planning activities at the local neighborhood level. As a direct result, data containing facts and figures about people and places are now being produced, used, and exchanged by large numbers of individuals and organizations (Obermeyer 1998). While adding geospatial value through metadata records, the amount of information being produced for users to discover geospatially is expanding at unprecedented rates.

Currently, digital geospatial data get updated frequently, and more rapidly than at any other time in history. They travel fast and easily become essential elements within the decision making and planning processes designed to support public policy creation to sustain complex urban environments. However, despite such rapid growth and multiple coordinated efforts to build a functional informational infrastructure, geospatial data from federal, state, and local sources are still disjointedly produced in many formats, projections, and temporal cycles that, when combined, create certain impediments for communities to use them for planning activities at the urban neighborhood level. Although GIMPs are indispensable to track lineage and to facilitate usage at different levels, they still make it difficult for average community users to reassemble and use data to study local conditions and to disseminate knowledge about their own communities.

Consequently, most of the data available to study the diversity of geospatial phenomena at the neighborhood level are still byproducts of institutionalized, top-down approaches (Taylor and Johnston 1995) that lack opportunities for communities to use and to add value to the local information they produce. These impacts are exacerbated in poor and minority communities, which change rapidly and often face a lack of resources and other technical impediments that create disadvantageous conditions sometimes perhaps comparable to those experiences in poorer nations where, as Harris et al. (1995) indicated, the value of local knowledge for GIS applications is underestimated and based on imported patterns of development. The lack and emergence of new opportunities for users to participate in the production and use of information for geospatial applications in planning has been a central tenet of the growing body of literature on Public Participatory GIS (PPGIS) which is the subject of the next section.

1.4.1 Public Participatory Geographic Information Systems (PPGIS)

Many of the arguments regarding the production, validation, and incorporation of local knowledge into GIS, which are raised in the Public Participatory GIS (PPGIS) body of literature, fall within the broad scope of Participatory Action Research (PAR). In fact, is has been argued that one of the main objectives of PAR is to “return to people the legitimacy of the knowledge they are capable of producing through their own verification system…and the right to use this knowledge…as a guide in their own action.” (Rahman

1991:15). Therefore, local knowledge is a cornerstone of PAR, which in turn contributes to the production of the large amounts of information needed to complete the different phases of the planning and GIS processes. Beinum (1998) indicated that the importance of such knowledge is reflected in the action it generates because a research problem, when approached in a participatory manner, can produce unique information about the context and histories of local places.

Despite its importance, local knowledge produced through PAR is still vaguely characterized as invalid by many policymakers who believe that local data fail to represent local conditions, and therefore favor quantitative methods instead (Barahona and Levy 2002). Rahman (1991:15) offers an alternative explanation and believes that local knowledge can be validated as scientific because true knowledge depends on social consensus, which is the widest, most valid form of verification available. Lee Shong (1995) points out that exclusion of local people's knowledge is the legacy of positivism, which promotes scientific methods as the only way of producing objective information.

Other scholars have also criticized the dual role PAR applications play in research and development. For example, David (2002:17) points out that educational institutions can assist with information extraction while simultaneously be instrumental in the '…alienated industrialization of knowledge production." Salas and Tillmann (1998:182) differentiated between instrumental and interactive knowledge where the former is held by the subject (scientific/researcher) and the object (participant/researched) only becomes an informational resource. David (2002:14) also warns about the importance of distinguishing between knowledge and social interest because the latter assumes an advocating role, which tends to "…structure [the] design process itself…"

However, other critics view local knowledge production as a synergetic relationship between the researched community and the scientific systems, which together channel the production of knowledge. For instance, Whyte (1989:376) explained the importance of integrating "…data and ideas from both the social system and the technical or technological system." Reardon (1998) concurs by noting the importance of knowledge sharing capabilities afforded through PAR.

Gaventa (1991) identified three key components in the production of local knowledge through PAR: 1) reappropriation; 2) development; and 3) participatory production. First, reappropriation occurs when individuals learn how to use information produced by institutions or master the art of finding corporate information. Second, knowledge development refers to the analysis and use of uncodified 'common wisdom' of local folklore which, as he points out, Fals-Borda calls 'popular science'. Third, participatory knowledge production involves the analysis of scientific knowledge by local individuals to determine the impacts a new technology may have on their communities.

Appropriation of technical knowledge and tools has also been part of the broader body of PPGIS literature. For example, the use of mapping to incorporate information produced by local individuals was coined by Peluso (1995:384) as 'counter-mapping', which requires the appropriation of "…state's *techniques* and *manner of representation* to bolster the legitimacy of 'customary' claims to resources" (emphasis by the author). In general, counter-mapping refers to the use of high-end mapping technology by local community groups to develop geospatial strategies with which to manage local resources.

Harris et al. (1995:196) also questioned claims about GIS as perpetuating "…the historical power relations associated with traditional developmentalism" and showed through PPGIS applications how to extract local knowledge using geotechonologies. Also known as geomatics (Poole 1995:16), geotechnologies include hardware and software, such as Geographic Information Systems (GIS), remote sensing (RS), and Global Positioning Systems (GPS) designed to interactively collect, maintain, analyze, and distribute spatially referenced information. Therefore, local data production is important not only for GIS applications but also for other geotechnologies, which can also have an ambiguous effect on the production of knowledge.

Furthermore, Elwood and Leitner (2003:154) emphasized that PPGIS provides opportunities for both, production of 'non-codified spatial knowledge' and reproduction of state-based 'codified spatial knowledge' to allow local knowledge to be integrated with top-down information to create alternative representations of places. They argue that GIS leverages funding opportunities for projects that promote government programs while at the same time producing new spatial knowledge to influence revitalization through participation. In addition, Leitner et al. (1998) pointed out that introduction of new technology can disrupt the internal and external conditions found within community organizations. Campbell and Masser (1992) also indicated that, in addition to issues of hardware, data collection, and database maintenance, there are also organizational aspects or 'orgware', which cause internal disruptions within organizations deploying new GIS applications. Moreover, Elwood and Ghose (2001) highlighted the importance of expanding the organizational context of PPGIS to include the network of local players and their resources to be able to integrate different forms of local participation.

Community participation is also essential to ensure the quality of information used in planning studies because "…expansion of [the] information base [is] only possible with the active participation of residents…" (Brown et al. 1995:57). Yapa (1991) stressed the importance of incorporating local participants into the production of geographic data because of the level of entropy needed to produce the large amounts of information required by GIS. Concurrent with PAR assertions, knowledge ownership is an important factor for the production and consumption of neighborhood geospatial information (Aitken and Michel; 1995:17).

Furthermore, since the success of GIS depends on the availability of large amounts of information (Gilbert 1995:197), the persistent lack of data sharing among players (Bellan and Bellan. 2001:325) prevents the effective use of this technology. This is particularly important for poor areas (Pinto and Onsrud 1995:45) where local resources are scarce and in need of better information and mapping standardization to become discoverable, which is the subject of the next section.

1.4.2 Geospatial Information and Mapping Policies (GIMPs)

Geospatial Information and Mapping Policies (GIMPs) refer to all the laws, mandates, rules and standards designed to ensure that public geospatial data are produced in a cohesive, distributed, and participatory manner for users to find and utilize information effectively. GIMPs contribute not only to the organized production of geospatial knowledge but also to information discovery, which is of paramount importance for individuals and organizations to be able to participate in local planning activities effectively.

GIMPs are based on common needs and shared protocols implemented by institutions that produced and/or use geospatial information at a variety of different scales. This study examines how current GIMPs shape metadata standards and their effects on the quantity and quality of discoverable information to conduct neighborhood planning activities. As Larson et. al. (2006) point out, developing standards for information sharing among players, such as the US Spatial Data Infrastructure (SDI), is important because geographic data can only exist in an open and shared environment.

New advancements in the geospatial sciences have resulted in the creation of new and more robust GIMPS designed to facilitate the creation, sharing, and discovery of information about places among different players. Many libraries and other public institutions have established robust standards and procedures to collect, produce, and disseminate information about their informational resources, many of which contain GeoDNA information. The new development of geolibraries is the subject of the next section.

1.4.3 Geospatial Digital Libraries –Geolibraries.

Historically, information discovery has been the central tenet shared by libraries around the world. Barr (2001:178) points out that the reason why users see "…the library as a storehouse of knowledge is in part predicated on assumptions of free access to publicly available knowledge´. Spanning thousands of years since the ancient Alexandria Library[5] in Egypt to the modern Alexandria Digital Library (ADL) at the University of

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[5] *Alexandria Library was the first public library originally created around 300 BCE and, although much of its contents were destroyed during many wars, it stands as a symbol of human knowledge.*

California Santa Barbara (UCSB), the common thread between these institutions is their mission to preserve and publicly disseminate information about human knowledge.

Following the landmark funding in 1994 by the US National Science Foundation to create the UCSB's ADL (Jankowski et al. 2001:7), increasing numbers of geolibraries have emerged worldwide. The term geolibraries, which refers to libraries that contain georeferenced collections and geospatial search tools to query them (Goodchild and Zhou 2003, Goodchild 2004), was originally coined in 1994 by researchers at UCSB's ADL. Since then, there has been a steady increased interest in geolibrary research leading to the development of new geolibraries throughout the world. Larson and Frontiera (2004) indicate that such expansion occurred in response to an increase in both interdisciplinary needs for more geospatial information and the digitization of text-based collections to make information discoverable based on their locations.

Wilson et al. (2004:205) describe a geolibrary as a "digital library that utilizes geography as one of the building blocks for organization and access." Larson et. al. (2006:summary) also point out that "the goal of geospatial catalogues is to support a wide range of users in discovering relevant geographic information from heterogeneous repositories." Janskowsky et al. (2001) refer to the 1999 National Research Council's definition which indicates that a library is geospatial and "…distributed if its users, services, metadata, and information assets can be integrated among distinct locations". Therefore, libraries embrace the new information discovery paradigm not only by implementing new GIMPs and standards to encode information, but also by developing interlinked networks for users to find collection materials across different knowledge domains and scales that range from global extents to the local urban neighborhood.

Using distributed geospatial networks theory by Bernard et al. (2005), Larson et al. (2006) analyze how five[6] of the 25 most popular geoportals comply with the Open Geospatial Consortium (OGC) standards. By evaluating their search tools, public access, metadata, and retrieval time, they concluded that in general these catalogues had weak metadata quality and lacked tools and frontend interfaces for users to conduct complex queries. Therefore, despite robust GIMPs and new advancements, links between tabular, textual, and geospatial information still need to be improved for geolibrary users to be able to discover information, particularly at the local neighborhood level which suffers from a lack of metadata standards to model its diverse and multiple geographies.

1.4.4 Metadata Production

Commonly defined as data about data, metadata is one of the most widely adopted standards used by institutions, particularly libraries, to make information resources more discoverable. Goodchild (2009) points out that "knowledge of spatial data quality is communicated through metadata, which must therefore be the key to any improvement in communication." Duval et al. (2002) indicate that "metadata is a primary tool in this work, and an important link in the value chain of knowledge economies." As a result, metadata standards are being implemented by many agencies including federal, state, and local offices (Federal Geospatial Data Committee) as well as international organizations (Nogueras-ISO 2004) which are seeking to share information and local knowledge geospatially. Smith (2001) characterizes the interoperability between different metadata

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[6] *The geoportals evaluated were:*

- *INSPIRE. Infrastructure for Spatial Information in Europe.*
- *IDEC Catalog Infrastructure de Datos Espaciales de Catalunya.*
- *Gigateway. Free web access for spatial information in the UK.*
- *GSDI Gateway. Global Spatial Data Infrastructure*
- *Geodata.gov. US One-Stop interagency geoportal initiative.*

standards as “crosswalks [which] work like bridges between the standards, but are independent tools and their nature rigid”.

Metadata is an essential element needed to embed geospatial knowledge into information to make it more discoverable. Larson and Frontiera (2004) indicate that geolibraries use metadata as “…surrogate representations of geographic resources that encode the structure and content of digital geographic data to support identification, discovery, evaluation and understanding.” They also point out that “geospatial metadata specifically addresses the encoding of coordinates of coordinate representations of geographic objects.” Smith (2001) indicates that “the extent to which [this definition] is relevant for describing traditional analogue material depends on local practice” and that “as the amount of geospatial data grows at exponential rates” the cost of producing metadata also increases thus, it is particularly useful to add value to local resources.

1.4.5 Neighborhood Information

Such contentious and yet highly coveted geographic constructs are used by many actors to produce and to exchange information indispensable to sustain much larger and more complex urban environments. Most recently, neighborhood geographies have become important for research, scholarship, and science across multiple disciplines including community development, urban and environmental planning, and geography.

Given the increasing demands for local data from many users, neighborhood information is being produced by many top-down agencies and bottom-up organizations aided by a shared set of GIMPs that allow for the sharing of local information, and thus globalization of neighborhood knowledge, at unprecedented rates and almost instantaneously. This rapid increase in local geospatial information demand and supply has created new opportunities, as well as challenges, to further expand the study and understanding of urban GeoDNAs.

Being produced and used by many different players for a variety of purposes, urban neighborhoods have been important sources of planning information. A variety of different organizations at the federal, state, county, city, interagency, and CBO levels, have actively produced geospatial data at the neighborhood level throughout the years to study local environments and to formulate public policy. In addition, Fred et al. (2004) indicated that the participatory role of the federal government in supporting research and investigation has also had an impact on the growth of the field of geography. As a result, increasing amounts of local information are produced based on robust GIMPs that permit the rapid dissemination of neighborhood georeferenced information at various scales.

Therefore, many players including academic institutions, local administrators, politicians, private industry and local organizations are creating, using and disseminating information georeferenced with multiple geographic boundaries that most often do not conflate with each other. Goodchild (2004:32) indicates that "massive reductions by orders of magnitude in the costs of data collection systems have meant that virtually anyone can now be a collector and publisher of geographic data." Adhering to a shared system of GIMPs, many institutions are now engaged in value adding activities, not only in the US but also worldwide, that result in the dissemination of local knowledge about neighborhood geographies to large audiences.

Local academic, research and other public libraries play an important role within the ongoing process of production and dissemination information geospatially. Hill

(2006) points out that "geospatial objects are most often under the management and care of the staff of map libraries, geospatial data centers, and government agencies." These advancements have also resulted in increasing numbers of trained professionals specialized in georeferencing the wealth of resources, including geospatial data and other materials, found within large library collections to make them discoverable.

1.4.6 GeoDNA and Information Discovery

Issues related to GeoDNA theory have been addressed within several fields of study and for many reasons. For example, information specialists, such as librarians and others, have studied the overall value of georeferencing library resources and materials to local places to facilitate information discovery; geographers and others have long debated about the societal implications of neighborhood geographies; and increasing numbers of planners consider public participation essential for effective policymaking and overall urban sustainability. However, despite such interdisciplinary interests on urban neighborhoods, very little research has combined all three paradigms to draw insights about urban GeoDNA. This study combines principles from these three strands of literature to assemble a framework to test the impacts urban GeoDNAs have on local information discovery.

The benefits of using a participatory approach to find and generate local knowledge have been noted within several fields of study and by several scholars such as Whyte (1989) who gained insights from the early works of Eric Trist and Associates about socio-technical systems to explain the importance of integrating information and knowledge from social and technical systems. Similarly, Reardon (1998) concurs by noting the importance of knowledge sharing capabilities afforded by Participatory Action

Research (PAR) for planning activities. Most recently, Hill (2006:219) established a connection between different types of information and an area "…because the search can be based on coordinates in addition to text. Place-based research will benefit from collecting data from otherwise non-interacting subject specialties and un-translated languages because geospatial access can be used as a common research method."

The new geospatial information paradigm has resulted in increasing amounts of local neighborhood information being produced and widely disseminated across the globe by multiple players. As a result, geospatial applications projects are now being deployed to disseminate information that contains facts and figures produced by multiple participants who employ a variety of different boundary definitions thereby generating a variety of different GeoDNAS representations about the same area.

These varied geographic representations are being used to georeference generations of knowledge and information that can now be queried geospatially using a Minimum Bounding Box (MBB) representing the area that most closely encapsulates or outlines the geographic feature about which users seek information. MBB and other geospatially produced graphic shapes, such as rectangles and circles, have also been used somewhat effectively to link neighborhood knowledge (e.g. vernacular names) to more formal local information (e.g. Wilson et. al. (2004). However, despite such impressive technological and methodological advances, the production of local boundaries by multiple players continues to present challenges, particularly for the discovery of information to conduct community development and environmental planning in particular neighborhoods within the urban complex.

1.5 Research Questions

Neighborhood information is one of the most basic elements required to conduct local planning and a cornerstone of the public participatory processes designed to sustain much larger and complex urban environments. Notwithstanding such values, a void of relevant neighborhood information continues to plague scientific inquiry and the planning practice. Issues pertaining to such unmet informational *demands* are addressed across multiple strands of literature, particularly within the social sciences. Moreover, the supply side of information is addressed by research in the geosciences. Consequently, it is important to assess information *demand* and *supply* from a community perspective to understand issues pertaining to urban GeoDNA and their impacts information discovery.

1.5.1 Information Demand

Administered via semi-structured interviews with members of selected CBOs engaged in local planning, an open-ended questionnaire is used as a research instrument to examine current informational needs among participants. ***Phase I*** of the study assesses the *demand* for neighborhood level geospatial information to answer the following questions:

1. In the context of Geospatial information, what is a framework for the *demand* of information from the perspective of urban neighborhoods?
    a. What is the history of the spatial definition of neighborhood?
    b. How do “top-down” and “bottom-up” definitions of neighborhood vary?
    c. Who is interested in geospatial information about neighborhood geographies?
    d. What types of information are they interested in and for what purposes?
    e. How is geospatial information collected and used in decision-making for neighborhood planning?

1.5.2 Information Supply

Insights gained from the literature review served to develop an open-ended questionnaire to conduct semi-structured interviews with key members of selected libraries. ***Phase II*** of the study seeks to answer the following set of questions regarding local neighborhood level information *supply*:

2. In the context of digital geospatial information, what is a framework for the *supply* of this information from the perspective of urban neighborhoods?
   a. What is the current availability of geospatial information from libraries and clearinghouses?
   b. What is the current availability of other information resources (e.g. books, charrettes, EISs, etc.)
   c. How are their datasets and informational resources georeferenced? (MBB, Keywords, etc.)
   d. How and by whom are these datasets and other neighborhood information published?
   e. How do they meet users' needs?

1.5.3 Information Discovery

Phase III of the study focuses on data preparation, analysis, and the interpretation of the final results. Data collected during the previous two phases are coded and used to create information with which to analyze neighborhood information discovery to answer the following set of questions:

3. Given the answers to the first two sets of questions, what are some of the current limitations of neighborhood information *discovery*?

a. Is there a significant difference in the quality of geospatial query results between top-down and bottom-up definitions of neighborhoods?

b. Are there differences in information discovery between neighborhoods of various types when querying for information geospatially using top-down and/or bottom-up definitions?

c. If so, would these differences impact the use of geospatial information in decision making?

d. Are there new ways to analyze and quantify differences in quality of information results?

1.6 GeoDNA Analysis Overview

First, data collected during unstructured interviews with study participants are prepared and analyzed to understand the interrelationships between information *demand* and *supply* at the local neighborhood level. Insights gained through this assessment are used to collect data to develop a GeoDNA geodatabase model to house information collected from several sources to perform the *discovery* analysis. Next, a series of geospatial processes such as geocoding, georeferencing, and layer development and intersects, are conducted to produce information with which to populate the final GeoDNA geodatabase for the study.

Qualitative information collected from participants during the *demand* and *supply* phases of the study is used to identify a group of neighborhoods of interest to create a preliminary sample set of cases. Additional geographic criteria are used to identify certain neighborhoods which, despite having demand scores below the interest mean threshold, are found to be strategically located in underrepresented areas.

Second, after importing, projecting, and reprojecting GIS layers into the countywide geodatabase, a series of boundary overlay geoprocesses are performed to examine the geospatial correspondence between bottom-up and top-down boundary versions found for the selected neighborhoods. Minimum Boundary Boxes (MBB), Bounded Box Factors (BBF), and centroids are also created and examined to understand the relationships between the selected neighborhoods' geospatial characteristics by boundary version.

Calculations resulting from the steps above are then integrated to perform a final neighborhood information discovery analysis and combined with findings from a local socio-demographic and metadata information relevance analyses. Interpretation of the local GeoDNA characteristics is conducted using metadata content analysis to assess the associations between neighborhood types and the different levels of information discoverability observed. The final step involves combining top-down with bottom-up geographic datasets to create extended neighborhood boundary versions to test their potential aggregate usability to discover information at the local level.

1.6.1 High Level GeoDNA Information Model

Figure # *1.1 High Level GeoDNA Information Model* shows a schematic representation of the GeoDNA database structure developed for the study. Data collected for the neighborhood case samples are organized into two major GeoDNA information strands corresponding to the physical and human branches of geography.

Figure 1.1 High Level GeoDNA Information Model

Physical		***Human***	
Geospatial			
• ClimatologyMeteorology Atmosphere • Elevation • PlanningCadastre • ImageryBaseMaps EarthCover			
Ecological	**Economic**	**Social**	**Administration**
• *Biota*	• Farming	• Society	• Boundaries
• Geoscientific Information	• Economy	• Health	• Utilities Communications
• Environment	• Transportation		• Locations
• InlandWaters			• Intelligence Military
• Oceans			• Structure

These two main strands serve to organize at a high level the 19 keyword topic categories developed by the International Organization for Standardization (ISO) and implemented by the US Federal Geospatial Data Committee (FGDC) (see Appendix J). These 19 keyword topics are further comprised into four main categories using a model proposed by Frey and Zimmer (2001) and outlined by Greene and Pick (2006) to analyze urban places. This study modifies the latter by adding a geospatial component that overarches the four main categories from the model postulated by Frey and Zimmer.

Originally, a larger number of socioeconomic variables had been selected to populate the GeoDNA database during the initial research design stage of the study. These data were modeled into the analysis after previous data released from the US Census of Population and Housing had been identified for their contents on educational attainment and economic conditions. However, since economic and educational data are now released through the American Community Survey (ACS) and were not available during the analytical phase of the study, only ethnicity, race, and housing characteristics are analyzed for the selected neighborhoods. Therefore, the study incorporates basic socio-demographic variables along with geospatial and other planning information related to the selected set of neighborhood case samples selected within the case study area.

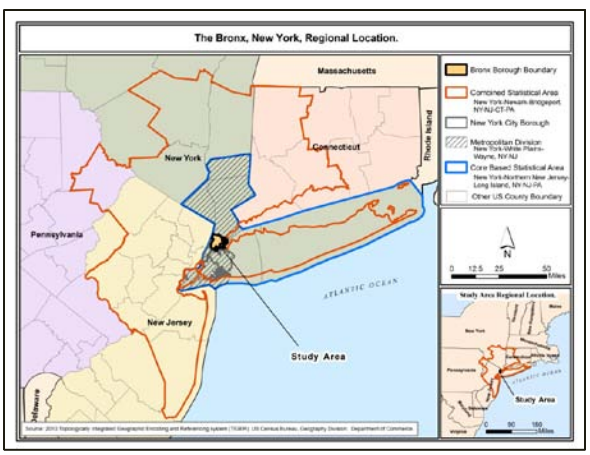
1.7 Selected Case Study

The Borough of The Bronx, NY, is the selected case study. Covering 42 miles^2 of land and 14 miles^2 of water, it occupies a total of 56 miles^2 in the northernmost section of New York City (see *Figure 1.2*).

1.7.1 Bronx Regional Geographies

Located south of Westchester County, this county is the only New York City borough physically located in the U.S. mainland; two other boroughs occupy separate islands –Manhattan (New York County) and Staten Island (Richmond County), and two others are part of Long Island –Brooklyn (Kings County) and Queens (Queens County). *Figure 1.2 Case Study Regional Location* shows the regional location of the case study. It is located in the US Census Northeast Region and in the Middle Atlantic Division of the New York-New Jersey-Pennsylvania Metropolitan Area, which is part of the New York-Newark-Bridgeport-NY-NJ-CT-PA Combined Statistical Area and the New York-Northern New Jersey Long Island, NY-NJ-PA Core Based Statistical Area.

Figure 1.2 Case Study Regional Location



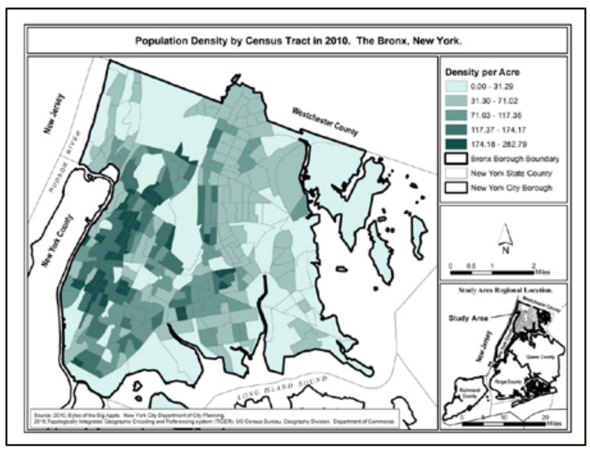
According to the Bronx Historical Society, in 1639 Jonas Bronck, a Swedish immigrant, became the first European settler in the area and in 1654 the Village of Westchester was established in the northeastern section of the borough followed by the

Town of Eastchester in 1663. The Bronx was officially designated a county in 1898 and it became one of the five New York City boroughs in 1914 also the last county in New York State (Bronx Historical Society).

1.7.2 Existing Socio-Demographic Conditions

In 2010, the Bronx had a total population of 1,351,186, which represented 16.5% of the total New York City population of 8,175,133[7].   *Figure 1.3 Population Density by Census Tract in 2010* shows the distribution of population per acre by census tract. As it illustrates, the population is more heavily concentrated in the southwestern most section of the borough, closer to Manhattan (New York County).

Figure 1.3 Population Density by Census Track in 2010.



1.7.2.1 Distribution of Non-Hispanic White Population

The distribution of the Non-Hispanic White population is shown on *Figure 1.4 Percent Non-Hispanic White Population by Census Tract in 2010*. In general, the northern section of the borough contains higher concentrations of White individuals when compared with the bottom southern portion where most tracts have less than 6 % of this population segment.

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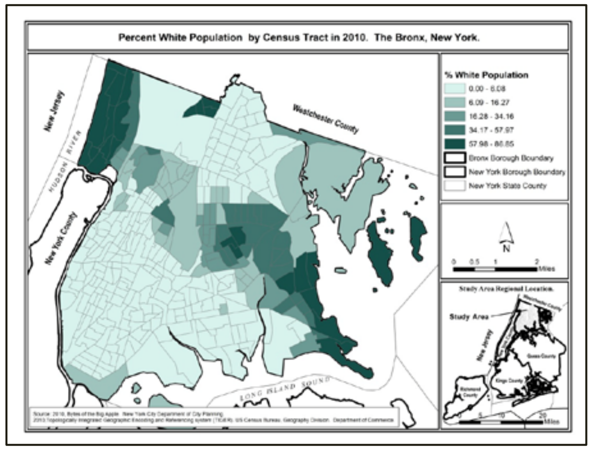
[7] Selected socioeconomic and demographic variables for the 2010 US Census of Population and Housing were obtained from the New York City Department of City Planning. Bytes of the Big Apple on 20110815.

Figure 1.4 Percent Non-Hispanic White Population by Census Tract in 2010

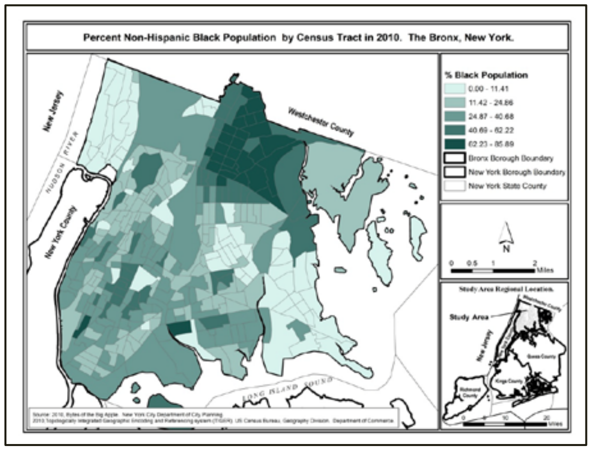


The largest concentrations of White individuals are found across the northern section of the borough in the neighborhoods of Riverdale, Throgs Neck, and City Island. A smaller area of heavy concentration is also found in the northernmost section overlapping the neighborhood of Woodlawn. A mixture of open parkland areas and a band of mid-to-high concentration of tracts with ranges between 6.09% to almost 56% of White individuals link these neighborhoods.

1.7.2.2 Distribution of Non-Hispanic Black Population

The Non-Hispanic Black or African-American population is more dispersed throughout the borough than the Non-Hispanic White population. While several tracts of high percent concentration are found around the southernmost section, a large cluster of over 20 tracts of high concentrations is found in the central northernmost section of the borough. This cluster is also surrounded by many census tracts with mid to high levels of concentration of Non-Hispanic African American individuals. *Figure 1.5 Percent Non-Hispanic Black Population by Census Tract in 2010* shows the percent distribution of non-Hispanic African American individuals by census tracts throughout the county.

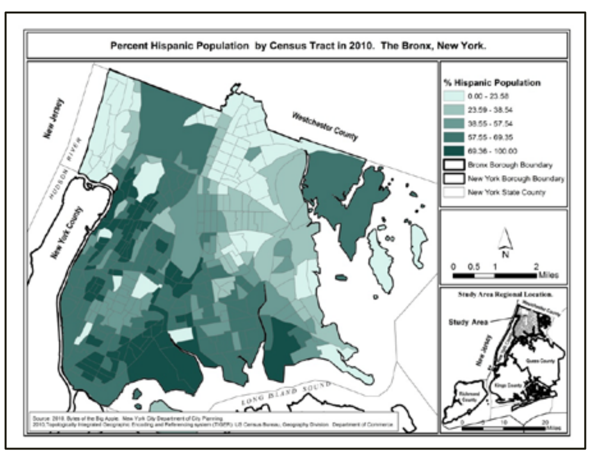
Figure 1.5 Percent Non-Hispanic Black Population by Census Tract in 2010



1.7.2.3 Distribution of Hispanic Population

The Hispanic population is largely dispersed throughout the study area. Except for a few pockets of census tracts with low density in the northern section of the borough, the majority of the neighborhoods have high numbers of tracts with larger concentrations of Hispanic individuals. Particularly, higher concentrations of neighborhoods with densely populated Hispanic tracts are found in the southern section of the borough. *Figure 1.6 Percent Hispanic Population by Census Tract in 2010* shows the percent distribution of Hispanic individuals by census tract within the study area.

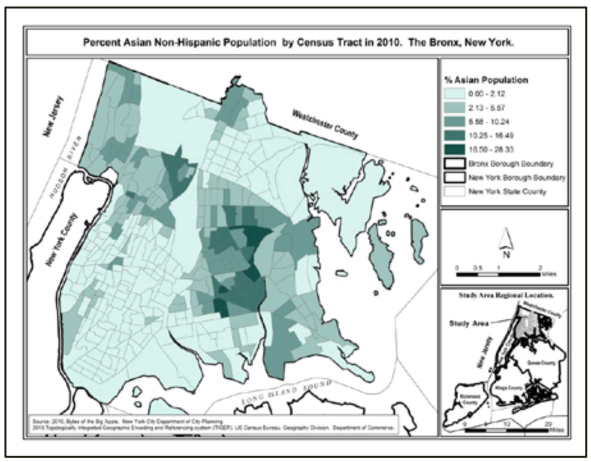
Figure 1.6 Percent Hispanic Population by Census Tract in 2010



1.7.2.4 Distribution of Non-Hispanic Asian Population

In general, low concentrations of Asian individuals are found in some neighborhoods. *Figure 1.7 Percent Non-Hispanic Asian Population by Census Tract in 2010* shows the percent distribution of Asian individuals by census tract within the study area. The largest concentrations are found in the northern middle section of the borough, where high concentrations of Non-Hispanic White individuals also reside.

Figure 1.7 Percent Non-Hispanic Asian Population by Census Tract in 2010



1.7.2.5 Distribution of Non-Hispanic Hawaiian Native Pacific Islander and Non-Hispanic American Indian and Alaskan Native Population

Fewer percentages of Hawaiian Pacific Islander, American Indian and Alaskan Natives were found in the study area. These groups were dispersed throughout the borough without any particular patterns. *Figure 1.8 Percent Non-Hispanic Native Hawaiian and other Pacific Islander Population by Census Tract in 2010* shows the percent distribution of this population segment by census tract within the area.

Figure 1.8 Percent Non-Hispanic Native Hawaiian and other Pacific Islander Population by Census Tract in 2010

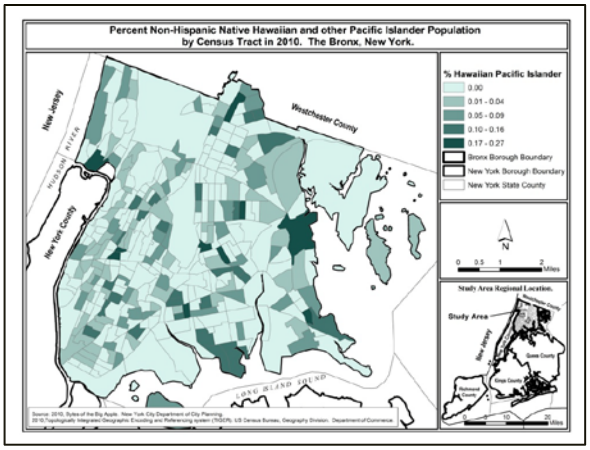
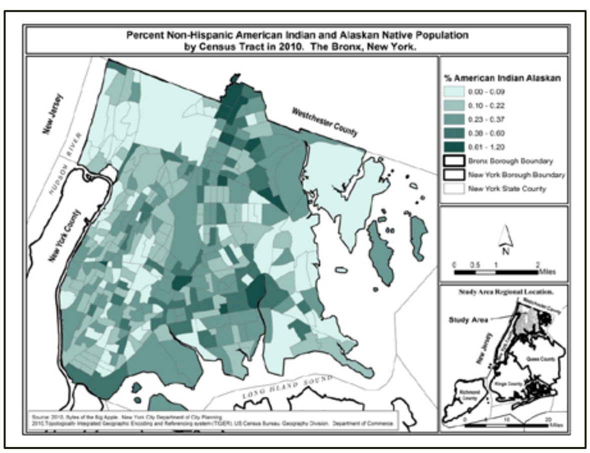


Figure 1.9 Percent Non-Hispanic American Indian and Alaskan Native Population by Census Tract in 2010 shows the percent distribution of this segment of the population by census tract within the study area.

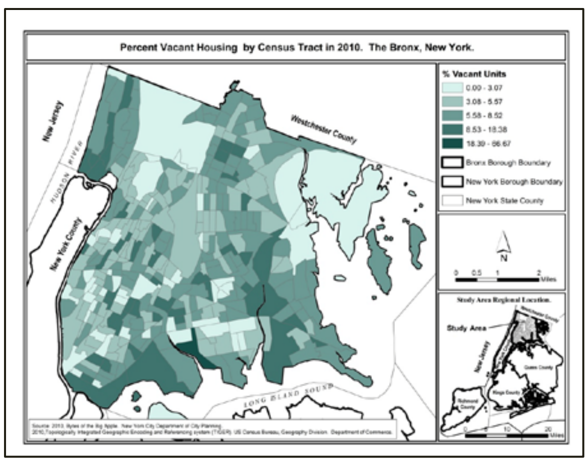
Figure 1.9 Percent Non-Hispanic American Indian and Alaska Native Population by Census Tract in 2010



1.7.3 Existing Housing Conditions

According to the US Census of Population and Housing[8], a total of 511,896 housing units existed in The Bronx in 2010. Almost 6% of these units (28,447) were vacant. *Figure 1.10 Percent Vacant Housing Units by Census Tracts* shows the distribution of vacant housing units in 2010 throughout the study area. In general, there were more vacant housing units in northern neighborhoods when compared to those in the southern section of the borough (the high percentage concentration in the southernmost tract is actually a visual effect because this tract is predominantly an industrial area).

Figure 1.10 Percent Vacant Housing Units by Census Tract in 2010



[8] Selected socioeconomic and demographic variables for the 2010 US Census of Population and Housing were obtained from the New York City Department of City Planning. Bytes of the Big Apple on 20110815.

1.8 Case Study Participation

The Bronx has been characterized as a place that engenders participation. A large number of Community Based Organizations (CBOs) are actively engaged in planning activities at multiple scales to sustain a variety of environments that range from the most desirable neighborhoods to some of the poorest Congressional Districts in the United States. These groups operate with each other and in tandem with local governmental agencies to address many of the problems faced by the communities that coexist within the study area. Many of these organizations are well known for their accomplishments not only within the borough but also at city, state and federal levels.

A total of eight CBOs were originally contacted to participate in this study (See copies of invitation letters in *Appendix B*). After numerous attempts that included phone calls, voice and emails sent to their managers, it became apparent that most of them were not willing to participate in the research. Of the eight CBOs originally contacted, two of the most important groups operating within the study area agreed to be case studies for the *Demand Phase* of the research.

The final two CBOs selected for the study are not only among the most important organizations operating in the borough, but also represent two important areas of research and practice relating to neighborhood planning. These areas are: 1) community development and 2) environmental planning. The two selected cases are:

1. The Phipps Community Development Corporation
2. The Bronx River Alliance

In addition, the study includes two large libraries whose operations are related to the study area. These libraries are also representative of the educational and the public sector libraries operating within the study area. The selected libraries are:

1. The Lehman Lief Library of Lehman College of the City University of New York
2. The New York City Hall Library of the New York City Department of Records

These four organizations form the *demand* and *supply* case samples selected for the study. Their questionnaire responses and compositions are described in *Chapter 4-Information Demand* and *Chapter 5-Information Supply*, respectively. Qualitative data collected from their responses also served to identify a set of seven neighborhood case samples selected to conduct the urban GeoDNA analysis for the study.

Figure 1.11 Selected Cases Combined GeoDNA Boundaries

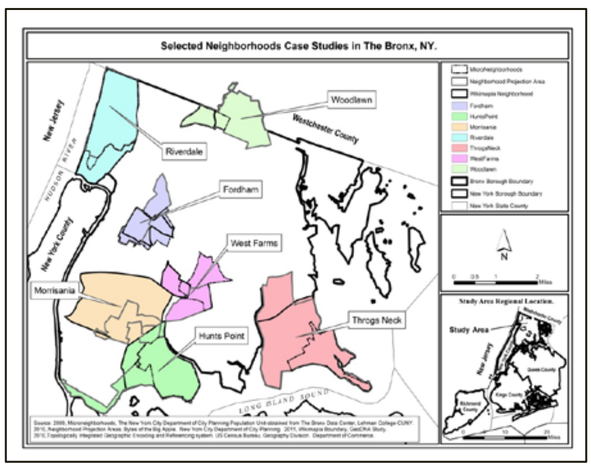


Figure 1.11 Selected Neighborhoods Combined Boundaries show the geographic extents defined by bottom-up and top-down sources for the case samples selected for the study. The socio-demographic as well as physical characteristics of their GeoDNA are discussed in detail in *Chapter 6-Information Discovery.* The selected case studies are:

1) Fordham
2) Hunts Point
3) Morrisania
4) Riverdale
5) Throgs Neck
6) West Farms
7) Woodlawn

1.9 Organization of the Study

The study is organized into seven consecutive and interrelated chapters. The first chapter contains this *Introduction* and a description of the organizational roadmap of the study. It also includes a preliminary theoretical overview, the research problem, the research questions, and an overall description of the neighborhood, CBOs, and library cases selected for the study.

The second chapter reviews literature pertinent to urban GeoDNA including urban neighborhood geographies, PPGIS, participatory planning, GIMPs, and digital geolibraries. Three strands of literature were assembled to review concepts and materials relevant to these areas of research: 1) *supply*, 2) *demand* and 3) *discovery* of information, respectively. Insights gained from the literature review served as the basis to develop two interrelated open-ended questionnaires, which are used as protocols to conduct semi-structured interviews with participants from the two (CBOs) and the two local libraries selected as case studies.

The third chapter contains a description of the research design methodology developed for the study. It presents an outline of the tasks and processes organized under three interrelated phases, which are arranged in a sequential order according to the mixed method approach used to create the *Urban GeoDNA Research Inquiry Model* presented in *Chapter 3*, *Figure 3.1*.

A qualitative assessment of the participants geospatial data needs was performed and their responses were used to select a group of representative neighborhoods of interests to conduct a series of analyses in *Part 2* of the study. The areas, shapes, centroid distances, Minimum Bounding Boxes (MBB), and Bounded Box Factors (BBF) of the selected neighborhoods are analyzed to examine the geospatial characteristics of each neighborhood case and the results are used throughout subsequent chapters.

Chapter four describes the organizational composition of the selected demand cases for the study. Two local groups were selected as case samples for the study (see section *1.8 Case Study Participation* above). The selected organizations are among the most important CBOs operating within the borough on community development and environmental planning issues, respectively.

Chapter five describes the two libraries that were selected as supply case samples for the study. These organizations are representative of the universe of institutions that supply information to users including local organizations involved in environmental planning and community development at the neighborhood level. The first library selected for the study is the New York City Hall Library which operates under the New York City Department of Records and Information Services (NYCDORIS). The second library is the Leonard Lief Library of Lehman College of the City University of New York-CUNY. It is a public educational library and also participates in the Federal Depository Library Program (FDLP).

The sixth chapter contains the information discovery analysis. It first describes the processes used to prepare the data collected during *Part 1* of the study and then expands on the steps used to conduct the GeoDNA Information Discovery Analysis. A LINK framework is developed to organize and link a series of four interrelated analyses as follows:

1. **L**ocal Socioeconomic Analysis
2. **I**nformation Relevance Analysis
3. **N**eighborhood Geospatial Analysis
4. **K**nowledge Interpretation Analysis

In this chapter, three different boundary versions for the selected neighborhood samples are used during these analyses to assess the ‘fitness’ of information found through geospatial queries quantitatively and qualitatively. Results from the analyses are evaluated in relation to the socio-demographic and housing characteristics of each neighborhood to examine the impact of urban GeoDNAs on local information discovery by neighborhood type.

Lastly, a combined neighborhood boundary information relevance analysis is performed to assess the potential of aggregating top-down and bottom-up boundary versions to increase the discoverability of local information at the neighborhood level. Results from the aggregated boundary analysis are examined and presented on a final table which is color coded to facilitate interpretation of the outcomes.

Chapter Seven contains the conclusions, limitation and recommendations for future urban GeoDNA research. A series of appendices and a list of bibliographic references are included at the end of the dissertation.

CHAPTER 2

Literature Review

This chapter reviews literature relevant to the emergence of Geospatial Digital Neighborhood Areas (GeoDNAs) and their impacts on the discovery of local information. Three interrelated literature strands are reviewed during three sequential and interrelated sections that are organized according to the three main research phases to examine the demand, supply and discovery of information, respectively.

First, information demand is studied from a community perspective to learn about the importance of neighborhood geographies for community planning and environmental sustainability. Different geographic definitions and the extents of urban neighborhoods are examined within a Public Participatory Geographic information Systems (PPGIS) framework to understand their functional role for community development and planning.

Secondly, the supply side of neighborhood information is reviewed by examining how Geospatial Information and Mapping Policies (GIMPs) are currently guiding the development and archival of geospatial information within digital libraries. Thirdly, the methods and practices used by online libraries are reviewed to understand how such rapidly expanding knowledge disseminating institutions encode, retrieve, and serve information geographically to support discovery.

2.1 Information Demand

This section provides a review of the literature relevant to information demand as experienced by local users to conduct community development and environmental planning at the neighborhood level. It reviews the development of urban neighborhood geographies, including their temporal, socioeconomic, functional, as well as geospatial aspects that together contribute to the creation of such highly coveted geographies.

2.1.2 Information Demand

Understanding urban GeoDNAs requires an examination of how data demands are experienced within the information production cycles local users engage in to participate in community development and environmental planning activities. Adriaanse et. al. (1989) studied how informational needs affect the formulation of environmental policy and concluded that “[t]he process of information supply starts with an analysis of the demand… [since]… integrated environmental policy puts increased demands on the associative power of environmental information systems.” (Adriaanse et. al. 1989: Abstract). Besides carefully planned assessments, information demand can also be reactionary. For example, the experiences of United States Environmental Protection Agency (USEPA) officials during the 9/11 attacks in 2001 demonstrated that impromptu data demands can result in a high, overwhelming and disparate supply of information (Joch 2003).

In addition, information demand is also associated with a variety of other external factors. Lundqvist et al. (2009) studied the relation between digital libraries and users’ perceptions of information supply and found out that information demand is highly dependent on the context of the information. Therefore, while having large amounts of information for larger areas overlapping a particular study case is important to conduct sound planning, narrowly defining local level data needs is paramount to guarantee an effective supply of more relevant and precise information. Consequently, understanding the dynamics of information demand at the local neighborhood level is a key component to achieve overall urban sustainability.

2.1.3 Neighborhood Geographies

In this study, neighborhood geographies are the most basic units of analysis used to examine the demand, supply, and discovery of local information. Hill (2006) points out that, besides the more structured administrative and geopolitical definitions, the organization of information also occurs through more abstract constructs including "… natural features… biogeographic regions… cultural features… and local neighborhoods…" (Hill 2006:218).

Local neighborhoods are the most basic "building blocks" (Gans 1991) used to sustain urban environments (Peterman 2000). However, while being "appropriate unit[s] of intervention" (Hunter 1983), urban neighborhoods lack conflation with other existing geographies which prompts for the study of these geographies to be able to represent local conditions appropriately (Hallman 1977).

Local neighborhoods are in general ill-defined due to their lack of 'official boundaries'. This unique characteristic has many pros and cons because while they are responsible for a wide range of functions –including public participation- that takes place locally, their obfuscated and rapidly changing boundaries arguably render powerless spaces.

Despite the unofficial and 'ill-defined' characterization attributed to these geographies, urban neighborhoods play an important role in community development and environmental planning since they link top-down governmental offices with local groups and individuals. However, although neighborhoods may be able to interact with local governments by acquiring 'official or quasi-official' status (Hallman 1977:52), many local organizations prefer to remain fuzzily defined by overlapping their extents with multiple geographies to avoid associations with bureaucratic governments or being controlled by politicians designating official boundaries (Rohe and Gates 1985:131).

Conceptually, neighborhoods are also important geographic entities; as Hirtle (2003) indicates "[n]eighborhoods are an important organizing construct…" which are "hierarchically structured…[despite having]… indeterminate or vague" boundaries (Hirtle 2003:195).

Lack of conceptualization is an important characteristic of neighborhood geographies because, despite being important units of analysis, they never become fully integrated into the planning process used to sustain the urban environment. Instead, urban neighborhood geographies are usually misrepresented and supplanted with larger communities; as Peterman (2000) pointed out, the lack of consensus about these two concepts is an "…inappropriate …model for doing meaningful neighborhood planning or community development." (Peterman 2000:10). Hallman (1984:33) concurs by pointing out that the use of either neighborhood or community is 'elusive' because their meanings vary according to context. Similarly, Figueira-McDonough (2001) believes that "the conceptual amorphousness that permits …adoption [of the term community] in a variety of contexts and with a variety of meanings is disastrous for social analysis" (Figueira-McDonough 2001:1).

Warren and Warren (1977) indicated that while the two terms are used interchangeably, they are in fact different in both scope and functionality because what "…distinguishes neighborhood and community are political jurisdictions or notions about natural boundaries. The neighborhood itself may contain a series of meaningful units." (Warren and Warren 1977:14). Based on Jacobs' seminal non-spatial neighborhoods, Peterman (2000) further elaborates on this concept and points out that while neighborhoods are mostly associated with geography, community reflects peoples' values and interests (Peterman 2000:22). Moreover, neighborhoods are also ambiguously defined because they represent both important urban areas as well dangerous places plagued with crime and poor quality of life (Warren and Warren 1977:7). Hunter (1983:5) called this lack of consensus on neighborhood definition a 'definitional problem'.

Furthermore, just as community research is impacted by a "predefinition of community" (Figueira-McDonough -2001 reference to Effrat's -1973), so is neighborhood research because "…neighborhoods are very readily defined authoritatively –they are what the agencies say they are." (Hunter 1983:12) Nonetheless, Hallman refers to sociologist Suzanne Keller's research findings on neighborhood planning which indicated that the term has multiple definitions but that usually means "…distinctive areas into which large spatial units may be subdivided…" (Keller 1968:87 quoted by Hallman 1984:15).

Given such variety of definitions, Peterman (2000) questions the applicability of classical neighborhood theories to today's complex urban landscape where neighborhood geographies play multiple roles simultaneously. According to Mark (2003), issues pertaining to neighborhood geographies and the new digital age fall within the geocomputational sciences because GISciences "…is concerned with ontology, representation, and computational issues, whereas geography attempts to explain and predict geographic phenomena." (Mark 2003:14). Consequently, it is appropriate to review the ontological development of the neighborhood concept to understand its role and impacts in defining information demand and supply within the new geospatial inquiry paradigm. The next section reviews the neighborhood development periods.

2.1.3.1 Neighborhood Development Periods

Urban neighborhoods are among the most important geographic constructs that have been used by individuals and local organizations to interact with their governments throughout history. Rohe and Gates (1985) group the development of neighborhood geographies into three broad periods:

a) Settlement Housing Development
b) Neighborhood Unit Period
c) Community Action Movement

<u>a) Settlement Housing Development</u>

The Settlement Housing period, which began in the late 1880's with a concept imported from UK by Steven Coit in response to Industrial Revolution problems, saw neighborhoods as unique and constantly changing areas in need of different planning approaches (Rohe and Gates 1985:20). In fact, the Commons Act of 1879 was one of the earliest governmental programs enacted in the UK to direct funds to develop recreational and other infrastructure within specific urban neighborhoods (The Codes Project, Arizona State University). During this period, academic institutions also began to place students with families in poor neighborhoods as a double approach to neighborhood development; poor individuals were exposed to upper class manners while at the same time affording opportunities for students to conduct research (Rohe and Gates 1985).

b) The Neighborhood Unit Period

The Neighborhood Unit period emphasized physical and fiscal contents of planning as philanthropic donations were sought to conduct neighborhood projects (Rohe and Gates 1985). During this period, the first Master Plan also appeared in the US. It incorporated neighborhood planning because it"…divided the city into neighborhood units; [and] groupings of such units [were] called a community or district…" (Gans 1991:127). In the UK, Howard Ebenezer introduced the neighborhood concept in Garden Cities. In the US, Stein and Wright used the neighborhood concept for designing planned communities in Sunnyside Gardens, in Queens, NY, and Radburn, NJ. By 1929, Clarence Perry, a well known planner, published his seminal book 'New York and its Environs' (Rohe and Gates 1985:4). It defined "neighborhood unit …as a fractional urban unit that would be self-sufficient yet related to the whole." (quoted by Peterman 2000:15 from Southworth and Ben-Joseph 1995).

c) The Community Action Movement

This Community Action Movement began after the great depression and WWII, and was characterized by government involvement in urban revitalization. Through eminent domain, cities acquired sites and cleared land for new development. The housing program started as a "slum clearance program and later became an approach for cities to compete against the growing suburbs" (Rohe and Gates 1985:34). Peterman (2000) points out that after WWII, revitalization programs altered the composition of urban areas through "the ghettoization of the poor and minorities into public housing, and the continued decline of central cities." (Peterman 2000:2). Focusing on the built environment and unit development, the US Housing Act of 1954 concentrated on housing rehab and neighborhood preservation (Rohe and Gates 1985:34).

According to Rohe and Gates (1985), participatory neighborhood planning started in the US during President Johnson's Economic Opportunity Act of 1964 through the Community Action Program (CAP) which placed emphasis on "maximum feasible participation of members of groups and areas served" (quoted by Rohe and Gates 1985:36). During the early 1960s, neighborhood residents had also started to question the consequences of having local organizations' personnel on public and private payrolls since such affiliation compromised the integrity of their organizations. (Hallman 1977).

During this period, complex neighborhood concepts had started to emerge. Innovative geospatial studies combined social area analysis and factorial ecology was employed to study the socioeconomic, racial and ethnic, and life-style cycle to create factors to define neighborhoods as distinctive units (Hunter 1983:6).

Originally conceived as Demonstration Cities (Gans 1991:127), the 1965 Model Cities targeted specific areas to make them a 'model' of redevelopment at a bigger scale (Von Hoffman 2003) of physical rehabilitation. Unfortunately, as Rohe and Gates (1985) point out, by seeking 'widespread' instead of 'maximum participation' this program took away power from local neighborhoods to spread it broadly (Rohe and Gates 1985:39).

Later, Nixon's Housing and Community Development Act of 1974 reversed the Federal role in neighborhood planning because it "…passed the responsibility along to organizations operating in urban neighborhoods where the problems existed." (Peterman 2000:2). Model Cities was later on replaced by the Community Development Block Grant program (CDBG), which required 'adequate citizen participation'. (Rohe and Gates 1985:6)

Next, in 1976 the National Neighborhood Policy Act presented a comprehensive legislature to address urban neighborhood problems (Warren and Warren 1977:7). Peterman found that the number of successful revitalization cases, which actually shift people and problems to other locations through gentrification, is relatively small when compared with the number neighborhoods in need of action, thereby challenging classical neighborhood development theories (Peterman 2000:4).

Figueira-McDonough (2001:2) frames community development periods into an "artificial chronology" that includes:

- Natural Community –used in late19th and early 20th centuries
- Personal Community –emerged in the 1920-30s
- Society Community –emerged after WWII and late 50s
- Limited Liability Community –since the last part of the 20th century

These concepts also mirror some of the traditional neighborhood definitions that are discussed in the next section.

2.1.3.2 Neighborhood Definitions

In general, neighborhood boundary definitions emerge from a combination of functions, characteristics, and features found within the complex urban environment. Hallman (1984:30) draws parallels between Ferdinand Toennies' early Gemeinschaft / Gesellschaft concepts and "communal and noncommunal" spaces and equates the former with neighborhood and the latter with the larger urban area. Figueira-McDonough (2001) also indicates that while Gemeinschaft is portrayed as a preferred, most natural order consistent with 'human nature', Gesellschaft is pictured as an undesirable environment containing a variety of individuals, mostly immigrants who interrelate "…in an impersonal, transitory, and artificial fashion." (Figueira-McDonough 2001:3). Accordingly, the idea that urban communities were counterproductive neighborhood units became institutionalized by governmental units. (Figueira-McDonough 2001:3)

Peterman (2000) indicated that planners' use of urban neighborhoods as important social units emerged from the early works at the Chicago School of Urban ecology, where plant ecology concepts were used as "individuals, families, groups and organizations formed into a 'natural organization based on their common location." (Peterman 2000:16). He explains that "…sociologists saw neighborhoods as being a mechanism for urban sustainability" such as "Burges [who] saw 'village type of neighborhood' as safeguard for youth" (ibid.).

Warren and Warren (1977:12) disagreed and indicated that therein lies a major definitional problem because neighborhoods are both human and physical. Peterman (2000) concurs and refers to both, Suttles' (1972) refusal of the ecological model which confined social interactions to physical boundaries, and Gan's (1991) disagreement of urban ecologists' narrow view on immigrant communities that missed the socioeconomic content of local neighborhoods (Peterman 2000:18). Rohe and Gates (1985:30) also criticized the early neighborhood concept, as being a romantic ideal that ignored urban dynamics because people socialize, work, and interact in multiple areas not in discreet isolated units.

Therefore, neighborhoods have been researched through history from the social, physical, and also beyond their spatial proximity because they emerge from the intricate interactions take place between social, environmental, and personal arenas. Given the importance of neighborhood territoriality, many of the issues explored in neighborhood studies fall within the classical debate on the spatial characteristics of neighborhoods. Peterman believes that "Jacobs is probably the best known planner to be critical of the place-based concept of neighborhood" because these units are not "cozy, inward-turned, self-sufficient" but rather expandable units that allow "mobile" people to select services from multiple areas which renders the city as a "fluid, allowing for the linking of people by interest, association, and purpose." (Peterman 2000:19).

Hunter (1983) indicates that in addition to common neighborhood definitions based on socioeconomic and housing characteristics, "there are …other dimensions by which neighborhood typologies may be developed than those relying upon compositional characteristics leading to descriptive typologies." (Hunter 1983:7). Hunter groups neighborhoods into two major type:

1. Residents' perceptions (reference to Lynch K. 1960. The Image of the City)
2. Functional characteristics

a) Neighborhood Functionality

The multi-spatial definitions of local neighborhoods are also associated with individuals' perceptions and needs. For example, Hunter indicates that functional districts often overlap, are not coterminous, and vary in scale according to the services they provide (Hunter 1983:12). Another important issue associated with administrative units and neighborhoods is the "specialization, compartmentalization of services." He points out that "a unique feature of neighborhoods is that it is a small-scale social unit where diverse problems and issues often coalesce … Therefore, agency specialization and proliferation of districts tend to crosscut the neighborhood as a single collective unit capable of dealing with a diverse set of interrelated issues." (Hunter 1983:12)

Warren and Warren (1977:25) outlined the main functions of neighborhoods as:

1. Sociability Arena –local residents socialize
2. Interpersonal influence Center –neighborhood may influence personal behavior
3. Mutual Aid –residents exchange goods and services
4. Organizational base –framework for social, political, and other groups
5. Reference Group –neighborhoods names are source of pride
6. Status Arena –provides vehicle to show personal achievement

Based on the above classification, they group neighborhood types into six major groups according to both function and content:

1. Integral –cosmopolitan, sharing mutual concerns with larger community
2. Parochial –strong ethnic identity, self-contained, excludes non-conforming
3. Diffuse –homogenous, some commonality lacks internal/larger community
4. Stepping Stone –active participation for personal not neighborhood interests
5. Transitory –high population change, separation between new and old residents
6. Anomic – non-neighborhood, no cohesion, unable to mobilize people or issues

Guest and Lee (1984) conducted a study of neighborhood geographies to look at how residents define their spaces and found out that local residents define their neighborhoods in term of function and area as 'relatively limited units' based on human interactions and their physical space. Hunter (1983) further comprises neighborhoods units according to primary functions:

1. Economic -production and consumption
2. Administrative and control function
3. Political function
4. Socialization and sociability function

Hallman (1984:15) uses early Suzanne Kellers' (1960) research and indicated that, despite much definition ambiguity, neighborhood geographies can be grouped into four major distinct types:

1. Geographic boundaries
2. Ethnic or cultural characteristics
3. Psychological unity of belonging among people
4. Land use concentrations

Hallman also indicates that "Keller noted that neighborhoods combining all four elements are very rare in modern cities, and that in particular geographical and personal boundaries don't always coincide" (Hallman 1984:16). Hallman also points out results from Ahlbrandt-Cunningham's study (1980) of neighborhoods in Pittsburg where "…nearly two-thirds (63 percent) felt more loyalty to their neighborhood than to the city with considerable variation of the use of different parts of the neighborhood facilities. Additionally, 72 percent of the respondents noted that their neighborhoods were a good or excellent place to live, but relatively few of them relied upon it exclusively for all of life's functions." Such findings coincide with Jacobs' main thesis that individuals use different neighborhoods for different reasons and to satisfy multiple needs.

b) Neighborhood Socioeconomics Characteristics

Peterman (2000) points out that while neighborhoods in ancient times seemed to have existed to identify 'larger urban agglomeration of places', recent planning views link them to the protection of life styles in more affluent residential areas and their high property values. Hunter (1983:3) points out that during the 1980s neighborhood planning in the US focus on areas as being neglected and the "...locus of social problems and the appropriate unit of intervention for their solution." (Hunter 1983:3)

Based on social interactions, Schwirian (1983) used Suttles' neighborhood characterization to create the following typologies:

- face-block –this is the immediate surrounding area where people share facilities and areas
- defendant neighborhood – this is the larger area which protects itself from other areas or individuals, depends on city officials for decision making
- Limited liability neighborhood –area develops from multiple administrative overlapping the city education, fire, etc.
- expanded community of limited liability

Peterman refers to Suttles' (1972) two main types of community of limited liability (proposed by Janowitz in 1952) and expanded Community of Limited Liability whereby he argued that just because individuals are not within immediate physical proximity does not imply they are not part of a community and that the image of a self-contained neighborhood is but a product of "some outsider; a government surveyor, a developer, a Realtor, founding father, booster, or newspaper man" (quoted by Peterman from Suttles 1972, p 52) (Peterman, 19). Hunter (1983) points out that neighborhoods have been depicted as consumption units and not productive ones because in general the traditional neighborhood model associates ‘home’ with house as an neighborhood object of consumption and ‘work’ with office, as a factory object of production.

c) Administrative / geopolitical

In the US the term ‘neighborhood’ has been associated with development. Historically, it has been used loosely throughout different administration periods to satisfy different program mandates and goals. For example, during the Grey Areas program little importance was given to local neighborhoods while more emphasis was placed on larger areas of cities to solve local problems. But, the Community Action Program saw the reemergence of the neighborhood concept as unit of development (Rohe and Gates 1985:41).

Hunter refers to Warren’s position on the number and role of social institutions to measure neighborhoods as being “…no more than spatial, statistical aggregation of individual characteristics.” (Hunter 1983:6). He indicates that “the political machines of US cities were built upon the primary ties and loyalties of ethnic ghettos that became established near the turn of the century.” And that “ a major tenet of the reform movement was a shift from the small districts to a large electoral districts, a shift that has tended to deny neighborhoods a formal position within the political process.” The void created by this move was filled by local community organizations which assumed the political function of local neighborhoods (Hunter 1983:13).

d) Neighborhood Size

A commonly used definition of neighborhood geographies is based on the size of both the physical extent as well as population size. Hallman pointed out that the sizes of neighborhoods need to be defined at the right balance because, while small definitions allow for "neighborly communication" and to be further aggregated, larger neighborhoods are more appropriate for service delivery (Hallman 1977:61). Rohe and Gates (1985) indicated that Howard Ebenezer's Garden Cities first introduced the neighborhood concept based on the size of a system of wards containing approximately 5,000 individuals that was served by a single school (Rohe and Gates 1985:24). Warren and Warren indicated that the school based measure corresponds to "the notion of elementary school district" also relate to individuals' walking distance (Warren and Warren 1977:11).

However, according to Rohe and Gates, Keller opposed the ideal 5,000 population threshold because such definition was too large for people to develop social networks (Rohe and Gates 1985:32). Hallman illustrated this issue with a practical example in Washington DC, where local ordinance established single-member councils with an approximate size of about 2,000 residents per neighborhood (Hallman 1977:57). In addition, anthropological studies use different variables based on the "number of first names a person can recall" which corresponds to a village-size definition containing between 2,500 to 5,000 persons. (Warren and Warren 1977:11)

Neighborhood size also varies according to their location and population density. For example, when compared to urban residents, Hallman (1977) indicated that suburban residents tend to locate their neighborhood in a variety of different directions due to the lack of existing local boundaries (Hallman 1977:54). Most recently, Coulton et al. (2001:380) referred to Haney and Knowles (1978) research which indicated that "…suburban residents tend to perceive larger and more clearly demarcated neighborhood boundaries than do city residents." Warren and Warren (1977) pointed out that several studies define neighborhood spatiality in terms of proximity to households that range from three to ten families. Techniques associated with population aggregation, particularly at the household level, have been used by the US Department of Commerce to satisfy federal mandates since the creation of the Census of Population and Housing.

e) Census Based Neighborhoods

Census tract geographies are the most commonly used boundaries by scientist, policymakers and others to study and define local neighborhoods. Besides providing readily available socioeconomic and demographic data, census tract information can be easily aggregated (Hallman 1977:53) while still maintaining residents' anonymity. Nonetheless, despite their wide spread use, delineating urban neighborhoods with census tract data has been criticized for a number of reasons including lack of conflation with individuals' perceptions and local neighborhood features, which seem to impact local service delivery. Nonetheless, as Coulton et al. (2001) point out that authors such as Brooks-Gunn, Duncan Klebanov and Sealand (1993); Crane (1991); Darling and Steinberg (1997); Duncan and Aber (1997); and Hogan and Kitagawa (1985), had all indicated that many proxy geographies including census tracts, zip codes, and administrative units, have been used in neighborhood studies despite their discrepancies with local neighborhood boundaries (Coulton et al. 2001).

However, despite the discrepancy found between neighborhood boundary perceptions and census tracts, many governmental offices often use them to conduct planning activities and to administer services. Cho and Choi (2005) studied public park access among a variety of different social neighborhoods and found that there was "…no significant change [in] the equity of accessibility … among neighborhoods of different social strata." (Cho and Choi 2005:296). Census Designated Places (CDPs), which are area determined by the US Census for unincorporated places, are also used to represent local neighborhoods. For example, many communities find them to be the closest units of analysis to study local neighborhoods such as the White Center & Boulevard Park located within Seattle & King County, in Seattle, WA (White Center & Boulevard Park Seattle, WA, no date).

Despite their fuzziness, census tract boundaries, which normally contain between 2,000 to 4,000 individuals within 5 to 10 contiguous city blocks, have been found to relate to local boundaries of both natural and political features (Coulton et al. 2001:373). Regardless of such discrepancies, many local associations find census tract data useful. For example, the Greater New Orleans Community Data Center (GNCDC) believe that the 1970 and 1980 City Planning Department's neighborhood boundaries are the most appropriate data for local planning because they not only coincide with census tract but also clearly demarcate neighborhoods without overlapping. In addition, they point out that City Planning uses such boundaries to give their proposals more validity. Hallman (1977) agreed that there are many advantages associated with the conflation of bottom-up with top-down official data. As a result, in the 1980 census many neighborhood residents sought to get census tracts aligned with neighborhood boundaries (Hallman 1977:54).

By comparing residents' drawn maps with census geographies, Coulton et al. (2001) found that "…at least two census tracts and at least three block groups" were within each neighborhood map drawn by residents and, furthermore, a closer relationship was found between the population sizes of resident drawn maps to the population of block groups than that of the census tracts (Coulton et al. 2001:378). Likewise, Clapp and Wang (2005) found out that a hedonic market analysis model, which was based on real estate sales in Connecticut, created neighborhood areas of about two census tracts each, but that residual variation can be reduced by tracing neighborhood boundaries behind the houses along the lot's rear boundary line (Clapp and Wang 2005:abstract).

2.1.3.3 Neighborhood Boundaries Definition

Notwithstanding the validity of non-spatial neighborhoods, some researchers believe boundaries are practical, identifiable entities and in many cases "…can acquire life of their own" (Galton 2003:151). In fact, despite such widespread negative characterization, boundaries are of paramount importance because "…neighborhood contains the idea of territory, [therefore] there needs to be a definition of boundaries …" (Hallman 1977:52). Similar research points out that the character of urban spaces is continuous and that "administrative boundaries discretize the continuous physical and social components of urban space…" (Campari 1996:59)

Figueira-McDonough (2001) indicated that during early community creation "…in order to preserve their balance, communities had to be all-inclusive, autonomous, and therefore protected by stable boundaries." (Figueira-McDonough 2001:3). Quoting Dorling and Fairbairn (1997), Galton indicates that boundaries are spatial tools because "…they suggest an uniformity within that shape which separates it from the outside, from what is alien or foreign." (Galton 2003:151). Rohe and Gates found out that while most organizations are initially interested in improving physical conditions, they may also employ a combination of techniques in a sequential manner such as starting with a socioeconomic and/or physical analysis; followed by citizens' inspections and adjustments; culminating with the final establishment of local neighborhood boundaries. (Rohe and Gates 1985:73)

Galton refers to Coucleis and Gottsegen (1997) observation that "a freeway is a way or a barrier depending on which way you look." Therefore, boundary functions are mostly "defined in terms of 'across' rather than 'along'." and that functionality depends on how "movement or communication [gets] across it." (Galton 2003:163) Galton groups these functions as:

- Inclusion: Regulates motion/communication outwards from interior to exterior
- Exclusion: Regulates motion/communication inwards from exterior to interior
- Separation: Combines inclusion with exclusion
- Contact: Extent to which separation is not complete

For Peterman, neighborhood planning ought to be not about building isolated communities but "…about building community …identifying the way in which people in neighborhoods link with communities beyond some limited and artificial boundary." (Peterman 2000:22). Gans (19910 calls the grouping of people into artificially created boundaries "the seventh danger of the underclass" (Gans 1991:337) which refers to the common assumption that census tract groupings based on concentration of poor people would render homogenous neighborhoods area.

In addition, ethnic neighborhoods tend to shift their boundaries more frequently as their population changes more rapidly (Hallman 1984:15). Consequently, boundary establishment is an important step in defining neighborhood geographies; as Galton points out, “boundaries can have a palpable effect on the behavior of objects and people in its vicinity.” (Galton 2003:151)

<u>a) Boundary Creation</u>

The creation of boundaries is an important aspect of neighborhood planning because it involves the processes of assessing features, geographic locations, drawing, designating, revising and institutionalization. Hallman (1977:52) points out that, depending on their boundaries, neighborhoods can be defined as:

- Precise: governments divide area into “…precisely defined neighborhoods”.
- Incremental: local councils propose neighborhoods boundaries incrementally.
- Overlapping: lack fixed boundaries allow for membership overlapping

Neighborhood boundaries have also been associated with social planning. For example, during the early settlement house period, neighborhoods were defined as a system of socio-spatial relationships based on the location of individuals of same social class, without establishing any physical boundaries (Rohe and Gates 1985:15). Hallman (1977:54) indicates that in some cases, political districts are used to shape neighborhood boundaries such as the case of DC “…where council members were in charge of setting neighborhood boundaries and wanted to keep an eye on the advisory neighborhood commissions.” Hallman indicates that in other cases such as in Atlanta, GA, council members, city administrators, and local groups bargaining resulted on an agreement to keep boundaries separated from political boundaries and crossing council districts to prevent politically-drawn boundaries and neighborhood superpower areas.

In general, many cities designate neighborhood boundaries for administrative and service delivery purposes. The City of Boston, Massachusetts, experienced a need for neighborhood boundaries when their lack impeded telephone and postal services companies to locate neighborhood areas to deliver services (Reidy 1992). In Atlanta,. Georgia, neighborhood geographies were used to create planning districts when190 neighborhoods were first identified and, since there were too many, 24 planning districts of 7 to 20 neighborhoods each were created. (Hallman 1977:58). In Miami-Dade County, Florida, unincorporated areas are also subject to neighborhood delineation by local constituencies who may or may not lobby to be incorporated as separate, or be annexed to adjacent, cities. Hallman (1977) also points out that in California, boards of supervisors are authorized to establish advisory councils in unincorporated areas following area wide resolution to that effect.

However, creating neighborhood boundaries through charter mandate or other local law has been widely criticized. For example, in Los Angeles, CA, the 1999 charter reforms that called for the creation of a neighborhood council system, “[i]nstead of establishing detailed criteria for the creation of the councils, the plan should include a clear process that permits negotiations to clarify neighborhood boundaries, reaches out to stakeholders, reconciles overlapping boundaries and promotes inclusion of economically disadvantaged neighborhoods.” (Cooper et al. 2000:9). An alternative approach is to allow residents to propose boundaries and then “acts as an arbiter for any boundary dispute between neighborhoods.” (Hallman 1977:59)

In Portland, Oregon, a clause was removed that used to prohibit overlapping boundaries from the neighborhood associations ordinance because of inter-neighborhood disputes (Hallman 1977:55). In some cases, private organizations undertake delineation of neighborhood boundaries such as the Independence Plan for Neighborhood Councils, Inc.; and there are even other cases where local educational institutions get involved in setting up neighborhood councils (Hallman 1977:60). However, the National Commission on Neighborhoods concluded in 1979 that "the only genuine accurate delineation of neighborhoods is done by the people who live there, work there, retire there, and take pride in themselves as well as their community." (National Commission on Neighborhoods quoted by Hallman 1984:17).

b) Boundary Delineation Criteria

Through applied research, Rohe and Gates (1985:72) identified the most common ways local residents define neighborhood boundaries. They include:

- Physical -75% of respondents use physical boundary to define neighborhoods
- Socioeconomic –includes statistical analysis of socioeconomic and demographic data as well as inspection of mapped data
- Individuals perceptions –includes citizens and local leaders
- Pre-existing political boundaries -26 % of responded indicated reliance on political boundaries

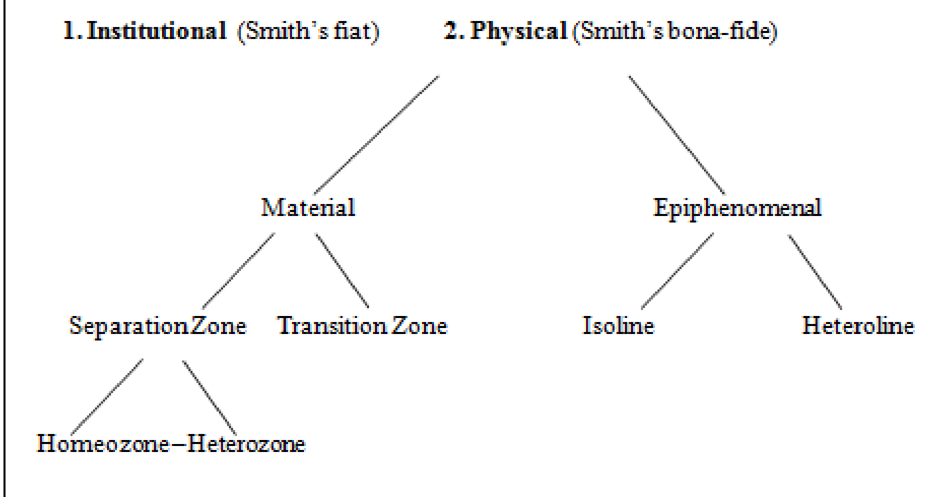
Hallman (1977) identified similar aspects related to the designation of local neighborhood boundaries including:

- natural boundaries
- existing school districts
- retail trade patterns
- non-governmental and neighborhood associations
- existing political boundaries
- historical significance
- socio-cultural and economic interrelationships

c) Boundary Classification

At a higher level, Galton (2003) draws from Smith's (1995) boundary classification proposes into two main broad types: 1) institutional and 2) Physical. While the former result from "…individual or collective human intentionality", the latter are made of matter because "there is some material substance or phenomenon which constitutes the boundary" (Galton 2003:152)

Figure 2.1 Galton's High Level Boundary Classification Schema



Source: Galton, Anthony. 2003.

Physical boundaries have been noted to be a tool to benefit some social groups more than others, particularly more affluent groups. For example, during early planning periods physical boundaries were used to delimit neighborhoods as proposed by Perry's neighborhood concept which relied on bounding arterial streets to facilitate 'bypassing, instead of penetration, by through traffic." (Rohe and Gates 1985:26) In some cases, social and natural features are used intermittently to create boundaries. Hallman (1977) points out that in Honolulu, Hawaii, both physical and social features are taken into consideration by statue to create local boundaries:

1. Neighborhood boundaries to be contiguous and compact
2. Boundaries should not favored any particular person or community
3. Neighborhood boundaries to coincide with Oahu's historic communities
4. Boundaries to coincide whenever possible with existing features (i.e. roads, street, steams, etc) and whenever practical with census tracts, or other precincts and/or admin boundaries

Galton (2003) points out that it is not uncommon for a "boundary of one type [to] evolve into or otherwise give rise to a boundary of another type." (Galton 2003:159). Some physical boundaries may become institutional even if it follows a real physical object because if it is established by human fiat then it is an institutional boundary (Galton 2003:157). "Institutional boundaries are generally conceptualized as lines in the Euclidian sense, i.e., as having length but no breath." (Galton 2003:158).

Boundaries can also ascend in administrative or geopolitical status such as the case mentioned previously where unincorporated neighborhood boundaries may become legal cities. For example, in Miami-Dade County, Census Designated Places (CDPs) are used to delineate neighborhoods boundaries by the Metropolitan Planning Organization (MPO). Several CDPs for unincorporated county land have become official cities, thereby attaching to this principle that some 'unofficial' boundary can become officially designated city's limit. I believe this transformation of boundaries is possible through a combination of forces ranging from socioeconomic, to environmental to political and even technological.

2.1.3.4 Neighborhood Development Forces

Neighborhood geographies are also defined as a result of the multiple interactions that take place between internal and external forces. A major external force affecting not only local neighborhoods but also their contextual definitions has been found within modern urban planning theory. As Rohe and Gates (1985:51) point out neighborhood planning addresses urban planning issues at large but it fails to solve local neighborhood problems, such as lack of local participation, while overemphasizing the physical environment.

Hunter believes that, based on "the dynamic aspect of cities –growth, expansion, decline, or rebirth and Burgess's developmental concentric model of –invasion succession- classical neighborhood transformation theory fails to address societal processes and instead proposes two important overarching neighborhood functional types delimited by internal and external forces: (Hunter 1983:7):

1. Neighborhoods based on social inequalities
2. Neighborhoods losing functionality to outside institutions at a higher level of organization.

Hunter (1983) concurs with Greer's (1962) early argument that the lost of local functionality is a major force shaping neighborhoods. Along similar vein, Peterman (2000) highlights different general characteristics that make up neighborhoods:

1. Neighborhood boundaries and their meanings are inexact
2. Neighborhoods change constantly and for various purposes
3. Individuals belong to many different communities
4. Communities are formed by both place and peoples' interests
5. Neighborhoods are dependent units, not isolated self-sufficient areas

Based on Warren's neighborhood typologies (integrate/parochial/stepping stone/transitory/and anomic), Schwirian (1983:88) also sees neighborhoods as being affected by both external and internal forces as:

1. External forces which links neighborhoods to outside systems
2. Internal forces which relate to their inner social organizations.

a) Internal forces

The internal social dynamics of neighborhoods have been considered since the early 60's to be among the most important factors that contribute to the definition of neighborhoods. As indicated above, the emergence of factorial ecology analysis and social area analysis contributed to the identification of socioeconomic characteristics as main neighborhood factors. In addition, differences between locals and experts' characterizations of local neighborhood conditions have been identified as an important factor across the sciences for determining local conditions. In fact, in neighborhood studies it is argued that the variety of perceptions that exist between local residents and researchers are "…possible source of bias in studies of neighborhood effects." (Coulton et al. 2001)

In addition, there are even differences between residents' perceptions of their own neighborhoods (Coulton et al. 2004) and those nearby (Coulton et al. 2001). Trodd and Geary (2006) concurred with Coulton et al. findings and add that such differences are framed by 'social construct theory', which views individuals' multiple choices resulting from multiple interactions with the physical and social world. These findings resemble the early works by Jacobs about the non-spatiality of neighborhoods.

Coulton et al. (2001) measured boundary perceptions using neighborhood boundaries drawn by local residents. Centroid points were created for common interests areas where neighborhood areas overlapped by 70%. Centroids were buffered and their coefficients of variation calculated to examine relationships between the map drawings. The study found a relationship between size and definition of neighborhoods since the larger the scale of the map (smaller area) the more disagreement there was between the different neighborhood boundary perceptions. (Coulton et al. 2001:376)

However, neighborhood perceptions are also conditioned by the ontological representations of what individuals have been told their neighborhoods are. Peterman (2000) refers to the approach by Nichols, an early land developer who based on communities in the UK "…created the first 'true' homeowners association" giving "self-policing powers… by transferring the enforcement of deed and other restrictions and the approval of building plans to the association." (Peterman 2000:14). Peterman (2000) refers to Worley's (1990) work which indicated that many of the homeowner associations' civic activities were in fact a way of enforcing community standards that "…almost always favor homeownership over renting and gentrification over the status quo." (Peterman 2000:15)

b) External forces

In addition to how internal forces impact neighborhood formation, researchers have looked at the impact a number of different types of external forces have shaped local neighborhood geographies. The character of these forces ranges widely to include social, physical, institutional, programmatic, and even natural forces, among many others. It is important to contemplate the role many of these forces have played to define neighborhood boundaries and other types of information locally. Hunter, for example, stresses the importance of widening the spatial extent of neighborhood analyses to include outside forces because to exclude the outside forces that impact the neighborhood is "…a persistent failure to grasp the causal explanations …that create the variety of neighborhood forms and constrain the conduct of neighborhood life." (Hunter 1983:4)

He believes that ignoring these other forces yields a "…description not explanation." (Hunter 1983:4) and refers to Ernest Burgess's (1973:42) assertion in *On Community Family and Delinquency* that to ignore the outside forces impacting the neighborhood and to keep the "…neighborhood or the community in isolation from the rest of the city is to disregard the biggest fact about the neighborhood..." (Hunter 1983:5). However, Hunter also points out that to consider neighborhood transformation as the main forces also result in the bias view that "macroforces that act upon neighborhoods, leaving the view that neighborhoods are dependent units lacking initiatory powers and unable to impact upon these largest forces." (Hunter 1983:9).

One of the major external physical forces that impacted the character of many urban neighborhoods is the highway construction that took place in many US cities (Holcomb and Beauregard 1981). For example, in New York City, many authors have widely acknowledged the devastating effects the construction of the Bruckner Boulevard had on the communities of the south Bronx.

Natural Forces

In addition to human derived or induced forces, natural forces can also have a significant impact on the formation and sustainability of local neighborhoods, particularly in areas prone to natural disasters, such as Florida, Louisiana and other areas located along the Gulf Coast, where local communities have been impacted by hurricanes and storms repeatedly throughout history. Nonetheless, Birch (2006) analyzed the post-Katrina neighborhood conditions in New Orleans, LA, and highlighted the resilience of many of these urban neighborhoods to recover from natural disasters.

Institutional forces

Institutions play an important role for defining local neighborhoods. In fact, they have many advantages over local community organizations. For example, Reardon (2005) points out the importance of Community University Partnerships (CUPs) and their involvement for sustaining local communities because local governments alone cannot solve the many problems faced by local communities. Institutions and/or partnerships such as CUPs, usually are better equipped with the technical expertise and resources to conduct planning projects that end up benefiting local communities.

Nonetheless, institutions may also face problems of their own when trying to interact with local communities. For example, (Cooper et al. 2002:83) point out that, despite the important role faith-based organizations play in neighborhood sustainability and social justice, their lack of focus on 'local community action' may prevent these organizations from actively participating in newly formed neighborhood councils.

Schwirian (1983) referring to Fischer who studied of neighborhoods based on Wirth (1938) urbanization-disorganization hypothesis, which states that as urban areas become larger and more complex, basic organizational units are disrupted, indicates that "In this light, secondary and formal organizations take over many of the functions of kin and neighbor." (Schwirian 1983:87).

2.1.4 Public Participatory GIS (PPGIS)

Due to the rapid growth and diffusion of Geographic Information Systems (GIS) during the early 1990s (Wiggins 1993), many scholars and other critics began to raise questions regarding the ethical and social underpinnings of this new technology (Pickles 1995, Curry 1995). This new area of critical inquiry that grew into Public Participatory Geographic Information Systems (PPGIS) emerged from participatory planning practices and apparently was first coined in the mid 90's during a meeting on improving access to GIS among disenfranchised communities –later followed by "GIS and Society", which was sponsored by the National Center for Geographic Information and Analysis (Obermeyer, online article @ncgia.ucsb.edu).

The expansion of GIS during this period also proliferated throughout many governmental offices prompting users and critics to stress the need for an assessment of the social implications of such rapidly proliferating technology (Innes and Simpson 1993). Pickles (1995) noted that many early GIS applications were being developed in an environment void of critical discourse. Aitken and Michel (1995) followed suit indicating that the rationalistic approach of GIS strengthened the positivist character of traditional planning activities. Sheppard (1998) concurred with the early criticisms adding that, in addition to the technical hardware and software issues that were being emphasized at the time, the importance of both social context and content of GIS were of paramount importance.

Barndt (1998) expanded the discussion when noting that the implications of PPGIS in socioeconomic and political arenas were representative of the lack of tools and mechanisms available for effective public participation (1998:105). Harris and Weiner

(1998) added to the overarching discussion by emphasizing that the dual character of GIS both empowers and marginalizes local communities. These discussions underlined the need for a new community based GIS to sustain local urban neighborhood environments.

2.1.4.1 Dual Role of GIS

The binary characterization of GIS permeates through the many aspects visited by its contentious literature and range from the most complex theoretical discussions to the most practical issues concerning its application. Theoretically, it has been argued that GIS plays a dual beneficial role because by expanding its social sciences context it can also "contribute significantly to the development of social theory" (Miller 1995:103). Other early GIS critics also advocated for the positive effects of GIS including Openshaw (1995:680) who believed that "…there is every prospect that a major revolution is underway, during which computer-based technologies will increasingly replace previous manual, analytical, and hand-crafted theory-based approaches." Similarly, Elwood and Ghose (2001) emphasized that not only are local organizations using GIS effectively but that they area also strengthening their internal analytical capacities while expanding external networks with multiple partners as they become equal GIS players.

Obermeyer (1995) sees these emerging trends as two diverting strands of inquiry; one that is more democratizing and less technocratic and the other more programmatic and less participatory. Likewise, Leitner et al. (1998) outlined two separate directions PPGIS was following: one was more theoretical relating to GIS access and democratizing issues and the other with praxis which focused on the development of new tools for local empowerment. Table II shows the six primary models of PPGIS users comprised by Leitner et al. (1998).

Table 2.1 Types of GIS Users

• Community-based (in-house) GIS
• University/Community Partnerships
• GIS facilities in universities and public libraries
• Map Rooms
• Internet map servers
• Neighborhood GIS center

2.1.4.3 Geospatial Neighborhood Information

Availability of local neighborhood information is shaped by a combination of factors affecting its production, dissemination and access. Information produced by local community groups is hardly ever disseminated widely because, as Elwood and Leitner (1998:87) explain, community based organizations face numerous challenges to create, legitimize and publish their local information.

Access to local information has also been difficult for local CBOs. For example, early GIS applications were plagued with a lack of information access (Sheppard 1995:13) which made it difficult for local communities to actively participate throughout the many different phases of the planning process. Leitner et al. (1998) also indicated some of the limitations community groups had for accessing information because of the need to have connections with producing governmental agencies and also strict freedom of information laws which allow for the imposition of high fees for accessing public information. Onsrud (2000) noted that an added benefit of being able to access public information is that it "…would greatly limit the ability of government and other powerful parties to marginalize other groups and individuals in society."

In addition, Whyte (1989) indicated that besides their applicability importance, data must also be perceived as credible by local users to guarantee success of the project.

PAR provides the tools and mechanisms for local participants to collect field data (Reardon 1998) and for creation of data based on historical interpretations that become ‘ideological projections’ of place (Fals-Borda 1991). In fact, one of the primary objectives of PAR is to involve participants in data collection and dissemination (Taylor et al 2002) about recent local history and to assign value to popular local knowledge thereby supporting empowerment of local individuals (Dickson and Green 2001). Elwood and Leitner (1998:87) had earlier on proposed the creation of “…a regulatory framework … to maintain neighborhood control over locally generated information.”

PAR, on the other hand, has been praised for its ability to produce important information with which to study both, data contents and their political implications (Dickson and Green 2001). Furthermore, Fals-Borda points out that the production of local data is depended upon the existence of what Helller (1989) calls ‘symmetric reciprocity’ because a “shared code of communication between internal elements and external agents of change…” is needed for action to take place (Fals-Borda 1991:10).

This ‘share code’ needs be established not only through top-down, normalized data elements but also using people’s local language (MS Swaminathan Research Foundation 2003). Most currently, critics have begun to highlight the contributions PPGIS makes for the production of data about local conditions through PAR. McIntyre (2003) demonstrated how through the use of pictures and textual stories it was possible to study how women experience local spaces. Kwan (2002) highlights how GIS methodology has been used to represent gendered spaces and refers to McLafferty’s (1995) interpretation of GIS usage to reveal “the broad contours of difference and similarity that vary not only with gender but also with race, ethnicity, class, place.”

Kwan (2002) concluded that, despite certain shortcomings associated with GIS, the technology can effectively be used to incorporate data at multiple, fine scale allowing alternative representations of space.

In addition to data, methodology is also an important aspect for developing both literature and practical applications that overarch PAR and PPGIS. For example, Wismer (1999:110) points out that small communities confront a number of limitations when applying methodologies developed for other much larger urban areas as well as other research agendas because there is a pervasive lack of small area data which prevents local trend analysis. However, other critics such as Hailey (2001:101) concluded that better local planning was conducted among South Asian local NGOs based on their mutual respect and understanding rather than using the 'formulaic' approach of participatory tools such as RRA.

Kothari (2001:152) emphasizes the adverse impacts participatory methodologies have on local knowledge because "…through the processes of normalization of social and cultural rules and codes, [they underestimate that] power circulates and can be expressed in a variety of ways." Consequently, while some practitioners and critics find participatory agency in GIS, others continue to question the applicability and effectiveness of participatory technologies and methodologies used in neighborhood planning.

2.1.4.4 Geospatial Data Conflation

Such an Increasing number of new research and publicly funded projects utilize geospatial applications as the primary tool to collect, manipulate, and disseminate information. However, while most projects rely on federally produced GIS data, many of them are also incorporating data from multiple levels, particularly neighborhood data, which overall lack conflation with data produced by more ‘expert’ participants. Campari (1996) indicated that many of the different boundary types that make up the urban environment –i.e. administrative; postal; services; religious; streets; blocks; etc.- are perceived as having definite boundaries despite their multiple geographical differences because “the contexts of observation are many, and all of them may lead to a different definition and identification of urban artifacts.”

As Larson and Frontiera (2004) point out, incorporating such large variety of data is important for users to be able to interact with natural and social environments. Hill (2006:19) cautions that the existing availability of a variety of multiple datasets from different sources may cause “…some confusion … because the information objects of different systems and communities is not at the same level of *granularity*” and calls for better standards to exchange geospatial information that “…deal with the representation of uncertainties so that the level of confidence in the footprints or the placement of their boundaries can be conveyed to the end users and incorporated in information retrieval and use practices.” Hill (2006:20). Therefore, there is growing concern for the development of better data, tools and methods for users to effectively employ Geographic Information Retrieval (GIR) to discover local neighborhood information.

2.1.5 Public Participatory Planning

In this section, the study reviews the roles and effects of Community Development Corporations (CDCs) , Community University Partnerships (CUPs), and Participatory Action Research (PAR) on the production of local geospatial information for community planning.

2.1.5.1 Community Development Corporations (CDCs)

Community organizations have played a pivotal role in local sustainability and neighborhood boundary identification. Community Development Corporations (CDCs) in particular have been instrumental in rebuilding many decaying neighborhoods throughout the nation. According to Von Hoffman (2003) the number of CDCs have expanded during the past fifteen years to approximately 8,400 making important contributions under the 1990 Low-Income Housing Preservation and Residential Homeownership Act (Von Hoffman 2003:16). However, as Newman (2004) points out, CDCs confront a series of impediments for revitalizing declining neighborhoods, particularly the lack of resources they experience presents challenges to local organizations despite their commitments and interests to maintain local urban neighborhoods.

2.1.5.2 Community University Partnerships (CUPs)

Reardon (2005) points out the importance of university involvement for sustaining local communities because problems faced by both urban and rural communities cannot be solved by governmental offices alone without the aid of Community/University Partnerships (CUPs). He refers to Schramm and Nye's (1999) nationwide research conducted among 59 community/university partnerships to highlight the increasing involvement of higher education institutions in sustaining local neighborhoods. The major categories are:

- "Paternalistic/Theory-Testing Partnership – occurs when community becomes a laboratory for testing ideas and theories

- Professional-Expertise Partnership – top down approach whereby locally identified problems are confronted without the input from local communities

- Empowerment/Capacity Building Partnerships. This approach includes local communities as "equal partners in each step of the revitalization process from problem identification to project implementation to program evaluation."

Reardon (2205) concludes that higher education institutions do make "…significant contributions…to the economic recovery of many communities" by defining successful partnerships "…that can respond to the unique history and nature of the community and the collaborating organizations, as well as the specific economic challenges and the political landscape of the region…" (Reardon 2005:10)

Public participation is an important component of local information discovery and is indispensable to achieve urban environmental sustainability. Despite certain perceptions of being 'disruptive' (Kotler 1969:28), local public participation was identified as a primary agent during the early empowerment works of Saul Alinsky. Rohe and Gates (1985) indicated that the community action approach to neighborhood planning emerged during the early 1960's in response to Federal agencies' lack of inclusion of local citizen participation in housing programs for displaced individuals.

According to Hallman (1997) citizen participation in neighborhood planning occurs through either official appointment by governmental units, such as in New York City where Borough Presidents appoint local members to planning committees, or by delegating responsibility to specific groups such as in Minneapolis where City Council appointed the League of Women Voters (Hallman 1977:57). In addition, some cities also rely on an electoral process to appoint local neighborhood representatives.

Peterman (2000) points out that Metzger (1996) referred to equity planning whereby advocacy planning is practiced by governmental agencies to create general "social equity and redistribution", and ultimately neighborhood empowerment (Peterman 2000:29-30). Hunter (1983) had also warned earlier on that the "…creation of a neighborhood clientele provides agencies with local support and legitimacy, at the same time providing potential cooptation of local neighborhood leaders." (Hunter 1983:12) Local neighborhood participation is therefore an important component to sustain the urban environment because it facilitates the generation of unique information indispensable to develop knowledge with which to sustain the environment.

2.1.5.3 Participatory Action Research (PAR)

Participatory Action Research (PAR) is a powerful methodology designed to benefit a wide range of actors involved in both theoretical inquiry and practical research applications to produce local knowledge as well as tangible community benefits. It aims to find local solutions and to create improvements to local communities (Whyte 1989:367); to utilize the communities' own practical processes (Whyte 1995:290); to empower participants (McNicoll 1999); and to transform the local environment (Rahman 1991:13) while generating valuable local knowledge (Gaventa 1991; Dickson and Green 2001). PAR not only enables marginalized communities to acquire, develop, and use their own knowledge (Fals-Borda 1991:4) through a 'role-reversal' approach (Diesen 1998:37) but also has been found "…to reach out to the elites and dominant groups with an electrifying effect (Rahman and Fals-Borda 1991:24).

However, similarly to Hunter's cooptation argument above, the appropriation of bottom-up PAR methodologies by powerful top-down large bureaucratic institutions (Gaventa and Cornwall 2001:70) has been connoted as a new 'tyrannical' way of power usurpation (Cooke and Kothari 2001:4). Ironically, many scholars concur that PAR was developed from in situ research processes that took place within developing areas (Gaventa 1991).

The philosophical basis of PAR have been attributed to the works of existential philosophers Jose Ortega and Gasset, who referred to common daily experiences as valuable learning processes (Falsborda 1991:4); the theories of Gramsci and Freire (Reason and Bradbury 2001:3; Falsborda 1991) and as far as Mao Tsetungs's principle of 'from the masses to the masses' which referred to the capacity of ordinary people 'to produce and to recover data' (Fals-Borda 1991). Reardon (1998) highlighted three milestones within PAR history: 1) development of self-help networks in Tanzania against top-down US funded Green Revolution programs; 2) the work of Eric Trist and Elinor Thursrud of the Norwegian Industrial Democracy; and 3) the organizing of US low-income communities by empowerment philosophy of Saul Alinsky.

On the practical side, PAR is closely related to Participatory Rural Appraisal (PRA), a family of participatory methods associated with the work of Robert Chambers, IDS in England (Francis 2001:75). PRA is also believed to be a product of Rapid Rural Appraisal RRA which, although does not necessarily focus on participants empowerment as PAR does (Salas and Tillmann 1998), also started in response to the need to collect and analyze local data in rural developing areas (World Bank). In fact, PRA and PAR are used interchangeably in development and planning; the main difference being that PRA values people's way of knowing whereas PAR focuses on "…recovering people's autonomy." (Salas and Tillmann 1998:185).

Although PAR is believed to have originated around the 1970's when empirical research became questionable (Coenen 1998:18), many scholars situate its origins back in the 1940s with the early works of the Tavistock Group of the British Army and in the US with Lewin's innovative ideas (Reason and Bradbury 2001, Beinum 1998). Given its long trajectory and interdisciplinary roots, PAR has been increasingly used by individuals and organizations worldwide (Rahman 1991:15). In fact, while its emergence is mostly associated with development work, PAR is an interdisciplinary research tool used "…by other people in other fields under different labels." (Whyte 1989:375). Unfortunately, while participatory methods allude to the wide inclusion of local participants, overuse of the word "participation has lessened its impact." (Bery 1999:231).

PAR's multi-actor approach allows for different players such as governmental officials, researchers and development practitioners (Barahona 2002), to exchange roles at different stages of the research and to produce different results. As Whyte (1995) explains, there can be 1) action research –which is performed without participation; 2) participatory research –which lacks action; and 3) PAR –which involves participants at every step throughout the research. Nonetheless, despite versatility, PAR's effectiveness continues to be questioned because of its allegedly unproven linkages to marginalized local communities (Cleaver 2001).

In spite of the limited productivity and availability of local data witnessed during its early development stages, GIS had been characterized by an accelerated growth during the 1990s (Aitken and Michel 1995:17). The rapid and unchecked expansion of GIS led some authors such as Onsrud (1998) to compare the geoinformation dynamics of the turn of the century with some sort of Maltussian Tragedy of the Commons. Obermeyer had also cautioned about "…a growing danger of a hidden GIS technocracy…" (Obermeyer 1995:78) crawling throughout the sciences.

2.1.5.4 Geospatial Information and Environmental Planning

Due to such rapid expansion and advancements in the geosciences, geospatial neighborhood level information has become a widely coveted element not only across the sciences but also by government offices, local neighborhood organizations, as well as the private sector. Janskowsky et al. (2001) pointed out that increasing numbers of governmental offices and private companies use online digital maps thereby allowing for interoperability between systems. Nogueras-Iso et al. most recently (2004) also indicates "…that around 80% of the databases used by the public administration contain some kind of geographic reference". Likewise, Hill (2006) points out that "we live in a time where place-based information is becoming even more important … whether it involves our local area or the world at large" and quotes Clark's (2001) point about a growing expansion of information production "… beyond the scientific community to the general public to support positions on a community planning process…".

However, Goodchild (2007:24) points out that, despite the importance of such indispensable data there is still a lack of "…concern for the basic supply of geographic information, and trends affecting the processes by which it is acquired and compiled" and foresees expanding possibilities for public participation. Barr (2001) also identified public participation as important for information production because "spatial data should be treated as scientific publications that add to the common wealth of human knowledge…" (Barr 2001:184). Undoubtedly, public participation plays an important role in geospatial information production because as pointed out by Sanderson and Larson (2006) "the cultural heritage of the world … [is] rapidly being replicated in digital form".

Hill (2006:215) foresees improvements for "…the archiving of digital geospatial information for future use…" and refers to Clarke's (2001) original concerns that just as historical maps are accessible in traditional libraries "current digital maps and datasets be preserved and remain accessible for future generations…" Furthermore, the US Federal Geospatial Data Committee (FGDC) highlights the importance of geospatial information because "the abilities to search data and to determine their relevance are critical in a knowledge-driven economy."

2.1.5.5 Local Information production

As pointed out above, there is a pressing need to evaluate and include data and tools to document information sources to meet the needs of multiple users. To meet this need, researchers are using a variety of approaches which are currently being employed by many institutions to produce local neighborhood information.

Prompted with the need to produce baseline neighborhood geographic information, scientists have conducted a variety of research investigations to develop new methodology; to test different data; and to establish effective parameters with which to document local information.

The need to develop and document neighborhood level information has fueled the expansion of geolibraries across the world. For example, University of California Santa Barbara's Alexandria Digital Library (ADL), which was funded as the first of its kind by the US National Science Foundation in 1994, indicates on its homepage that a geolibrary is intended to answer questions such as:

> ``What information do you have about this neighborhood?" ``Do you have a guidebook covering this area?" … or ``What photographs do you have of this area? [Because] in all of these queries the geographic footprint provides the primary basis of search." …
>
> "In summary, the contents of a geolibrary would be very different from those of a conventional physical library. They would be dominated by multimedia information of local interest, in fact precisely the kinds of information needed by an informed citizenry, and one that is deeply involved in issues affecting its neighborhood, region, and planet. Because its contents would be different, a geolibrary might attract an entirely new type of library user."

2.2 Information Supply

In this study, the literature pertaining to information supply is organized into two main sections: 1) Geospatial Information and Mapping Policies (GIMPs) and 2) metadata standards. the new set of GIMPs are facilitating information production, exchange, and discovery at many different scales and among many different players. However, new standards have also impacted the traditional role of public libraries because, due to intellectual property rights and the increasing numbers of individuals and agencies claiming ownership over data products, these institutions are now "policing or controlling the use of spatial data" (Barr 2001:179).

2.2.1 Geospatial Information and Mapping Policies (GIMPs)

Geospatial Information and Mapping Policies (GIMPs) refer to all the laws, mandates, rules and standards designed and implemented to ensure that geospatial and other public data are produced in a cohesive, distributed, and participatory manner for users to find and utilize information effectively. GIMPS occur at many different levels and among many different types of participants; international, national, state and even local governmental organizations are engaging in the creation and applications of a variety of GIMPS to facilitate the production and discovery of information that is not only geographic but also textual and numerical.

2.2.1.1 International GIMPs

At the broader scale, there are international players aiming to standardize the worldwide production of geospatial information by creating interchangeable GIMPs that can be used among countries to share data. The International Organization for

Standardization (ISO)[1] is the most widely known agency for creating global standards. In 1992, ISO created the 211 Committee (ISO/TC 211) which developed in 2003 the ISO 19115, a standard used for the implementation of metadata worldwide. Most recently, the Open Geospatial Consortium (OGC)[2] was created to coordinate geospatial information interoperability with ISO (Larson et. al. 2006). According to Hill (2006:67) the OGC Geographic Markup Language (GML) is the most widely used standard being used to georeference real world locations (Hill 2006: 67).

Other international organizations are also developing national, regional and international GIMPs to standardize the production and dissemination of geospatial information. For example, the European Commission Regulation (EC) No 1205/2008 of December, 2008 passed Directive # 2007/2/EC of the European Parliament and of the Council establishing metadata standards known as INSPIRE[3]. Nogueras-Iso (2004) indicates that in 1998 created by the European Committee for Standardizations had already created the European voluntary norm prENV 12657. According to INSPIRE, the new continent-wide geoportal "…aims at making available relevant, harmonized and quality geographic information to support formulation, implementation, monitoring and evaluation of policies and activities which have a direct or indirect impact on the environment." (INSPIRE 2008).

The governments of Australia and New Zealand indicate that due to the lack of agreement on international standards for spatial metadata management, they created the Australian New Zealand Land Information Council (ANZLIC) and charged it with

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[1] http://www.iso.org/iso/home.html
[2] http://www.opengeospatial.org/
[3] http://inspire-geoportal.ec.europa.eu/

defining metadata standards for the Australian Spatial Data Directory (ASDD)[4]. The ANZLIC metadata standard uses the Geographic Extent Name Register (GEN Register) to streamline entry of geographic footprints for the bounding boxes of objects and features including landmarks, maps, and areas. According to the council, "ANZLIC is developing nationally-agreed (in both Australia and New Zealand) policies and guidelines aimed at achieving "best practice" in spatial data management..."

2.2.1.2 National US GIMPs

a) The US National Spatial Data Infrastructure (NSDI)

Originally created by the Federal government, the National Spatial Data Infrastructure (NSDI) is the most widely used set of metadata standard in the US. Established through Executive Order 12906, it "…defined as the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community".[5]

According to the US Federal Geospatial Data Committee (FGDC), "the National Spatial Data Infrastructure NSDI is a physical, organizational, and virtual network designed to enable the development and sharing of this nation's digital geographic information resources".[6] The US Office of Management and Budget indicates that the purpose of "The NSDI [is to] assure… that spatial data from multiple sources (federal, state, local, and tribal governments, academia, and the private sector) are available and easily integrated to enhance the understanding of our physical and cultural world." (US White House). The NSDI is comprised of five interrelated parts:1) data themes, 2) metadata, 3) the National Spatial Data Clearinghouse, 4) standards, and 5) partnerships.

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[4] http://asdd.ga.gov.au/asdd/
[5] (http://www.fgdc.gov/)
[6] Ibid.

b) The US National Geospatial Clearinghouse

The FGDC defines the National Geospatial Clearinghouse as an "…electronically connected network of geospatial data producers, managers and users. It is neither a central repository where datasets are stored nor a set of web sites referencing spatial data. It is a federated system of compatible geospatial data catalogs that can be searched through a common interface – the geodata.gov portal"[7].

c) The US National Digital Information Infrastructure and Preservation Program.

The US National Digital Information Infrastructure and Preservation Program (NDIIPP) was funded by The US Congress and is administered by the US Library of Congress which manages all geospatial products of national historical value.

d) The US National Geospatial Digital Archive (NGDA)

Originally funded by the US Library of Congress, the National Geospatial Digital Archive (NGDA) is a collaborative project between the University of California Santa Barbara, Stanford University, University of Tennessee, and Vanderbilt University designed to build an infrastructure for the archival and exchange of digital images and geospatial data.[8]

e) The US Content Standard for Digital Geospatial Metadata

Adopted since 1994 by the US Federal Geographic Data Committee (FGDC) by Executive Order 12096, the Content Standard for Digital Geospatial Metadata (CSDGM) was revised in 1998 to support the National Spatial Data Infrastructure (NSDI). It is the most widely used standard in the US and requires all federal agencies that produce geospatial data to use the CSDGM (Version 2) to produce and disseminate data. It also

[7] (http://www.fgdc.gov)
[8] (http://www.ngda.org/)

requires all federal agencies to inform users about metadata existence, condition and access and to make metadata available through the National Geospatial Clearinghouse.

The CSDGM is also being implemented by multiple agencies from states and local governments[9] to international agencies in Africa and Canada (Nogueras-ISO 2004). Hill (2006) indicates that "the FGDC's CSDGM is now recognized as a standard by the American National Standard Institute (ANSI) under the auspices of the International Committee for Information Technology Standards (INCITS)." (Hill 2006:162)

f) The US FGDC Metadata Keyword Standard

The FGDC metadata keyword standard contains four main groups of keywords including: theme, place, stratum, and temporal. The FGDC recommends users to include at least one of the 19 ISO topic keywords categories (see Appendix J)[10]. These thematic abstractions are designed to represent data types based on their common characteristics. Larson and Frontiera (2004) indicate that "the FGDC standard [require] only a coordinate pair defining a minimum bounding rectangle (MBR) for the object, but allows more complex descriptions." Wilson et al. (2004:198) indicate that the aim is to link place names to geographic information to retrieve "relevant objects and/or metadata records".

2.2.1.3 Local New York City GIMPs

At the local level, there are also a series of GIMPs being used to streamline the production and discovery of local information. The New York City Department of City Planning (NYCDCP) is the leading agency producing geospatial data that are used by all city agencies, local organizations and private vendors to georefence materials. According to NYCDCP standards, data produced by any city agency must be projected in Feet in

[9] (http://www.fgdc.gov)
[10] http://www.fgdc.gov/metadata/documents/preparing-for-international-metadata-guidance.pdf

Lambert Conformal Conic projection, NAD 1983, State Plane Project Coordinate System for New York Long Island (FIPS 3104). In addition, there are two important statuses that facilitate the dissemination of local information. These are:

1. The New York City Charter- Chapter 72, Section 3004.(4)(d), mandates the Department of Records and Information Services to "…establish, maintain, and operate facilities for the storage, processing and servicing of records for all city agencies pending their deposit in the municipal archives or their disposition in any manner as may be authorized by law."

2. Local Law No. 11 of 2003[11] directs New York City to "… lead the nation in using information technologies to improve the efficiency and accessibility of municipal government" and also calls for increased use of internet technology to disseminate digital information of materials produced by city offices.

The series of local GIMPs mentioned above are explained in more detail in *Chapter-5 Information Supply* which covers the library cases selected for the study.

2.2.3.1 Primary Metadata Standards

An important advantage of implementing common metadata standards is that information about local resources can be discovered using geospatial tools with greater levels of relevancy. While the concept of metadata has existed throughout history with more modern geospatial terms since the 19th Century (Goodchild 2009:2), the variety of existing schemas can be summarized into a set of three primary systems: The FGDC Content Standard for Digital Geospatial Data (CSDGD); the International Organization

[11] Local Law is available at http://www.nyc.gov/html/records/pdf/law03011.pdf

for Standardization (ISO 19115); and 3) the Dublin Core Metadata initiative (DCMI) (Caldwell 2005).

The FGDC's Content Standard for Digital Geospatial Data (CSDGD) uses the bounding box paradigm under the Spatial Domain Bounding Coordinates heading (Caldwell 2005). The FGDC CSDGD began since the 1990s when the US Federal Data Committee operating under the National Spatial Data Infrastructure (NSDI) drafted a standard later updated in 1998 to include cloud cover definitions for remote sensed data as part of Version 2 (Goodchild 2009). In 2006, Intergraph developed the CSDGM2ISO, a crosswalk between CSDGM and ISO 19115 (NSDI Cooperative Grants Program)

The International Standardization Organization (ISO 19115) incorporates the bounding box paradigm under the EX_Extent entity through the EX_GeographicBoundingBox to define geographic coordinates (longitude and latitude) as the limits of the dataset (Caldwell 2005). Hill (2006) indicates that although the ISO 19115 standard is designed for digital data, it is also applicable to other cartographic, geographic and non-geographic resources. Additionally, Hill indicates that contrary to CSDGM standard, ISO standard does allow "…location to be represented only by a geographic identifier, which in the ISO system includes a placename, address, or other code or text label." (Hill 2006:164)

The Dublin Core Metadata Initiative (DCMI) establishes identifiers for place in the Coverage entry which includes a DCMI Bounding Box sub-element (Caldwell 2005). The DCMI is a standard created by library users while meeting in Dublin, Ohio.[12] These standards are being adopted by digital libraries to interface with other catalogues because there are four missing elements in ISO: contributor, relation, rights, and audience.

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[12] (http://www.dublincore.org)

(Nogueras-Iso 2004). Hill (2006:199) points out that the DCMI has a coverage data element that can be used for placenames and coordinates as well as other values…" Similarly, Larson and Frontiera (2004) indicated that DC's *coverage* element '…can be used to specify a place name, place code (e.g. zip code), of the geospatial coordinates of a point, bounding rectangle, or irregular polygon that locates the resource being identified."

2.2.3.2 The North American Profile (NAP) of the ISO 19115: Geographic Information – Metadata

As stated earlier, the NAP is a national (ANSI) standard. As such, it is up to individual organizations to determine if the standard supports their mission and objectives and if it is in their best interest to adopt the standard. The FGDC promotes the adoption of the NAP as a Federal standard and, if adopted, nonfederal organizations will be obligated, as with the CSDGM, to create NAP compliant metadata if they apply Federal funds to the development of geospatial data.

2.2.3.3 Other Metadata Standards

<u>a) MARC21</u>

Machine Readable Cataloging (MARC) is a widely used system developed by and for use in libraries. Due to its limitations, Reese (2005) foresees a trend for MARC users to adopt FGDC standards due to a higher level of granularity useful to describe geospatial materials. However, Petras (2004) conducted a study using over 5 million MARC records from the University of California Library Catalogue Melvyl to examine their geographic contents and found that from the 10 MARC fields to store geographic information a large number of them were empty or underutilized. The study uncovered a "… correlations between place of publication, geographic area and language that could be used to enrich catalog records with missing fields."

Hill (2006) compared the result of Petras' study with a study conducted by D. Vizine-Goetz in which over 54 million records in the OCLC (Online Computer Library Center) WorldCat were analyzed and also found lower concentrations of records with geographic identifiers (Hill 2006:159). She also found that MARC's "…georeferencing is at a general level, designed for bringing together groups of objects that are about the same general topic than for representing the specific geographic area..." (Ibid)

b) Z39.50

Chandler et al. (2000) compared the 34 most basic elements needed to create efficient crosswalk between the three information standards and found problems with translating records that have been stored in FGDC Z39.50 databases because records are re-indexed. They indicate that an important flaw of the FGDC standard is the lack of unique URL to link records and low response time by Z39.50 servers, which forces users to export data into more user friendly packages.

c) Hybrid Systems

Given the variety of metadata standards, some users prefer to build their own in-house hybrid systems to be able to meet particular needs. Smits (2001) points out that many hybrid systems combine FGDC standards with requirements from other sciences such as the National Biological Information Infrastructure (NBII), which resulted in 50% of failed queries due to poor interface design and server issues. Therefore, metadata standards are developed with enough flexibility to be able to incorporate new tools designed for specific users, which point to an expansion in interface design "… to determine the forms (eg DC, MARC, or FGDC) in which results are presented." (Smits 2001:131).

2.3 Information Discovery

Increasing interests concerning geospatial information discovery at the neighborhood level have emerged from interrelated strands of literature and industry practice. While the societal implications were addressed earlier on under Public Participatory GIS (PPGIS) studies by Pickles (1995), Curry (1995), Sheppard (1998), Barndt (1998), Harris and Weiner 1998), among others, applied technical issues relating to the discovery of information have most recently been addressed under Geospatial Information Retrieval (GIR) theories that range from placename studies to areal analyses (Wilson et. al 2004, Larson and Frontiera), including Minimum Bounding Rectangles (MBR) calculations (Hill 2006).

Despite such voids, rapid advancements in geographic information technologies continue to emerge that often fail to fully support the production and dissemination of local neighborhood information from a community perspective. Using GIR tools, users can find, download, and upload local information at unprecedented speeds through interconnected networks of distributive geolibraries where increasing amounts of information are being georeferenced to make knowledge more discoverable to worldwide users than ever before. Hill (2006) indicates that such growing phenomenon is due to "geographic associations of information [being] widespread throughout most of the activities of our lives" and foresees this trend as an expanding area of research for "understanding human spatial and temporal cognition…in the coming years." (Hill (2006:215-217)

Several methods have been successfully tested to discover neighborhood information. For example, commercially available maps and local neighborhood knowledge were combined by Wilson et al. (2004) to develop the *Los Angeles Digital Gazetteer*. They used the Thomas Bros' *2001 Los Angeles County Street Guide and Directory* to extract placenames with which to create centroids for 218 different neighborhoods throughout California County. Areas were buffered around placename locations to create circular footprints representative of local neighborhoods' extents. Proximity was calculated for nearby points and their mean distances used to buffer the neighborhoods centroids from the commercial map.

Subsequently, they built circular polygons by county sub-region, which according to the author, avoided the problem of having too many either small or large polygons in densely, or less-densely, populated areas, respectively (Wilson et. al. 2004:202). In addition, overlapping between buffers was actually "…desirable because the boundaries are inherently fuzzy and there are numerous societal actors and trends that will tend to keep them imprecise." (Wilson et. al. 2004:204). Researchers found the methodology to be useful for discovering and retrieving neighborhood information spatially despite overlapping and fuzziness.

Hill (2006:158) points out that although Machine Readable Coding (MARC) schema has been commonly used by libraries to enter circular bounding shapes to enclose the geography of objects, they are "…rarely used in cataloguing…" Wilson et al. (2004) found the use of circular footprints to be an effective GIR method applicable to many urban areas. They indicate that circular footprints are "the most compact shapes" and that compactness is a "desirable property for an initial attempt to delineate (estimate) 'real world boundaries." (Wilson et. al. 2004:205). Furthermore, they believe this method provides not only a vehicle for inserting emerging new neighborhoods into the local geography but also for "…provid[ing] a bridge between the vernacular place names and other terms …" (Wilson et. al. *ibid*).

Hill (2006:101) also talks about GIPSY: Automated Geographic Indexing of Text Documents, a project conducted by Woodruff, Plaunt and Ray Larson (1994) at the University of California Berkeley to apply "enhanced geoparsing techniques to a set of publications of the California Department of Water Resources to derive polygons representing the spatial coverage of the text." She points out that polygons were displayed on a "…base map and were, in effect, stacked on top of one another when their areas overlapped." Other GIR projects Hill highlights include:

- Perseus at Tufts University (Smith 2002; Smith and Crane 2001)
- Going Places in the Catalog at Berkeley (Buckland, Gey, and Larson 2002)
- MaNIS –Mammal Network Information Systems- aims at georeferencing objects in the biological sciences (Beaman, Wieczorek, and Blum 2004)
- CLEF – Cross Language Evaluation Forum – a multilingual geographic information retrieval (GIR) project (Gey and Clough 2005)
- MetaCarta private company working on "geographic text search systems" (metacarta Inc. evolved from work at MIT)
- Open Geospatial Consortium (OGC) published a draft geoparser guidelines (OGC INC. 2001)

2.3.1 Georeferencing Information

Georeferencing refers to the processes used to assign geographic information to transform data into information and to make it discoverable through geospatial searches. Hill (2006) defines georeferencing as "…a human activity based on the processes of spatial cognition involving the knowledge of geographic facts and the ability to navigate around our environment, as well as the configurational geographic knowledge for the world at large that we acquire through exposure to and study of maps and earth." (Hill 2006:31).

Hill calls the use of standard coordinate systems to geocode information 'formal georeferencing' and, while multiple forms exist such as "geospatial associations [which are] based on geometric measurement of distance and direction or topological relationships of adjacency and connectedness, … cadastral, postal zones and postal geocoding…, [their results] are translated into lat/long coordinates." (Hill 2006:63)

For example, Hill (2006:51) points out that analog maps can be georegistered through digitalization or scanning them and assigning at least 3 control points to "…photographs and other visuals …with less geospatial grounding, the [control] points are recognizable". Other objects, including text content, can also be georeferenced using "…placenames, feature types (e.g., mountain, park), and spatial prepositional references (e.g., in, south of, near, 5 miles from) in both informal and controlled ways."

2.3.1.1 Geoparsing

Hill indicates that geoparsing is a commonly used process for relating informal geographic information (e.g. text) to formal geographic coordinates because they provide the link between areas of interest and the resources (Hill 2006:91). Another form of georeferencing informational materials is known as geotagging. Hill (2006:100) indicates that when geotagging images, such as photographs, that have time and location placenames are looked up on a gazetteer to find associated coordinates to create the objects' metadata; and when geotagging resources without location information, nearby features are used to estimate geo-location used for georeferencing.

2.3.1.2 Gazetteers

The collection and management of placenames is perhaps the oldest forms used by humans to georeference location information. According to Hill (2006:91) placename georeferencing evolved from the early 6th Century traditional occupation of preparing gazettes to the modern gazetteers which, according to Hill (2006:221), are a type of Knowledge Organization System (KOS) containing placenames, geographic, and attribute information that serve as comprehensive "…devices between formal and informal georeferencing… a bridge between the user's information need and the material in the collection. With it, the user should be able to identify an object of interest without prior knowledge of its existence."

Gazetteers are also important tools to link information to local knowledge because, as Hill (2206:93) points out, "Information about named places is local in nature. That is, the best, the most detailed, and the most up-to-date information about named places is known locally. Gazetteer data is typically created either for local purposes (e.g., naming parks, neighborhoods, administrative districts, buildings, facilities) or is related to some activity such as travel….or documenting collections of information and objects." (Hill 2006:93

Adding lat/long coordinates to metadata for non-spatial objects takes place through a variety of processes that depend on additional resources such as gazetteers. For example, Hill (2006:98) points out the usefulness of "gazetteers …as aids to cataloging and indexing when coordinates are to be added to metadata." Gazetteers are particularly important because they combine information from multiple sources concerning 1) the feature's "geographic location (i.e., footprints) and 2) feature types (e.g., "lakes") (Hill

2006:94). Nogueras-Iso (2004) pointed out that semantic interoperability between networked knowledge domains requires an “agreed set of terms” to provide interdisciplinary access and ability to accurately retrieve data among different domains.

2.3.2 Geospatial Information Retrieval (GIR)

Geospatial Information Retrieval (GIR) is a key component of information discovery. It is particularly important for neighborhood planning because it provides users with tools to find information about resources in library collections by ‘recalling’ records about a particular place of interest with high level of ‘precision’. GIR occurs through a number of tools that allow users to draw referential polygons (box, convex, or circle) on a map; enter keyword placenames; input geographic coordinates in a search window; or even indicate distances to navigate from and to places.

Hill (2006:186) points out that GIR was first coined in 1996 by Ray Larson and “…is based on comparing a query spatial footprint to the footprints of objects in a collection and identifying the objects with *matching* footprints (italics by author).” She also explains that any object that overlaps partially or entirely the query’s footprint is considered a matching record, whose relevance is proportional to the amount of overlap with the query’s spatial extent.

Based on a set of 99 previously indexed bibliographical records in her 1990 dissertation, Hill analyzed “…the effectiveness of GIR in returning spatially relevant information in response to user queries” (Hill 2006:207). The footprints; or geospatial geographic extent of each study area record were used to compare degrees of overlapping, containment, and distance between selected text vs. spatial queries and concluded that spatial search methods are more effective than placename searches.

In order to facilitate Geographic Information Retrieval (GIR), neighborhood areas are represented by the most common and easy to compute shapes such as the Minimum Bounding Boxes (MBB) and convex hulls, which mostly cause distinct levels of overlapping between space representation and the selection of local objects.

Hill (2006) refers to Frontiera's (2004) analysis of 2,527 FGDC compliant metadata records gathered from the California Environmental Information Catalog (CEIC) which included "… geospatial datasets, digital and hard copy maps, database files, documents, websites, and so on...". The study compared the probabilistic, spatial similarity, and ranking methods for both MBB and convex hulls as footprint for GIR and reported that the "…use of the probabilistic methods and MBB together achieved better retrieval results than the spatial similarity methods with convex hulls." (Hill 2006:210) Quoting Frontiera, Hill points out that such finding "suggests that the probabilistic geographic information retrieval offers an alternative to the use of higher quality spatial representations that may be more difficult to implement." (originally quoted by Hill from Frontiera's dissertation dated 2004:2).

In addition, the current lack of understanding regarding the economic value of spatial information as well as unclear legal guidelines prompts many institutions "…to operate access and acquisition policies in an uncertain environment." (Barr 2001:186)

Larson and Frontiera (2004) measured the probability of GIR relevance on a set of 2,500 geographic digital data library records. Testing various ranking algorithms, they found out that logistic regression was most useful to achieve “high quality approximations that reduces the number of false matches… [and] … can provide significant improvement for Geographic Information Retrieval, even when the simplest regional approximations (MBRs) are used.”

Hill indicated that complexity and uncertainty are indirectly related; in other words, as complexity of an object’s footprint increases (i.e. point vs. polygon) its uncertainty decreases because more detail about the footprint of the area become available. (Hill 2006:192). Hill also foresees new GIR developments to occur via ‘…more sophisticated spatial ranking methods than from requiring the use of footprints that are more faithful to the shape and extend of the geographic location.” (Hill 2006:192). These methods test the effectiveness of information retrieval by measuring the quality of the ‘recall’ and the quantity of ‘precision’.

Hill explains that geospatial information retrieval relies on search queries that can be submitted in three formats: 1) a ‘simple polygon’; 2) a bounding box; or 3) a placename to be matched to a gazetteer’s footprint. For example, users request library resources that pertain to a city within a state (process described above) and the placename of the higher level geography *–the identifier-* is passed through the search query to the backend where a “footprint for a spatial query” is used to find all footprints with the city name “that have footprints *within* the footprint associated with the query identifier.” (italics by author Hill 2006:203). Therefore, the effectiveness of Information retrieval processes is measured through three basic and interrelated concepts: relevance, recall, and precision.

2.3.2.2 Recall and Precision

Recall and precision are two important units used to measure the relevance of records selected during a user's query and are intricately related to information discovery. As Smith (2001:119) indicates, "Information retrieval may be measured in terms of recall and precision: if a lot of relevant information is missing, there is poor recall and if a lot of information is retrieved, there is poor precision." Hill (2006:206) indicates that "recall measures the percentage of relevant items retrieve from the estimated number of relevant items actually in a collection and precision measures the percentage of relevant items among the items retrieved."

2.3.2.3 Spatial Relevance

Spatial relevance is used to measure geospatial conflation between search footprints and those found within a collection; ranking methods are used to "…compensate for coverage-area differences by ordering the retrieve set from most spatially relevant to least." (Hill 2006:187) However, Hill (2006:206) points out that while spatial relevance "…is an appropriate and useful response to [measure] a user's information needs", it "…ultimately depends on the judgment of the user." (Hill 2006:207)

Effective information discovery systems provide users with a variety of GIR tools to further refine their searches. According to Hill (2006), these tools are grouped into basic types such as: 1) front-end user-guided spatial matching criteria "…*contains*, *is contained* and *overlaps…" (italics by author);* 2) back-end spatial similarity algorithms that allow items to be displayed in sequential order of relevance; and 3) on-screen footprints representation of the objects for users to visually evaluate geospatial topologies between searched objects.

2.3.2.4 Spatial Similarity

Spatial similarity is an important indicator used to rank query search results. According to Hill (2006:204), spatial similarity is "…the degree of spatial match between a query footprint and the footprint of an information object…". It ranges from 0 to 1 and measures from the least similar footprints to the most exact, complete overlaps, respectively. Hill points out that one of the most widely used tests of similarities is based on measuring "…the degree to which the two areas overlap and the relative size of the two areas…"; expressed as a formula:

Relevance = 2x (area of overlap of X & Y) / (area of X + area of Y)

She explains that the formula translate as "… a ratio where the numerator is two times the extent of the area where X and Y overlap and the denominator is the combined total area of X and Y." (Hill 2006:204). She also talks about Hausdorff distance method, which is used for matching "objects within digital images", based on calculations using "… Euclidian distance between points in the point sets of two footprints (reference to Frontiera 2004; Janée 2003; and Janée and Frew 2004). However, Wilson et al. (2004) indicate that "…digital libraries require footprints that specify the geographic extent as polygons and/or bounding rectangles and not just as point locations to facilitate search and retrieval of generated content." (reference to Harpring 1997 and USGS 1998).

2.3.3 Bounding Boxes Search Forms

Footprints are visual representations of geographic features; they bind information to the features' spatial extents and are useful to subsequently perform data query and information extraction. For technical reasons, it is advantageous to use object footprints because they provide "…for a finite geometric object … [b]efore invoking a computationally expensive intersection or containment algorithms for a complicated object…[to] exclude the possibility of intersection or containment, and no further computation is needed. (http://geometryalgorithms.com)

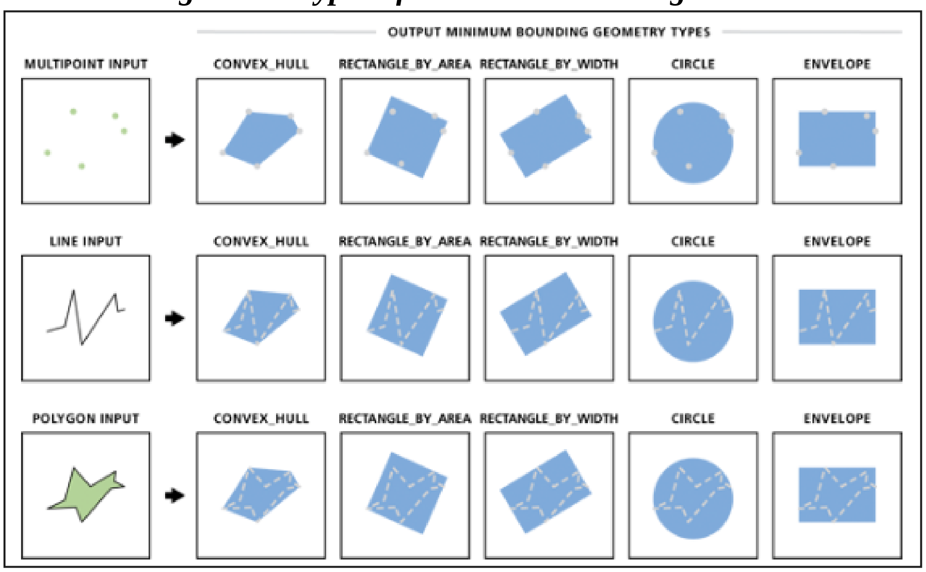
According to the ADL, in a geolibrary "…Information is found and retrieved by matching the area for which information is needed with the footprints of items in the library, and by matching other requirements—but the footprints always provide the primary basis of search." Although embedded within metadata records and thus transparent to users, these elements are indispensable for a geolibrary's collection items to become discoverable via geospatial searches. As Janskowsky et al. indicate, the value of geolibraries relies on their ability to use geospatial footprints for public information dissemination without facing any of the problems of traditional libraries "…because all records are stored in the same digital media…" (Jankowski et al. 2001:7).

However, Wilson et. al. (2004:200) indicate that there are also important issues affecting the production of footprints for library materials because boundaries may be fuzzy and also changing according to "…multiple representations, …representation method used (point, bounding box, line, polygon, grid cell), source, resolution (scale, level of generalization), and time period (given that the extents of some features will change over time)." In general bounding boxes can be produced through different variations of the following elements:

Data Model (point, line, poly, complex object)
Simple vs. complex polygons (multi-vertices)
Information source, resolution
Methods used to generate the footprint
Temporal aspects

The Environmental System Research Institute (ESRI) provides tools in the newer ArcInfo's ArcToolBox version 10 to create a variety of different MBB types.

Figure 2.2 Types of Minimum Bounding Boxes



Source: ArcGIS Help Guide. ESRI. http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//00170000003q000000

Figure 2.2 Types of Minimum Bounding Boxes shows the different types of MBB that can be created for point, lines and polygon features including convex hulls, circular, rectangular, and envelop shapes which are use to encompass the geographic extent of these features. The OGC's GML sets specification standards to geocode footprints with coordinate for a variety of geographic objects including point, lines and polygon features

(Hill 2006). Polygon spatial binding is of particular importance because as Sunday (undated) indicates "the 'bounding box' of a finite geometric object is the box with minimal area… the computationally simplest of all linear bounding containers." Papadias and Theodoridis (1997) concurred with the advantage of using bounding boxes and indicate that by simply drawing two points; one at the lower left corner and one at the upper right, is the most efficient way of to chose "object approximations" with which to perform geospatial queries aimed at retrieving topological and directional information useful for user interface object recognition.

2.3.1.1 Minimum Bounding Rectangle

Hill (2006) indicates that "a bounding box (also called minimum bounding box (MBB) or minimum bounding rectangle (MBR)) is the smallest box that completely encloses a spatial footprint. Bounding boxes are frequently used generalizations of irregular polygons in georeferenced information systems." (Hill 2006: 69) The National Institute of Standards and Technology (NIST) defines the MBR as "the smallest rectangle completely enclosing a set of points" and Wikiedia.org users indicate that "MBRs are frequently used as an indicator of the general position of a geographic feature of dataset, for either display, first-approximation spatial query, or spatial indexing purposes."

Caldwell (2005) indicates that bounding boxes are one of the "key components of geospatial metadata and lie at the heart of many computational geometry algorithms as well as spatial indexing systems." Papadias and Theodoridis (1997: 112) conducted a study to test the retrieval of geospatial relations based on Minimum Bounding Rectangles and found that "the formalization of spatial relations is crucial for user interfaces and query optimization strategies. "

Alani et. al. (2001) developed the Dynamic Spatial Approximation Method (DSAM) to generate boundary information based on points and the number of places in a region. The method uses ArcInfo's Thiessen algorithm to create Voronoi diagrams to calculate missing boundaries for historical and/or imprecise areas from entry points available in gazetteers. They also indicate that placenames attached to points and bounding boxes paradigms for information search are of "…limited value in determining spatial relationships…[particularly] in "…the absence of digitized boundaries."

Alani et. al. (2001) believe the DSAM method was " …an effective way to approximate the extent of spatial regions and derive their spatial relationships using sets of coordinates in association with place name hierarchies and region adjacency data [providing] … good approximations of current, historical, and imprecise boundaries, and help answering nearest neighbour queries." However, Wilson et al. (2004) pointed out that Alanis et al. research "…found that the results from using this approach were very sensitive to geographic variations of the character and density of the built environment…and the same criticism would apply to the ability of this method to show change through time." Wilson et. al. 2004:201)

Furthermore, as indicated by Alani et al. (2001:304) object footprints include both centroids and minimum bounding rectangles (MBRs) but exclude local boundaries. In relation to information discovery, a similar problem was also identified by Caldwell (2005) who found that, despite the advantage of using MBR across metadata standard (i.e. CSDG, ISO, and DCMI), there is uncertainty regarding the geospatial meaning of the dataset because the georeference can be "…either the extent of the data collection area or the extent of the data records in the data set." Hill (2006) also points out that the system uses Geographic Markup Language (GML) and that it requires a minimum of three points (vertices) to accept "object-level metadata".

2.3.1.2 MBR and Local Boundaries

Given the widespread use of MBRs, researchers have conducted studies to evaluate their applicability to local boundary research. For example, to study the relationship between footprint precision and objects Caldwell (2005) computed the Bounded Box Factor (BBF), which is "the ratio of the area of the bounding box to the area of the feature" to compare census tracts, eco-regions, and hydrologic units and found that census tracts received almost a perfect factor of 1, which is indicative that a shape approximates its MBR almost perfectly because "…Census Tracts are designed by human using guidelines that place an emphasis on compactness." Hydrologic regions came in second and ecoregions last by having the largest BBF figures.

2.3.1.3 Convex Hull

Another useful shape frequently used to bind polygon features is the convex hull. According to Sunday (undated) this is "the bounding container that is the closest and least area approximation for the object it contains." But, Hill stresses that there is agreement among scholars to use either points or MBR as the preferred forms of footprint due to the expensive cost of more detailed representations because the cost for producing, storing, and retrieving "…between the base-level point and MBB representations and all of the other footprint representations, getting progressively more expensive as the footprints become more expressive." (Hill 2006:192)

2.3.1.4 Place name Importance

The names of a places are the most important identifier commonly used to associate information with the geography of places and, as Hill indicates, the concatenated form of this word is nowadays widely used as it embodies its own meaning (Hill 2006:20). Hill alludes to Jones and Dumais' statement that (1986) "subjects can recall information about the objects by name more readily than by spatial location…..suggest[ing] that names carry a great deal of information concerning the object's content an its purpose and that an object's location appears to carry considerably less information". However, she also points out that while names are important, geospatial referencing will become predominant "…as we are more frequently exposed to map-based interfaces to computer-based information systems." (Hill 2006:27)

Many toponymic authorities use rules to standardize place names –to avoid "offensive or otherwise unacceptable names" (Hill refers to Orth and Payne 2003) She points out that "formal toponymic authorities focus on placenames and generally use point locations for footprints, which are sufficient to disambiguate one feature from another." (Hill 2006:103) Alani et al. (2001) point out that gazetteers rely on 'sparse spatial databases in which geographical place names are associated with a spatial footprint." (Alani et. al. 2001:304)

2.3.1.5 Placename Conclusion

Larson and Frontiera (2004) indicate that the use of place name for GIR presents problems regarding a lexicon of placename distortion, duplicates, and spelling, for objects that are fuzzy and often changing. They also pointout that, in order to overcome such limitations, geolibraries are now relying on geographic coordinates for accessing geospatial information creating new "… challenges in terms of storage, indexing, processing and user interface design that only recently have begun to be investigated…"

Larson and Frontiera (2004) point out that "one key question for GIR [geographic information retrieval] is what level of detail should be used to encode coordinate information?"and refer to the earlier research by Hill and others about the usability of minimum bounding rectangles to simplify more intricate shapes as well as point data to represent geographic objects and suggest these techniques can be combined with ranking algorithms to refine results from users' searches based on locational information. Identifying coordinates of geographic objects is particularly important to encode and retrieve neighborhood information effectively since local boundaries tend to be more explicitly defined when they are drawn by individuals or institutions from the bottom-up.

2.4 Conclusions

This chapter organized and reviewed literature relevant to the study of urban GeoDNA into three interrelated strands that overlap the demand, supply, and discovery of local information. Firstly, analyzing demand from a community perspective, it reviewed concepts related to neighborhood geographies, PPGIS, and participatory planning. Secondly, it looked at GIMPs, which are the series of laws, mandates, and standards designed by federal, state, and local units to facilitate the production, archival, and dissemination of gereferenced informational resources. Finally, it reviewed issues affecting the discovery of information and other materials through geolibraries including the methods and tools currently being used for referencing, querying, and retrieving resources geospatially.

CHAPTER 3

Research Design

The previous chapter reviewed literature pertinent to neighborhood information discovery. It examined a number of factors that define information ***demand*** at the local neighborhood level from a bottom-up perspective as well as those that affect its ***supply*** in a digital library environment, where ***discovery*** takes place. Based on insights gained from the literature review, this chapter designs what Yin (2008) calls a 'blueprint' of the framework developed to conduct a mixed method research analysis.

At a high level, the research model is organized into two consecutive parts to approach the inquiry sequentially. ***Part 1*** contains two consecutive phases designed to assess and collect information about ***demand*** and ***supply,*** respectively. *During* ***Part 2,*** the information collected during the first two phases is used to assemble a geodatabase to support the final ***discovery*** phase. The research approach utilizes qualitative and quantitative data collection methods and techniques during the first two initial data assessment phases ***–demand and supply-*** prior to conducting the third "…meta-reference process which integrates the results" (Teddlie and Tashakkori, 2008) during the final information ***discovery*** phase of the study.

3.1 Research Questions

In ***Part 1***, two sequential phases are conducted to examine the dynamics of neighborhood information discovery using The Borough of The Bronx in New York City as case study. *Phase I - The Information Demand*, assesses users' informational needs through an open-ended questionnaire and semi-structured interviews conducted with members of a sample of Community Based Organizations (CBOs) engaged in two important areas of local planning at the neighborhood level; community development and environmental planning. *Phase II - The Information Supply,* examines the processes used by the selected libraries to georeference information for archival, as well as the type and amount of information available about selected neighborhood cases within the study area. Open-ended questionnaires, semi-structured interviews, and metadata analysis are used during this phase to collect, assess, and analyze information pertaining to these areas.

Part 2, contains the *Phase III - Neighborhood Information Discovery* analysis. It focuses on the interpretation of the results gathered through a mixed method analysis. First, information collected during the first two phases is transformed into quantitative data through a series of methods including data coding, metadata assessment, and a neighborhood geospatial analysis which is based on a series of interrelated geoprocessing tasks. The next step requires the use of metadata content and narrative analyses to assess, through a neighborhood information relevance analysis, whether results obtained meet users' informational needs, demands, and expectations. Finally, a combined neighborhood boundary information relevance analysis is performed to examine the potential use of aggregating "top-down" and "bottom-up" geospatial boundary versions to discover local information at the neighborhood level.

3.2 Research Methods

The series of questions above call for a flexible inquiry approach to integrate quantitative and qualitative data and processes. Creswell (2008) indicates that after it originated in psychology, mixed methods research became 'the third research paradigm' of inquiry needed for the social sciences. This study uses a sequential mixed method approach to examine information demand and supply and their impacts on neighborhood information discovery. Two main parts enclose three interrelated phases to sequentially collect, integrate, and analyze qualitative and quantitative data to conduct the final interpretative discovery analysis.

Figure 3.1 – The Urban GeoDNA Research Inquiry Model

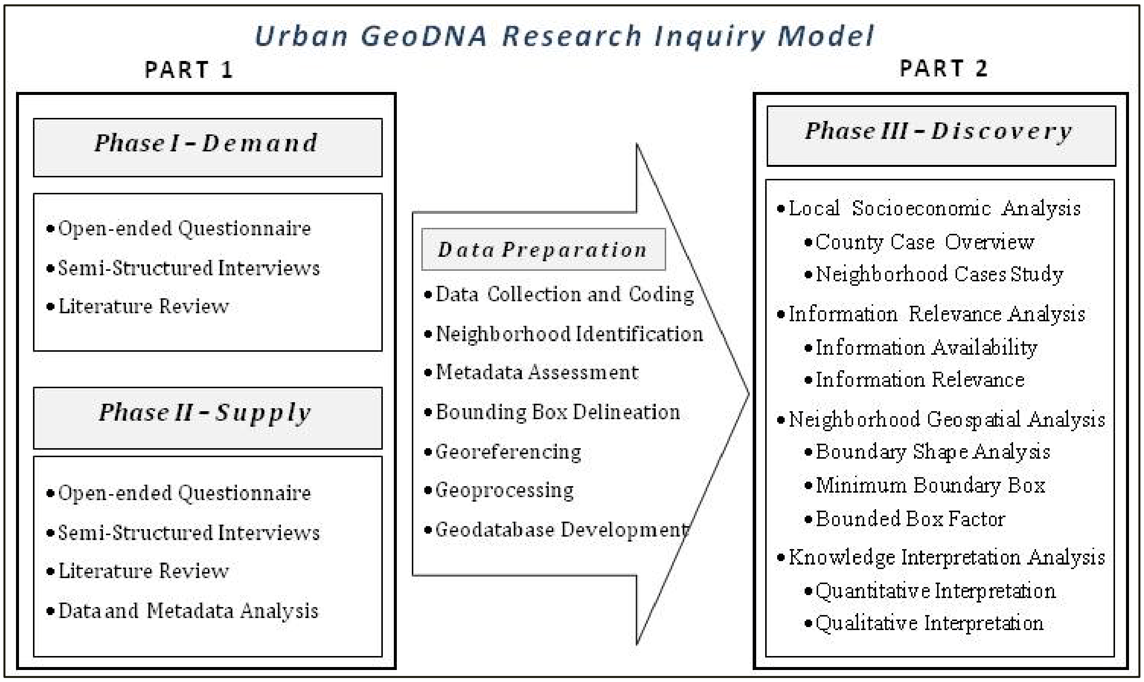


Figure 3.1 –The Urban GeoDNA Research Inquiry Model shows a high level representation of the research design's two interrelated parts, their interrelated phases and the underlying data preparation processes. ***Part I*** concentrates on the collection of information through two sequential phases designed to assess the ***demand*** and ***supply*** of neighborhood information, respectively. ***Part II*** focuses on data transformation, analysis, and the final qualitative interpretation of the results to answer the interrelated set of questions posed by the research inquiry.

While increasing numbers of geospatial information users are nowadays also becoming data producers (Goodchild 2007), the term *'users'* here refers exclusively to

CBOs seeking neighborhood level information with which to participate within the planning processes affecting local communities in The Bronx, NY. These organizations influence the ***demand*** side of information ***discovery***. Conversely, information dissemination institutions, specifically public libraries, represent the ***supply*** side of the equation. Two libraries form the ***supply*** sample group; they are representative of the universe of local educational and citywide governmental institutions charged with the primary mission of preserving and disseminating public information.

3.3 Questions # 1 – *Information Demand*

The first part of the study begins with ***Phase I-Information Demand*** to assess the users' needs, usage and demands for neighborhood geospatial information. An open-ended questionnaire is used to collect information during a series of semi-structured interviews conducted among members of CBOs engaged in local community planning.

3.3.1 Methods - Question #1

Creswell (2008:98) indicates "…that qualitative research is exploratory and researchers use it to explore a topic when the variables and theory are unknown." Therefore, an open-ended questionnaire is used to conduct semi-structure interviews with key members of local CBOs to collect information about qualitative (text and images) and quantitative (numeric) local neighborhood data. Gaber and Gaber (2007:103) stress the usefulness of *content analysis* to study written information. In addition, the literature review on PPGIS and neighborhood planning provides insights about the types of geospatial information sought by participants involved in GIS and planning projects.

3.3.2 Case Studies Selection - Question #1

Two t important nonprofit organizations are selected from the group of local CBOs currently engaged in community development and environmental planning within the study area. First, as Reardon (1998) indicates, higher education institutions play a key role in neighborhood planning. Consequently, expert advice from members of the Department of Environmental Geographical and Geological Sciences of Lehman College of the City University of New York –CUNY, which is the only public senior college located in The Bronx, was used to identify local CBOs actively involved in planning activities within the study area. After inviting a total of eight local groups (see Appendix B), the two CBOS selected for the study are:

Table 3.1 List of Selected Community Based Organizations

CBO	**Area of Expertise**
• *Phipps Community Development Corporation*	Community Development and Planning
• *The Bronx River Alliance*	Environmental Planning and Conservation

The selected cases are representative of the variety of local groups operating within the study area. While some focus on economic development in certain areas, others seek to contribute to borough-wide environmental planning. Cluster sampling is an appropriate technique to identify key individuals to interview because, as Creswell (2008:148) indicates, "…the researcher first identifies clusters (groups or organizations), obtains names of individuals within the clusters, and then samples within them." However, in this study sampling is based on much narrower criteria aimed at specifically interviewing key users including planners and analysts who use data and other informational resources to analyze local conditions and to recommend public policy.

3.3.3 Data Collection - Question #1

This phase seeks to identify what types of geospatial information CBOs seek to obtain to participate in community development and environmental planning from a neighborhood perspective. An open-ended questionnaire is used to collect responses from participants in the form of narrative, images and qualitative data indicative of their informational needs. Literature on PPGIS and neighborhood and environmental planning also provides insights about the use, needs, and types of information demands most commonly experienced by users.

For example, geospatial boundary files are identified across different strands of literature as one of the most important resources needed to facilitate local information discovery and to participate in community development and environmental planning. However, it is also widely acknowledged that a discrepancy between "top-down" and "bottom-up" neighborhood geospatial definitions (Cho and Choi, 2005) impacts these activities and urban planning in general. Therefore, the combination of open-ended questionnaire and interview instruments serves to identify neighborhood information available from both, "top-down" and "bottom-up" sources.

In order to compare "top-down" vs. "bottom-up" neighborhood definitions, a combination of different datasets is assembled from different sources. From the New York City Department of Planning (NYCDP), Population Division, two interrelated neighborhood boundary files are incorporated as "*top-down*" layers. These layers are 1) the Bronx Microneighborhood boundary file and 2) the Bronx Neighborhood Projection Areas (NPA).

Figure 3.2 – Bronx Micro-Neighborhoods

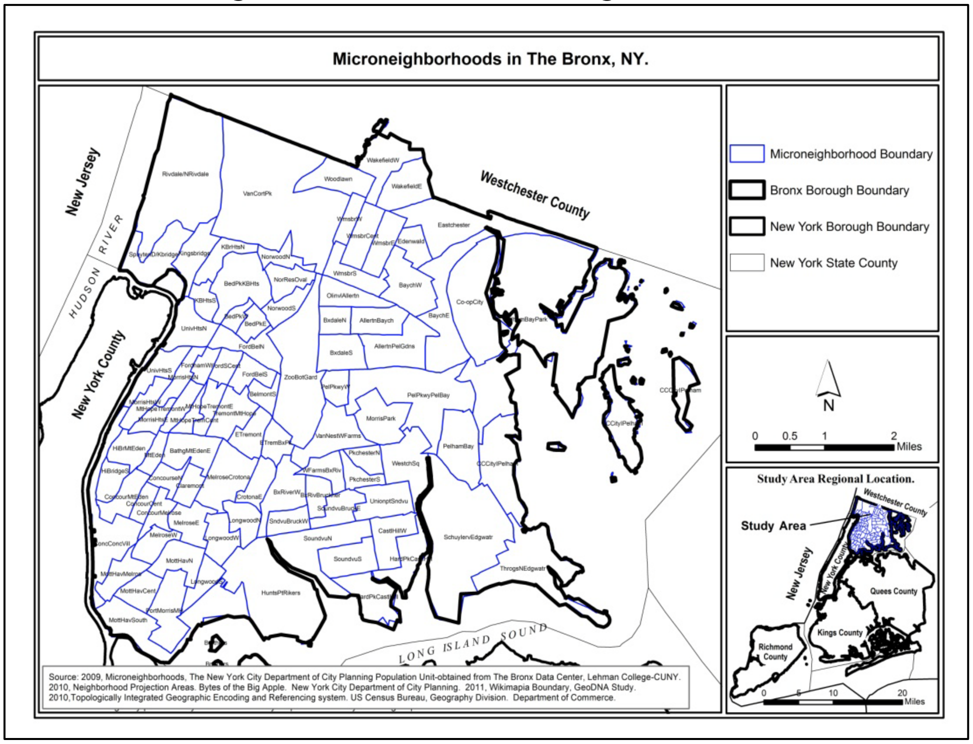


Figure 3.3 Bronx Neighborhood Projection Areas

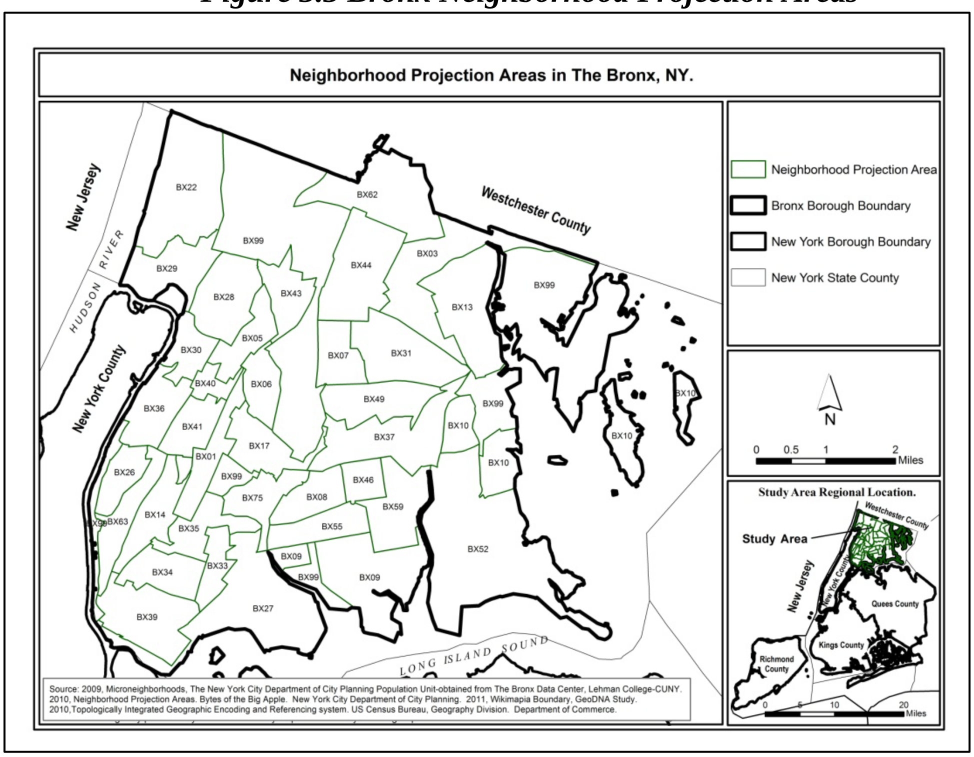
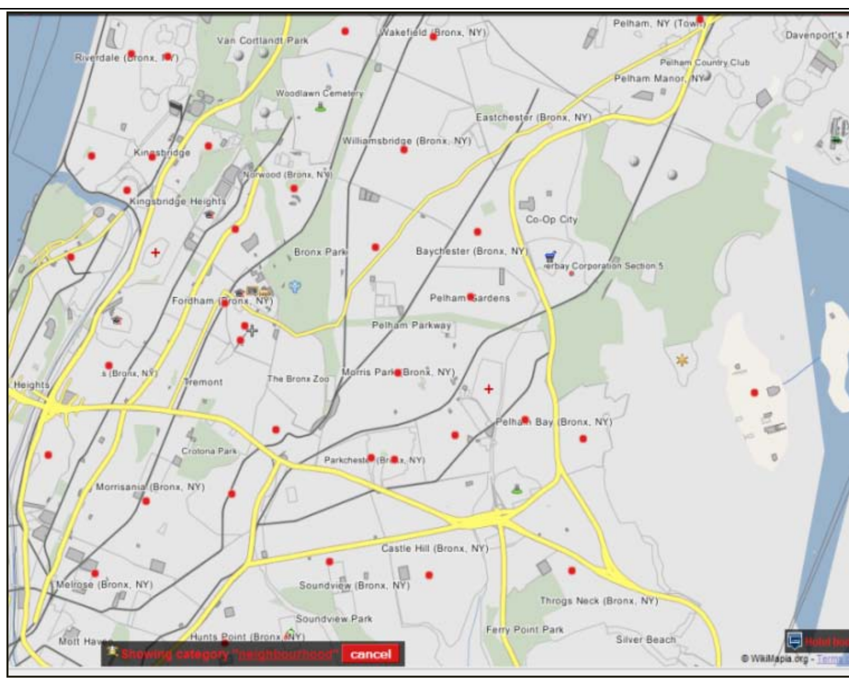


Figure 3.2 – Bronx Microneighborhoods shows the NYCDP interpretation of local microneighborhood boundaries in the county. These boundaries are related to the

NPA boundaries, which are shown in *Figure 3.3 Bronx Neighborhood Projection Areas*, because they are both based on census tracts but do not always conflate

Since bottom-up boundaries were not available from local CBOs, the study combines information gathered from two publicly populated online sources: 1) neighborhood names were obtained from Wikipedia (see Appendix D); and 2) local boundaries were developed from Wikimapia geospatial information, which maintains boundaries digitized by online users through an open public participatory Web 2.0 application. Goodchild (2007) indicates that the newly emerging bidirectional Web 2.0 platform allows increasing number of online users to collect and supply geospatial information openly. *Figure 3.4 Bronx Neighborhood Centroids* shows the general location of Bronx neighborhoods as defined by online Wikimapia users. This Web 2.0 site also provides polygon definitions (see below) for each one of these neighborhoods.

Figure 3.4 Bronx Neighborhood Centroids



Source: Wikimapia.org. Retrieved 09/23/09

3.4 Questions # 2 – *Information Supply*

During the second phase of the study, the ***supply*** side of neighborhood ***discovery*** is explored to assess the availability of neighborhood level geospatial information via digital libraries and clearinghouses. An analysis of the number, type, and quality of datasets and other informational records available through the selected group of libraries serves to gain knowledge about the quantity and quality of information available for CBOs to participate within the planning processes affecting local and urban environmental sustainability. In addition, a review of existing metadata and other informational resources about the neighborhoods in question provides insights about the ***supply*** and quality of information afforded to users.

3.4.1 Methods - Question #2

To answer the second set of questions, the ***supply*** side of neighborhood information ***discovery*** is analyzed via semi-structured interviews conducted with an open-ended questionnaire with representative of local libraries selected as case studies. The goal of this phase is twofold. First, it assesses whether informational resources about the neighborhoods in question are being georeferenced by these institutions to make them more discoverable to users. Second, it also examines how value is being added to such resources via geographic information technologies.

Therefore, the open-ended questionnaire and semi-structured interview are the instruments used to evaluate how 1) metadata production meets 2) users needs through information supply. Lutz and Klein (2006) refer to these functions as 1) metadata registration and 2) customer services, respectively. While the former concerns metadata publishing as well as pulling records from other providers, the latter refers to the tools made available to users to query, browse and discover information. These functions are the bases of the framework used to evaluate the supply of neighborhood information by the selected institutions from a participants' perspective.

3.4.2 Case Studies Selection - Question #2

During this phase of the study, two local libraries were selected as information supply sample cases. While their physical location, function, and service propinquity are the primary selection criteria, these cases are also representative of local libraries disseminating information about local neighborhoods within the study area. Table # 3.2 lists the two information dissemination institutions selected as cases to complete the second phase of the study.

Table 3.2 List of Selected Information Dissemination Institutions

Library	**Type**
• *New York City Hall Library*	Public/Governmental. New York City Department of Records and Information Services (DORIS).
• *Leonard Lief Library*.	Educational. Herbert H. Lehman College. City University of New York (CUNY).

3.4.3 Data Collection - Question #2

The overall goal of this phase is to assess the current ***supply*** of neighborhood geospatial information. Therefore, it seeks to evaluate and collect data on the number and type of library records pertaining to the neighborhoods of The Bronx, NY. Records come from collections maintained by the selected libraries and clearinghouses (See *Chapter 5- Information Supply* for information about the collections available from each library). Insights gained from the literature review served to develop an open-ended questionnaire used to collect these data from participants during a series of separate semi-structured interviews.

In addition, the assessment sheds light on how geospatial value is being added to information and other resources, particularly at the neighborhood level. Janée et al (2004) indicated that, while *information discovery* is the geolibrary's primary goal, the *spatial context of users' interfaces is also critical*. Therefore, the research examines the tools provided by the selected cases for users to search neighborhood information geospatially to support discovery.

3.5 Questions # 3 – Neighborhood Information Discovery

The third set of questions is addressed through a series of meta-reference processes organized under ***Phase III - Neighborhood Information Discovery***. Data previously collected during the ***demand*** and ***supply*** phases are prepared and transformed using a combination of methods to assess the quality of information that can be queried and thus discovered about different types of neighborhoods. The main data preparation procedures include data coding; georeferencing and geoprocessing; geospatial and information relevance analyses; as well as metadata content evaluation and narrative interpretative techniques.

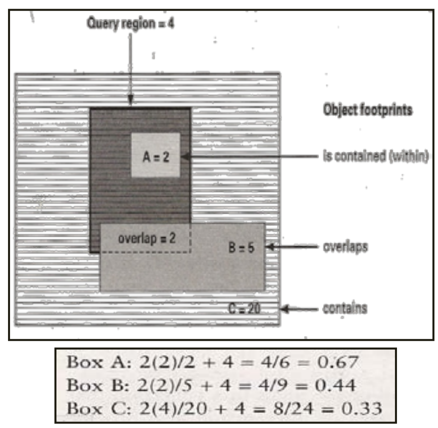
Based on their geospatial relevance, information records collected are examined to determine the type and quality of information available from digital libraries for CBOs to gain local knowledge to be able to participate in community development and local environmental planning processes. Gaber and Gaber (2007) indicate that planners combine meta-analysis with content analysis to gather a large universe of informational materials and then evaluate their contents qualitatively. Therefore, the third and final phase of the study seeks to *qualitize* neighborhood information discoverability.

3.5.1 Methods – Question #3

Discovery is the third method used to answer the last set of questions. The goal of this phase is to evaluate ***discovery*** by neighborhood type and to analyze qualitatively their geospatial and information relevance. Findings from the previous two methods of inquiry -***demand*** and ***supply***- are combined to examine neighborhood information ***discovery*** during this phase. While the geospatial relevance analysis assesses spatial similarity between informational records and neighborhoods' footprints, the final information relevance analysis examines the quality of information discovered by neighborhood type.

The geospatial relevance analysis results are ranked based on their overlapping extents. Hill (2006) calls this relation a *'spatial match'* ranging from 0 –least relevant- to 1 –most relevant (Hill 2006:204). Figure 3.5 shows a series of three possible spatial matches.

Figure 3.5 Hills' Spatial Match



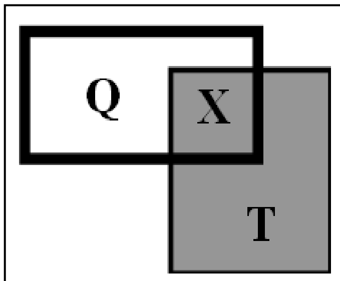
From: Linda Hill. 2006. Georeferencing.

Expressed as a formula:

$$Relevance = \frac{2x\ (area\ of\ overlap\ of\ X\ \&\ Y)}{(area\ of\ X + area\ of\ Y)}$$

Most recently, Lanfear (2009) tested the geospatial ranking factors of a set of objects based on the relevance between geospatial queries and objects' footprints. He "…impos[es] a penalty upon an object with a "footprint" that extends beyond the search area or that fails to cover the entire search area." Testing spatial ranking by increasing the overlapping fractions by a constant power of k (where $k > 0$), he concluded that the ranking factor "…provides an effective way to spatially search a collection of reports." Figure 3.6 shows a partial spatial match area 'X' between an object 'T' and the query area 'Q'.

Figure 3.6 Lanfear's Spatial Match



From: Lanfear, Under Review.

Expressed as a formula: $S_t = F_t^{kt}$

Where;

$F_t = X / T$ (X is the overlapping area between object 'T' and the query)

$F_q = X / Q$ (Q is the overlapping area between the query and the object).

In this study, Minimum Bounding Boxes (MBB) from neighborhood boundaries are used to define the spatial search query area (Q) and the objects' (T) extents are from a set of 28 records from rezoning planning reports found at the New York City Hall Library. Hill's method is employed during the final phase of the study to rank library records identified during the ***Supply*** phase based on their geospatial relevance, or 'spatial match', with each one of the seven selected neighborhood case studies. In addition, an aggregate neighborhood boundary approach is tested as an alternate form of geospatial footprint to examine its potential to increase discoverability of local information.

3.5.2 Case Studies Selection - Question #3

A sample set of neighborhoods are selected as case studies based on their geospatial relevance; socioeconomics characteristics; and importance as identified by respondents in qualitative narratives gathered during the semi-structured interviews conducted through open-ended questionnaires in ***Phase I – Information Demand***. A total of seven neighborhoods are selected as case study samples to conduct the final steps of the ***discovery*** analysis. This group accounts for almost 17% of the total number of local neighborhoods which, according to the NYCDCP and other online resources consulted, currently exist within the borough.

In addition, the selected group of case studies is also representative of the universe of neighborhoods found within the study area; Bronx County also contains some of the most densely populated neighborhoods in the US and hence it is also representative of many other urban environments worldwide. Based on responses from participants and geographic criteria as explained above, seven cases are selected from distinct types of neighborhoods in the study area.

3.5.3 Data Preparation, Analysis and Interpretation

Data preparation refers to the conversion or transformation of data from qualitative to quantitative or inversely from quantitative to qualitative. Teddlie and Tashakkori (2009) call these processes *quantitizing* and *qualitizing*, respectively. In general, in this study *quantitizing* takes place at the end of ***Part 1*** when information gathered from users is turned into numeric format to conduct a quantitative analysis of the responses. Qualitizing, on the other hand, corresponds to the final task conducted at the end of ***Part 2*** when results are analyzed qualitatively via metadata analysis and by comparing information supplied by neighborhood types with information demands from local users engaged in community development and local environmental planning.

As illustrated on *Figure 3.1 the Research Inquiry Model*, in order to analyze data collected during ***Part 1*** a series of data preparation techniques are used including georeferencing; geoprocessing; Boundary Box Factor Analysis; and spatial relevance analysis. Finally, the interpretative analysis serves to examine information qualitatively in relation to its discoverability by neighborhood type not only by assessing metadata records, but also by comparing their contents to the needs originally expressed by users interviewed during *Phase 1 –Information Demand* of the study.

By combining Hill's spatial match with Lanfear's relevance ranking methods, the study examines the linkages between information discoverability and the selected neighborhoods. In addition, the qualitative characteristics of the selected neighborhoods are examined though the interpretation of narratives available in the metadata records found through digital libraries. Teddlie and Tashakkori (2009:6) indicate that qualitative analysis of narrative materials is also known as *thematic analysis* because textual information can become thematic data through a series of "inductive and interactive techniques including categorical strategies and contextualizing (holistic) strategies."

Therefore, the interpretative approach to the analysis is inductive because it incorporates users' responses as data to create information representative of the contexts and qualitative aspects of the demanded information. Thematic interpretation of this knowledge will be used to develop categories or clusters of knowledge for the selected neighborhoods. Therefore, the interpretation of the responses will also be analyzed visually through thematic mapping to uncover any potential correlations between information discoverability and particular types of neighborhoods based on socio-demographic characteristics of the sampled neighborhoods.

3.6 Advantages, Disadvantages and Inference Quality Testing

There are several advantages and disadvantages associated with using a mixed research method to design and conduct the research inquiry.

3.6.1 Advantages

A mixed method approach is appropriate for this inquiry because the research takes place in its natural neighborhood setting. It also provides for the incorporation of flexible open-ended questionnaires as the main instruments to guide a series of semi-structured interviews to identify users' informational needs. Consequently, participants' knowledge about community development and local environmental planning is integrated directly into the analysis. Gaber and Gaber (2007) point out the importance of incorporating both of these aspects –natural setting and community participation- into the research approach for conducting robust qualitative data analysis.

3.6.2 Disadvantages

One disadvantage of this research method is that it depends on the availability of extant neighborhood geospatial boundary files. Therefore, its applicability is heavily dependent on local neighborhood boundary information availability from the beginning. Nonetheless, as pointed out above, the increasing development of Web 2.0 bidirectional online applications provides many readily accessible interactive tools for users to become producers of neighborhood based geospatial information worldwide. Moreover, although questions about online access have been raised regarding participatory representation, recent research has also demonstrated the usability of web content analysis to extract meaningful qualitative information from online narratives.

Creswell (2008:98) points out that a mixed method research requires extensive data collection and demands long period of time to analyze text and quantitative data synchronously. When working with GIS based projects, a considerable amount of time is spent on data collection and manipulation, particularly when working at the local urban neighborhood level. In addition, narrative analysis of metadata records is also a time consuming activity. Therefore, a high level research model was designed as a 'blueprint' to allocate time equally between the two main parts, which concentrate on data collection and production followed by the quantitative and qualitative interpretation of results as the primary milestones of the inquiry.

3.6.3 Inference Quality Testing

The quantitative sciences define the validity of an inquiry approach if a single research method meets four main standards: construct validity, internal validity, external validity and reliability (Creswell, 2008; Yin 2008). Creswell (2008) points out that the strategy to validate accuracy in mixed methods requires 1) interpolation of findings through shared lessons learned and use of existing literature and theory; and 2) demonstrating reliability and generalizability. Teddlie and Tashakkori (2009) indicate that whereas inference quality is associated with internal validity, inference transferability parallels external validity.

3.6.4 Findings Interpolation, Reliability and Generalizability

This study uses insights gained from lessons learned during several Participatory Action Research (PAR) opportunities, literature review, and existing theory to guide data collection and analysis through three interrelated phases deployed to conduct the research inquiry. While the first two phases of the research -***demand*** and ***supply***- focus on data needs assessment, identification and production, the final phase concentrates on information assemblage and analysis to conduct the ***discovery*** phase based on the qualitative interpretation of the quantitative results. Use of mixed method is an appropriate approach to answer the research inquiry because neighborhoods are studied within an urban complex while incorporating community participants input to develop locally representative data.

In addition, this multi-phase mixed method approach provides opportunities for *quantitizing* and *qualitizing* data through a series of sequentially interrelated parts that integrate bottom-up needs with both top-down resources and data requirements to analyze phenomena within their local natural environments. The holistic and participatory approach employed to analyze local information dynamics is also transferable to study neighborhood information discovery within other large and complex urban environments, thereby meeting external validity criteria.

CHAPTER 4
Information Demand

This chapter describes the Community Based Organizations (CBOs) selected as representative cases to gain insights about information demands issues experienced by local users. The missions, programs, and activities of two 501(c)(3) organizations selected for the study are summarized and presented with an overview of their information dynamics in relation to the planning projects they conduct. As indicated in *Chapter 3-Research Design*, the two CBOs selected for the study are representative of the variety of local organizations operating throughout the area. Consequently, studying their uses and needs for geospatial and other public data, is important to understand CBOs' experiences and demands for local information to conduct planning activities to sustain local neighborhoods within much larger and complex urban environments, particularly in Bronx County, NY, which is part of the largest US metropolitan area.

The two selected CBOs are: 1) The Bronx River Alliance and 2) Phipps Community Development Corporation (Phipps CDC). While both organizations work towards achieving neighborhood sustainability, the former focuses on environmental and ecological issues around neighborhoods abutting the Bronx River, and the latter addresses aspects related to human, socioeconomic, and community development in various Bronx neighborhoods and other New York City areas. Consequently, both CBOs perform essential planning functions throughout strategically selected neighborhoods within the study area.

Figure 4.1 Propinquity of Selected Community Based Organizations

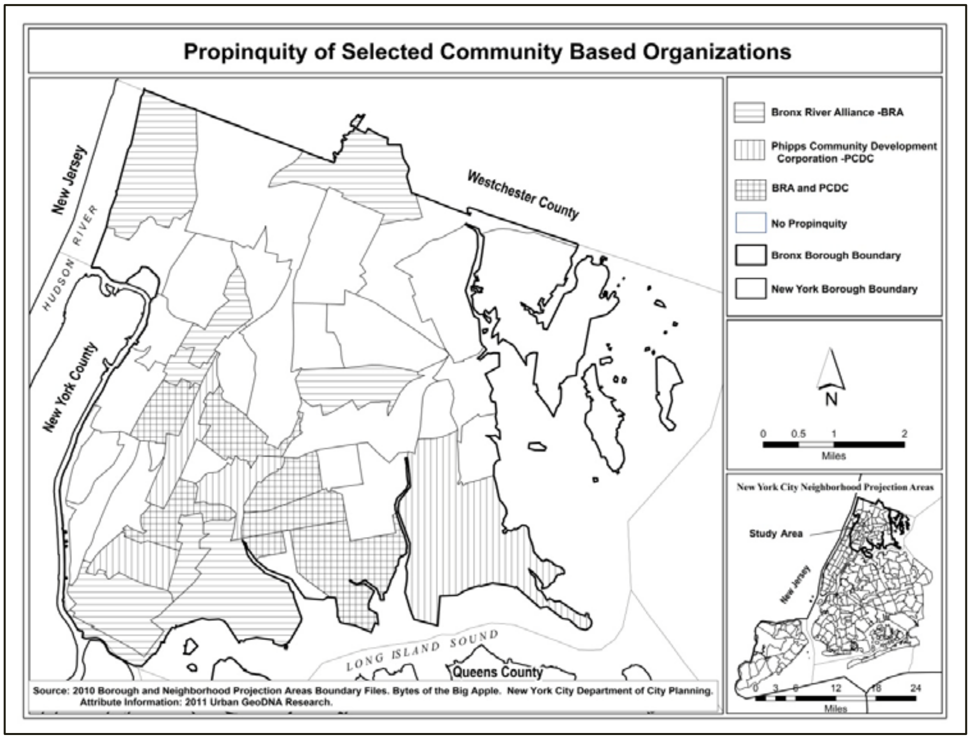


Figure 4.1 Propinquity of Selected Community Based Organizations shows the general geographic extent of the selected organizations' service areas. The figure shows the distribution of neighborhoods of interest[1] where the selected organizations conduct planning activities. It is mapped at the local level using Neighborhood Projection Areas boundaries outlined in the New York City Department of City Planning's Bytes of the Big Apple dataset. While overlapping interests are concentrated towards the center and southernmost areas, there are some neighborhoods of interest where these organizations operate in other parts of the borough. In addition, The Bronx River Alliance indicated working with additional neighborhoods abutting the river in a more general map of the borough (see section *4.2.7 Service Area Overview below*).

[1] A complete neighborhood of interest analysis is performed in *Chapter 6- Information Discovery*.

The two organizations selected play an important role in local sustainability and participatory planning within the borough because their projects and activities act as centralizing forces for residents and representatives from other CBOs and governmental offices to interact with each other through the many steps of the planning processes affecting local neighborhoods. According to the US Internal Revenue Service (IRS)[2] publication # 557, "An organization may qualify for exemption from federal income tax if it is organized and operated exclusively for one or more of the following purposes.

- Religious
- Charitable
- Scientific
- Testing for public safety
- Literary
- Educational
- Fostering national or international amateur sports competition
- The prevention of cruelty to children or animals

This online publication lists 2,118 Bronx charitable organizations registered with the US IRS in a variety of areas including tenant and block associations, medical and educational institutions, faith based groups, development corporations, and many other organizations that are currently engaged in neighborhood projects. Working with a small number of case studies that represent these CBOs is important to gain insights about the larger population's experiences with the use of public information for local development and environmental planning. By studying a smaller representative group it is possible to ask questions that pertain to the overall needs of the larger population. A case study approach also serves to understand information demands from the bottom-up as experienced by local CBOs.

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[2] http://www.irs.gov/app/pub-78/

4.1 Information Demand Overview

The information demand analysis is based on seven interrelated parts designed to gain knowledge about each organization's mission, staff, programs, resources, as well as practices concerning the use, needs and geographic extent of their public information demands. These seven parts (see Table 4.1below) are part of the open-ended questionnaire (see Appendix G) that was used as the primary research instrument used to conduct semi-structured interviews with respondents from the two selected CBOs.

Table 4.1 Demand Questionnaire Sections

1. Mission and Development
2. Organization's Composition
3. Programs and other Resources
4. Information Usage Overview
5 Information Gathering Overview
6 Information Demand Overview
7 Geospatial Information Extent Overview

Using the seven questionnaire sections, the overall mission of each selected CBO case is first reviewed to understand the general organization as well as the main goals and objectives. Then, the general composition of each case is assessed by looking at the assemblage of personnel, volunteers, board members, and local community groups that participate in local programs as well as in the production of information and other organizational resources. The final section of the questionnaire contains an overview of how each organization uses, gathers, and demands information within a series of neighborhood geographies.

4.2 Demand Case Study #1 – The Bronx River Alliance

The Bronx River Alliance is a local CBO environmental organization which was incorporated as a 501(c)(3) nonprofit charitable organization in 2001. The Alliance's work within Bronx County predates its official incorporation back to the early 1990's when a group of local Bronx activists united to raise awareness about environmental pollution and the overall ecological degradation that was affecting the Bronx River and its surrounding neighborhoods.

4.2.1 Mission and Development

The Bronx River Alliance's overall mission is centered on the restoration of the Bronx River and the protection of its surrounding neighborhood environments. To achieve this goal, it relies on a number of participatory activities designed to incorporate a large number of players including staff, volunteers, CBOs, local businesses, in-kind donors and other representatives from local, state, and federal governmental agencies. A *List of Bronx River Alliance Supporters and Donors* is included in *Appendix F* at the end of this dissertation.

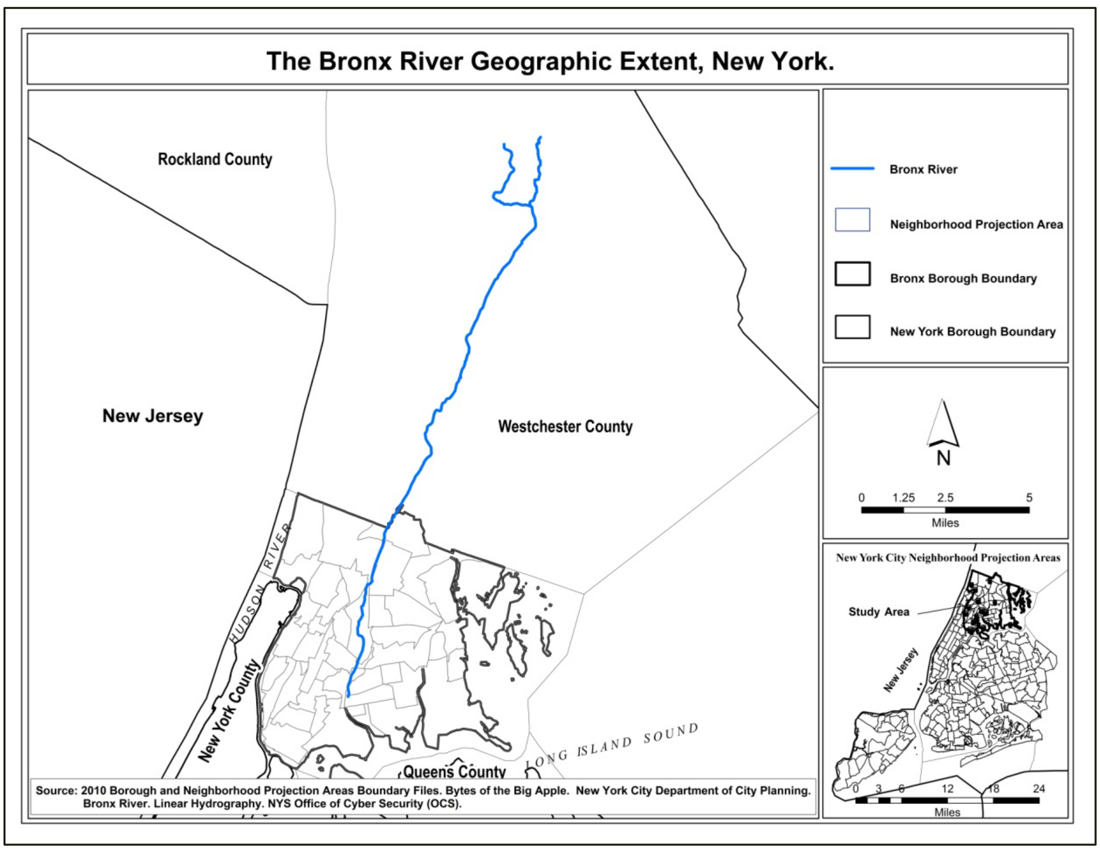
4.2.1.1 History

As indicated above, The Bronx River Alliance's 501(c)(3) status was finalized in 2001 following the work initiated by a group of local activists who worked together to address issues concerning the detrimental effects uncontrolled industrial pollution was having on the river during preceding decades. Since then, the Bronx River became an important planning element within the borough because not only it is an important ecological feature but also a centralizing entity for participatory planning to take place among many players.

4.2.1.2 Geographic Extent

Starting at the Kensiko Dam in Westchester County, NY, the Bronx River runs down south for about 23 miles through Bronx County, NY, until it merges with the East River into the Long Island Sound. *Figure 4.2 The Bronx River Extent* shows the entire extent of the river. The World Conservation Society characterizes the river as an important ecological asset for local, regional and even global environmental sustainability as many species use it as a stopover between large migration routes. [3]

Figure 4.2 The Bronx River Extent



[3] The World Conservation Society (WCS) highlights the stopover functionality of the Bronx River for various migrating species at http://www.wcs.org/where-we-work/north-america/united-states/the-restoration-of-the-bronx-river.aspx.

The Bronx River Alliance's homepage points out that it functions as "…*a coordinated voice for the river…*" and in a participatory manner since its "…*values are born out of desire to empower communities… value and respect [*their*] needs, priorities, input, participation, and independence.*" The Alliance works in cooperation with the New York City Department of Parks & Recreation and with a large number of other partners, donors, and volunteers. Its general geographic extent is described in section *4.2.7 Service Area Overview* below.

4.2.2 Organization's Composition

The Bronx River Alliance is composed of approximately 20 members including staff, interns, and volunteers who are organized into an Ecology Team, a Greenway Team, an Education Team, and an Outreach Program and Recreation Team. These teams work with Board of Directors members as well as other CBOs, partners and supporters.

The Board of Directors is comprised of 13 voting members, 1 Director Emeritus, 2 Honorary Members and 7 Ex-Officio. Members are representatives from local CDCs, residents, as well as several city offices. Such wide and open participatory approach to environmental planning ensures representation from all interested parties.

Partners and Supporters. The Alliance relies on the participation and support from many individuals and a large number of organizations including other CBOs, federal state and city governmental units, schools, and other supporters (see Appendix F).

Ecology Team. This team includes scientists, members of regulatory agencies as well as CBOs representatives. Its main focus is on ecological restoration projects related to the Bronx River and surrounding communities.

Greenway Team. This team is comprised of planners, designers and advocates from CBOs and government agencies working to create the Bronx River Greenway, a 23 mile bike and pedestrian pathway that link parkland in Bronx and Westchester counties.

Education Team. This group includes teachers, scientists, and other local participants involved in the development of educational programs for classroom activities while monitoring the river's health.

Outreach Team. This team is formed by community, civic, and business participants interested in expanding public outreach and access to the river events such as the Amazing Bronx River Flotilla, the Bronx River Festival, as well as ongoing clean-up days and restoration projects.

Recreation Team: This group is in charge of deploying a number of leisure and recreational activities such as bike rides and canoe trips to attract people to the river from different areas throughout the city and other adjacent counties on an ongoing basis.

4.2.3 Features, Programs, and Resources

The Alliance conducts a wide range of local planning activities designed to protect the Bronx River and the many communities located within its rivershed. The main activities include:

- Management of the Bronx River corridor and its greenway corridor
- Deployment of small and large scale restoration projects
- Coordinating and linking greenway projects with Westchester County
- Providing technical assistance to other community-based planning projects
- Conducting educational and training activities
- Collecting and disseminating data on watershed quality

4.2.3.1 Reports and Products.

The Bronx River alliance provides an online search page[4] for users to query information, reports and other products. Besides copies of reports, articles, and other products, it also provides access to the following maps:

- Bronx River Greenway Map
- Bronx River Greenway Phasing Map
- Bronx River Watershed Map
- Bronx River Drainage Areas

4.2.4 Information Usage Overview

The Bronx River Alliance utilizes publicly available geospatial and other environmental data to conduct planning activities. Having access to public information is of paramount importance for this organization to achieve its main goals and objectives.

4.2.5 Information Gathering Overview

The Alliance utilizes information collected from public sources and combines it with data collected out in the field through its many programs and activities. Primary data are collected on a project specific basis and are used to manage its programs designed to maintain and protect the health of the Bronx River.

4.2.6 Information Demand Overview

Although it operates in close cooperation with the New York City Department of Parks and Recreation (NYCDPR), the Alliance lacks access to GIS software and therefore does not employ geospatial and other information used by the NYCDPR and other city agencies for environmental management. Therefore, its data demands are also

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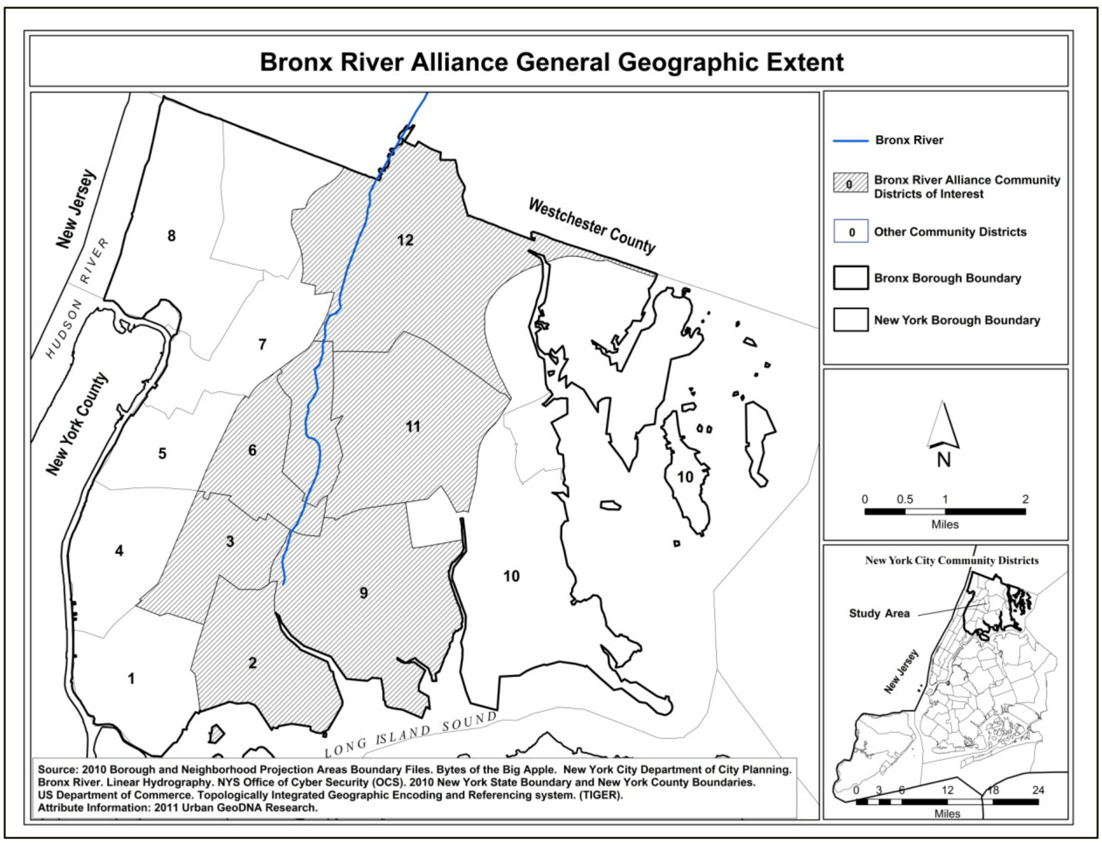
[4] The Bronx River information Search engine is located at http://bronxriverdata.org/

accompanied by the need to acquire software to be able to utilize and to benefit from geospatial information.

4.2.7 Service Area Overview

The Bronx River Alliance's geographic extent overlaps a large number of neighborhoods within several communities abutting the Bronx River. Figure 4.3 *Bronx River Alliance* G*eneral Geographic Extent* shows the extent of this organization's general service area based on the Community District geographies.

Figure 4.3 Bronx River Alliance General Geographic Extent



4.3 Demand Case Study # 2 – Phipps Community Development Corporation

Charged with the human development and socioeconomic functions of its parent organization Phipps Houses Group, Phipps Community Development Corporation (Phipps CDC) has provided programs and services in several neighborhoods in the counties of The Bronx and New York for over 50 years. These services include educational, vocational, job training, and community development programs.

Currently, Phipps CDC serves over 8,000 individuals through more than 40 programs funded in part by government grants and contributions from foundations, corporations, and private individuals. According to its homepage, the parent company is "…New York City's oldest and largest nonprofit developer of affordable housing."[5] Phipps Houses is composed of three main functional programs: 1) The Phipps Houses Real Estate Group, which oversees housing development; 2) Phipps Houses Services, Inc., which manages all Phipps developments and properties; and 3) Phipps CDC, which is in charge of community development programs and the selected case for this study.

4.3.1 Mission and Development

The Phipps CDC's primary mission is to improve the overall quality of life of individuals and their families by providing programs and activities "…that enhance their ability to strengthen their neighborhoods…"[6]

4.3.1.1 History

Phipps CDC was founded in 1972 to serve the needs of Phipps Houses residents. Its programs are designed to serve individuals and families residing within specific low

[5] http://www.phippsny.org/index.html
[6] http://www.phippsny.org/pcdc.html

income neighborhoods in New York City including West Farms, Melrose, and Morrisania in the Bronx, and Bellevue South in Manhattan.

4.3.1.2 Geographic Extent

The Phipps CDC provides human services, housing, and management services throughout many New York City neighborhoods. *Figure 4.4 The Phipps Houses Group Service Area* shows the location of the facilities owned and managed by this group.

Figure 4.4 The Phipps Houses Group Service Area

From: http://www.phippsny.org/images/location_map.gif

4.3.2 Organizational Composition

As indicated above, this organization is part of the Phipps Staff, Volunteers and Local Participation

4.3.3 Features, Programs, and Resources

Phipps CDC services are delivered through the following series of interrelated programs:

- Adult & Community Recreation
- After-School & Teen Programs
- College Advisement
- Educational Technology
- Family Literacy
- Family Support Services
- Financial Empowerment Center
- Growing Through Greening
- Literacy/Adult Basic Education
- NYC Justice Corps
- Work Readiness

These services are available at eight different Phipps CDC Community Centers:

- Phipps West Farm Beacon
- Phipps Beacon at the Piagentini and Jones Campus
- Phipps Cornerstone Community Program at Soundview Houses
- West Farms Community Education Center
- West Farms Technology & Career Center
- Phipps Opportunity Center
- Phipps Classic Center
- Phipps Turning Point

4.3.3.1 Reports and Products

The Phipps CDC produces reports on an ongoing basis to meet finding requirements. These reports are not available at public libraries but are submitted to funding organizations and its internal library.

4.3.4 Information Usage Overview

Phipps CDC utilizes primary and secondary data to conduct its programs. Primary data are collected through clients' interviews and community surveys designed to collect information indispensable for daily management and program reporting. These data are then tabulated from individual forms and aggregated by neighborhood study area for program assessment and funding purposes.

Secondary data utilized by this organization are readily available from public sources such as the US Census of Population and Housing. Phipps CDC does not utilize geospatial or environmental information to conduct its programs and projects. Datasets normally used by this organization include demographic, socioeconomic, health, education, and transportation related information.

4.3.5 Information Gathering Overview

Data are gathered through project-based surveys and/or through intake forms that are filled out by new program clients. Datasets are used to measure a wide variety of issues ranging from the psychological and psychosocial aspects of participants including speaking confidence, change in self esteem, as well as skills development and level of empowerment through reading skills and knowledge acquisition.

4.3.6 Information Demand Overview

Although Phipps CDC requires local neighborhood data to run its programs, it does not normally engage in any special FOIL or FOIA data request. Instead, the organization produces its own data through community surveys to incorporate local neighborhood knowledge into a variety of analyses.

4.3.7 Service Area Overview

Phipps CDC's programs and activities are designed to serve specific low income neighborhoods in the poorest sections of New York City. *Figure 4.4 The Phipps Houses Group Service Area* shows the general geographic extent of the services it provides.

CHAPTER 5
Information Supply

This chapter describes the case studies selected from the group of libraries that are currently supplying local information to users within the study area. The two supply cases selected are representative of the types of libraries that maintain and supply information about their collections of local resources available for users to learn about neighborhood environments. In addition, both cases are important examples of public, educational, and governmental libraries operating throughout the study area.

The first case is the New York City Hall Library, which works in parallel with the Municipal Archives under the New York City Department of Records and Information Services (NYCDORIS). The second case is the Leonard Lief Library of Lehman College of the City University of New York (CUNY), a Federal Designated Library Depository (FDLD) that serves the needs of a wide audience composed of students, researchers and the general public.

An overview of their mission, composition, resources, and supply of information available to meet users' demands is presented along with a review of their interlibrary exchange programs and the geospatial extent of their collections at the end of the chapter. A complete analysis of the information demands from library users is performed in the next *Chapter 6 – Information Discovery*.

5.1 Information Supply Assessment Overview

The increasing amounts of geospatial information being produced by multiple actors are prompting libraries to update their search engines to facilitate information discovery, particularly at the local neighborhood level. In this study, issues concerning the supply of information used for local community development and environmental planning within the study area are studied by assessing how users request local neighborhood information as well as the type of informational resources they request and access, through the two selected cases mentioned above.

Elements used to evaluate information supply from these libraries are organized into seven interrelated parts which are part of the open-ended *Information Supply Assessment Questionnaire* (see Appendix I). Incorporated as a tool within the research protocol, this instrument serves as the primary mechanism to conduct a series of semi-structured interviews with respondents from the two selected cases. The seven questionnaire parts are:

Table 5.1 Supply Questionnaire Sections

1. Mission and Development
2. Organization's Composition
3. Programs and other Resources
4. Information Usage Overview
5 Information Gathering Overview
6 Interlibrary Information Demand
7 Geospatial Information Extent Overview

5.2 The New York City Hall Library

The New York City Hall Library is located in City Hall Park in downtown Manhattan and is designated the official depository for all documents produced by city agencies. The current number of books and reports available in its various collections totals about 250,000 items. It operates under the direction of NYCDORIS which also oversees three other divisions; The Municipal Archives, the Municipal Records Management Division, and the Information Technology Division. Together, these four divisions are charged with maintaining and disseminating materials produced by local agencies to guide neighborhood development and planning projects in New York City.

The two main administrative statuses that guide the preservation and dissemination of public records are:

1. New York City Charter- Chapter 72, Section 3004.(4)(d)
2. New York City Local Law No. 11 of 2003

1. The New York City Charter- Chapter 72, Section 3004.(4)(d), directs the NYCDORIS to "…establish, maintain, and operate facilities for the storage, processing and servicing of records for all city agencies pending their deposit in the municipal archives or their disposition in any manner as may be authorized by law."

2. Local Law No. 11 of 2003[1] directs New York City to "… lead the nation in using information technologies to improve the efficiency and accessibility of municipal government" and also calls for increased use of internet technology to disseminate digital information of materials produced by city offices. Section 2 of Local Law No. 11 further specifies that:

[1] Local Law in pdf format is available at http://www.nyc.gov/html/records/pdf/law03011.pdf

> *The head of each agency shall also transmit to the department of records and information services or its successor agency, in electronic format, each report, document, study and publication required by local law, executive order, or mayoral directive to be published, issued, or transmitted to the council or mayor, within ten business days of such publication, issuance or transmittal to the council or mayor, which materials shall be made available to the public on or through the department's website, or its successor's website, within ten business days of such publication, issuance or transmittal to the council or mayor…*
> *Where practicable, each agency shall also transmit, in electronic format, to the department of records and information services or its successor agency any report, document, study and publication required to be published by any state or federal law, rule or regulation within ten business days of publication. Such materials shall further be made available to the public on or through the department's website, or its successor's website, within ten business days of such publication.*

Community Boards became subject to the provisions of this law after one year the original law was enacted. Since enactment of Local Law 11 of 2003 the department has provided access to digital copies of documents through automated tools that allow users to purchase services and/or products online. The department has now preserved nearly 1,000,000 documents on microfilm from Mayor David N. Dinkins' administration; catalogued more than 75,000 pictures; and digitized over 800,000 new records along with more than 160,000 additional records. The Municipal Archives collection alone holds over 160,000 cubic feet of archived materials stored on and off site. Through the four divisions, the Department of Records owns one of the largest collections photographs, manuscripts, vital records, moving images, maps and other resources in the world.

5.2.1 Mission and Development

The City Hall Library is the designated official public library for the city to make available materials produced by all city agencies to the public. Its main mission is to facilitate access to these materials to other city agencies and the general public.

5.2.2 Organizational Composition

The City Hall Library is staffed with a total of 2 full time librarians. While it is not part of the New York Metropolitan Library Council, which is a non-profit organization servicing New York City and Westchester County users, the City Hall Library interacts with other metropolitan libraries to find and borrow materials to meet users' needs and demands. Therefore, to meet users' information demands, it operates within an established system of external libraries as well as internal city departments.

The library operates in conjunction with the three other divisions mentioned above. For example, the Records Management Division oversees administration and management of all records; the Technology Division is in charge of systems maintenance and operations; and the Municipal Archives manages record retention operations and also provides public services to all users seeking information produced by all city agencies.

5.2.2.1 The Municipal Archives Mission and Development

The Municipal Archives was created in 1950 to preserve and facilitate access to the historical records spanning over 400 years of New York City history. The main mission of the Municipal Archives is to preserve the historical records produce by over one hundred city agencies for public access. The Records Management Division oversees the administration and management of all informational records pertaining to documents produced by city agencies, the local courts and the district attorneys' offices.

The scope of the entire collection includes both; permanent records stored in the archival collection and transitory records which are subject to an established record retention schedule. The resources contained in its collection include:

Table 5.2 Municipal Archives Resources

• Manuscripts
• Official Correspondence
• Vital Records
• Ledgers
• Moving Images
• Photographs
• Sound Recordings
• Maps
• Architectural Plans

5.2.4 Information Usage and Management Overview

The current records laws calls for information to be managed according to strict retention schedules. Chapter 72 of The New York City's Charter Records Guidelines, Policies and Procedures defines a record as:

> "Records" means any documents, books, papers, photographs, sound recordings, machine readable materials or any other materials, regardless of physical form or characteristics, made or received pursuant to law or ordinance or in connection with the transaction of official city business.

Records to be stored for public documents produced by city agencies are received by the Municipal Records Center and catalogued and maintained by the Municipal Archives Division based on a retention schedule based on the following criteria:

- The record must have a retention schedule from the originating office
- The record must be on an authorized retention schedule
- The record is part of a series and arranged by the retention schedule
- The record series must be organized and separated by retention year
- Only records marked with longer than 3 years retention can be transferred
- All records must have a destruction date issued by the originating agency
- Historic records are retained and maintained as permanent.

5.2.5 Information Gathering Overview

The City Hall Library relies on the collection of information gathered by the four divisions mentioned above. These divisions are directed to gather materials according to The City Charter, Chapter 72, Section 3004.(4)(d) and Local Law 11 of 2003.

5.2.6 Information Supply Overview

The City Hall Library offers access to the materials available in its collections both online and in person. City Hall Librarians provide a number of services and referrals to users through the following types of consultation tools:

Table 5.3 City Hall Library Referral Service Types

• E-Mail consultation
• Answering written correspondence
• Interlibrary loan
• Referral to outside libraries
• Telephone reference
• Walk-in or by appointment

Online search services are provided through The Library's search page[2] using a Mandarin Oasis Library Automation system[3]. This library software system provides tools for cataloging, inventorying, circulation management and report generation. The front end of the basic online search tool provides users with the ability to query the back, database either anywhere, or by subject, by title or author. The enhanced search tool allows for the querying of information using an 'and/or' Boolean search combination of any three of the following items:

[2] http://nyc.mlasolutions.com/m4/opac/m4opac.dll?installation=CityHall&command=getSession&session=33117b93-24fb-11e1-985c-fdf926197db4&style=ui

[3] http://www.mlasolutions.com/products/oasis.php

Table 5.4 City Hall Library Search Elements

• Abstract	• Local Call Number
• Anywhere	• Material Type
• Author	• Publisher
• Publication Date	• Subject
• ISBN	• Title
• ISSN	• Title Series
• LCCN	• URL

Resources can also be found by searching by record type as follows:

Table 5.5 City Hall Library Record Types

• Artifact	• Map
• Book	• Music CD
• Cartographic Materials	• Musical recording
• DVD	• Non-Musical Recording
• Electronic Materials	• Online Resource
• Kit	• Photo/Graphic
• Large Print	• Sheet Music
• Magazine / Journal	• Video Recording

In addition, the search tool also allows users to conduct a *Visual Search* using clickable pictures displaying an associative icon for the following thesaurus entries:

Table 5.6 City Hall Library Visual Search Icons

Animals	***Arts***	***Countries / Cultures***	***Holidays***	***People***	***Science / Technology***	***Sports***	***Stories***
Amphibians & Reptiles	Dance	Africa		Athletes	Computers	Acrobatics Gymnastics	Adventure
Birds	Movies	Antarctica		Artists	Health and Medicine	Baseball	Novels
Bugs & Spiders	Music	Asia		Entertainers	Light & Sound	Basketball	Fairy Tales and Folklore
Endangered & extinct	Painting	Australia		Explorers	Plants	Football	Humor
Invertebrates	Photography	Europe		World Leaders	Space	Hockey Skating	Mystery
Mammals	Sculpture	North America		US Presidents First Ladies	Weather	Soccer	Plays
Sea Creatures	Television	South America		Scientist Inventors		Swimming	Poetry
	Theater			Writers			Science Fiction

A large majority of the records available in the Library's collections date back to the 17th Century, and are only available in paper or microfilm format. These include:

Table 5.7 City Hall Library Paper and Microfilm Collections

• Annotated New York City street name index
• Annual reports from all City agencies
• Biographies of city and state officials
• Budgets and other financial materials
• New York City Civil Service Collection
• Extensive clipping and pamphlet files on New York City matters
• Mayoral committees and commissions
• Microfilm of City Council proceedings,
• Annual reports of agencies, Board of Estimate proceedings
• New York City history
• New York City neighborhood files
• Newspapers including New York Law Journal, The Chief, The City Record
• Back years of the New York Times and the Chief on microfilm
• Proceedings and minutes of City Council, boards and other legislative bodies
• Rules and regulations of New York City agencies
• State, Federal and other public agency publications
• Annual Civil List of current New York City Employees

5.2.6.1 Additional Department of Records Information Supply

As indicated above, Local Law 11 of 2003 directs the NYC Department of Records to make available to the public copies of documents published by all city agencies in digital format. Consequently, the Department homepage provides access to a large number of records through its digital collections including:

Table 5.8 New York City Department of Records Digital Collections

Photo Gallery	***Publications***
• Aerial & Panoramic Views	• Business and Consumers
• Bridges	• Cultural/Entertainment
• Celebrities	• Education
• City Departments	• Environment
• Civic Center	• Finance and Budget
• Crime & Criminals	• Government Policy
• Education	• Health
• Hospitals & Public Charities	• Housing & Buildings
• Housing	• Human Services
• Landmarks	• Labor Relations
• Mayors	• Public Safety
• Parades	• Recreation/Parks
• Sports	• Sanitation
• Street Scenes	• Technology
• Times Square, Grand Central, Penn Station	• Transportation
• Transportation	***Vital Records***
• Waterfront	• List of Holdings
• WPA (Works Progress Administration)	• Birth Certificate
• Working	• Marriage Certificate
	• Death Certificate
	• Heirloom Certificate

5.2.6.2 The Municipal Archives Collections

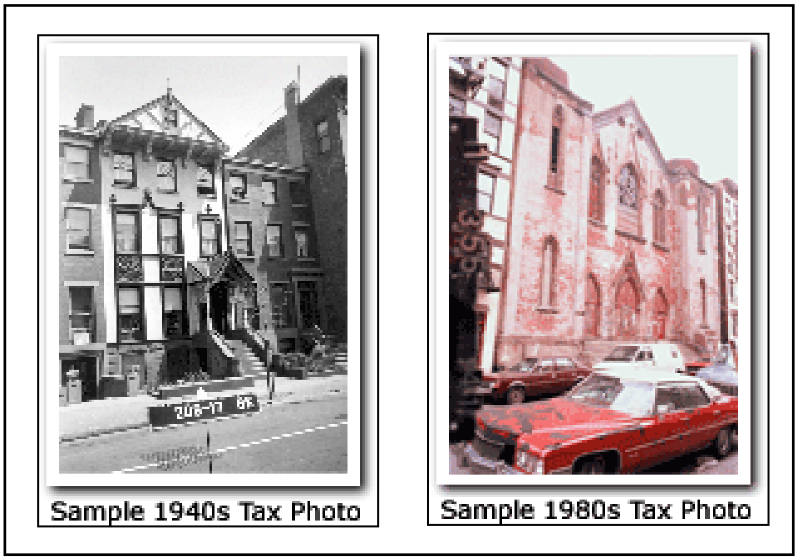
The Municipal Archives maintains the following special collections:

Table 5.9 Municipal Archives Special Collections

• Almshouse, 1758-1953	• Court Records, 1684-1966
• Real Estate Assessed Valuation 1789-1979	• District Attorney Records, 1895-1971
• Board of Education, 1842-2002	• Genealogy, 1795-1948
• Brooklyn Bridge, 1867-1938	• Mayor Dinkins, 1990-1993
• Department of Buildings, 1866-1975	• Mayors, 1849-present
• US Census	• "Old Towns," 1663-1898
• City Cemetery, 1881-1950's	• Department of Parks, 1850-1960
• City Council, 1647-1977	• Photographs, 1889-1956
• Civil List, 1883-1967/68	• WNYC, 1936-1981
• Coroner and Office of Chief Medical Examiner, 1823-1946	• WPA Federal Writers' Project (NYC Unit), 1936-1943

In addition, the City Hall Library maintains a collection of photographs of every single house and building in the city from two different periods between 1939 through 1941, with some additional entries from the 1980s. Users can view these pictures and also purchase copies directly from the library.

Figure 5.1 City Hall Library Tax Photos Collection



From: http://www.nyc.gov/html/records/html/taxphotos/home.shtml

Another important collection maintained by the library is the early Manhattan Jury Censuses which dates back to 1816, 1819, and 1821.[4]

5.2.7 Geospatial Information Extent Overview

The City Hall Library owns and preserves the original paper-based NYC Street Names Index. This index covers the entire city and is not available in digital format. Librarians expressed an interest in digitizing this geographic information data source. The library maintains a thesaurus of neighborhood names organized by keywords for users to conduct searches for local information.

[4] Jury Census information - http://www.nyc.gov/html/records/html/collections/collections_census.shtml

5.3 The Leonard Lief Library of Lehman College

The Leonard Lief Library of Lehman College of the City University of New York-CUNY- is a public educational library. It is part Federal Depository Library Program (FDLP) designed to archive government documents and also one of the main 28 CUNY libraries located throughout New York City (See Appendix H).

The Government Documents Librarian oversees the daily operations of the public governmental resources which are available to the public during library hours. Materials supplied by the US Government Printing Office (USGPO) are available in digital format through the GPO can be queried by the following categories:

5.10 Leonard Lief Library US Government Printing Office Categories

• Health & Nutrition
• Laws, Statistics, & Presidential Materials
• Science & Technology
• Business & Careers
• Education
• History
• World Maps

Of the total 77 FDLP libraries in New York State, 25 are located in New York City and only 3 in The Bronx (See Appendix H). *Table 5.3 GPO Libraries* shows the distribution of these libraries by borough in New York City.

Table 5.11 Government Printing Office Libraries in New York City

Borough	***# of Depositories***
Bronx	3
Brooklyn	4
New York	13
Queens	4
Staten Island	0

5.3.1 Mission and Development

The Lehman Lief Library main mission is to serve the informational access needs of the public. It is the only four-year college public library in the Borough of The Bronx, NY. It serves the needs of graduate, undergraduate, and other researches from CUNY colleges. As a FDLP, it also serves the needs of the general public per Federal mandate. Users are allowed to visit the library and request access to government documents.

5.3.2 Organizational Composition

The Lehman Library currently employs a total of 15 full time librarians, 6 faculty and 9 specialists. It also has 8 part time adjunct members who provide services in a variety of specialties. The Government Documents Librarian provides services to users' requesting information and materials for local neighborhood planning and development.

In addition, a Lecturer specializes in geographical and geological information sources and also maintains abreast of new literature emerging within these subjects. The library does not have GIS-based search engine or specialized GIS staff.

5.3.3 Features and Programs

The Leonard Lief Lehman Library is located on the eastern side of The Lehman College Campus. Its homepage is located at http://www.lehman.edu/library/. The library offers users a variety of information access services within the main area:

Table 5.12 Leonard Lief Library Service Areas

• Research Resources
• Library Services
• Library Information
• News & Feedback
• Support the Library

Although it lacks geospatial searching functionality, this library offers access to general maps which can be searched via a database subscription called "AtoZ Maps Online" which is located at http://www.atozmapsonline.com.memex.lehman.cuny.edu:2048/a-z_maps_online_home.asp?c=hlc

Figure 5.2 A to Z Maps Online Frontend

However, this generalized map search engine lacks geospatial information and maps about The Bronx. Instead, users need to query the main CUNY library system to find maps, images, etc.

5.3.4 Information Usage Overview

This library serves the needs of a four-year college clientele as well as the surrounding community. Users from outside the college are allowed to enter the library to access GPO documents.

5.3.5 Information Gathering Overview

As an FDLP site, the Lehman Lief Library receives copies of information materials produced by Federal governmental agencies automatically.

5.3.6 Information Supply Overview

The Lehman Library is part of a consortium of 28 CUNY which together hold more than 7.5 million print volumes and several hundred thousand e-books. Currently this library does not provide geospatial information to users.

5.3.6.1 Special Digital Collections

Currently, the Lehman Library hosts a number of special digital collections that are available online to the general public. These collections include:

Bronx Business for Everybody: This collection contains a number of digitized photographs, articles, and copies of the Bronx Chamber of Commerce Minutes Collection (Digital METRO New York project, 2006) [5]

Bronx Architecture: This collection contains a guide to the borough's architecture. It accompanies the "Public Art in the Bronx" exhibit and provides references to over 75 buildings, neighborhood histories, walking tours, and several maps.[6]

Public Art in the Bronx: A combination of public art works created during the 1930s under the *Work Projects Administration* (*WPA)* and more recent projects such as Arts for Transit, Health and Hospital Corporation, Percent for Art, Port Authority of New York and New Jersey, Public Art Fund, and New York State Dormitory Authority.[7]

Childhood in the Bronx: An assemblage of digitized contemporary photographs by Georgeen Comerford and other vintage images. There are also oral history sound

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[5] http://www.lehman.cuny.edu/provost/library/BronxBusiness/index.htm
[6] http://www.lehman.edu/vpadvance/artgallery/arch/
[7] http://www.lehman.edu/vpadvance/artgallery/publicart/

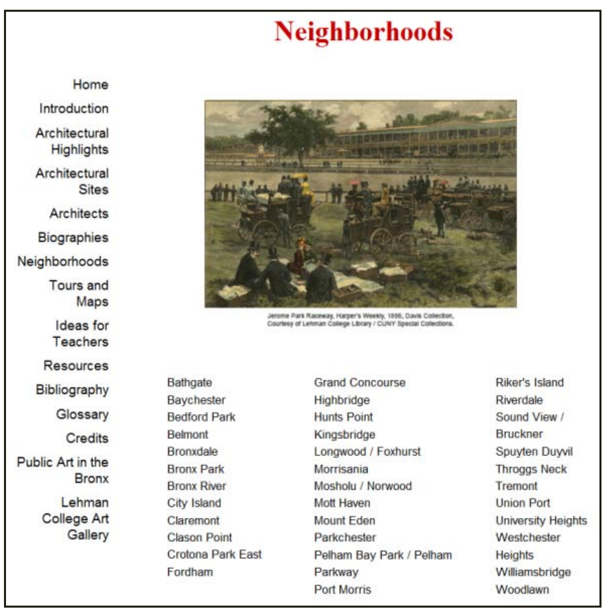
excerpts from the Collections of the Bronx Institute Archives of Lehman College from the Digital METRO New York project of 2009.[8]

Digital Preservation of Publishing in Irish-America: This digital collection was created by the CUNY Institute for Irish-American Studies. It contains over 70 digitized full text books that were originally published in the U.S. from 1820 to 1922; an image bank of maps, landscapes, portraits, and other documents is linked to full text entries. [9]

5.3.7 Geospatial Information Extent Overview

The Lehman library maintains an extensive list of public collections and makes these materials available to users, both online and on site. Most of its collections are focused on Bronx County and several are focused at the neighborhood level such as the digital collection "*Neighborhoods*" which is hosted at:

Figure 5.3 Lehman College 'Neighborhoods' Digital Collection



http://www.lehman.edu/vpadvance/artgallery/arch/neighborhoods/index.html.

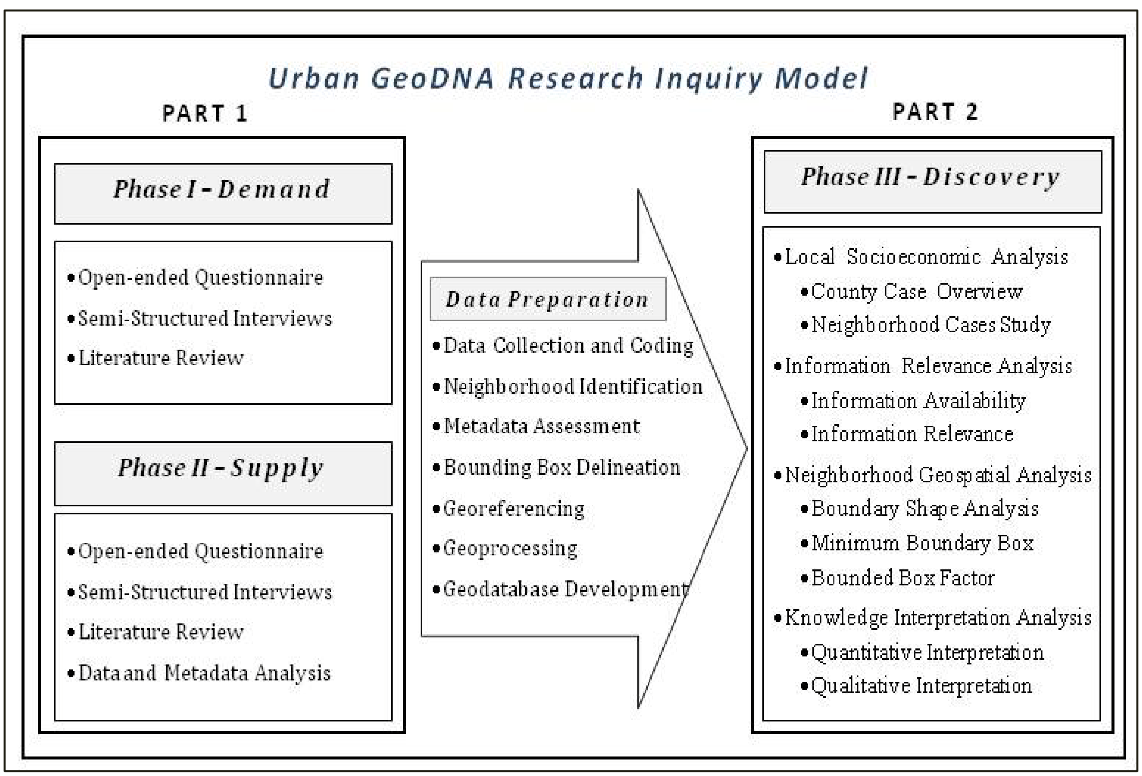
[8] http://www.lehman.cuny.edu/library/childhood-bronx/
[9] http://www.lehman.cuny.edu/lehman/irishamericanstudies/bcartlann.html

CHAPTER 6

Information Discovery

This chapter contains ***Part 2*** of the study. It first describes a series of data tasks conducted to prepare data collected during the previous two phases and then expands into the final analysis outlined under ***Phase III-Discovery***. Questionnaire responses collected in ***Part 1*** are analyzed to assess data availability and needs from the *demand* and *supply* sides of the information *discovery* research design. The geography of neighborhoods of interest is assembled from data collected from respondents through the questionnaires to develop information to populate the GeoDNA database created for the study. The last section of the chapter contains a series of analyses as outlined under ***Phase III-Discovery*** in the research inquiry model shown in *Figure # 6.1 Data Processes and Information Discovery*, which was discussed in detail in *Chapter 3-The Research Design*.

Figure 6.1 Data Processes and Information Discovery



6.1 Data Preparation

Several numerical and geographic datasets were developed from data gathered during the first two phases in ***Part 1*** of the research. These datasets were used to create layers of information to be loaded into the geodatabase. *Figure 6.2 Data Preparation Steps* lists the main processes employed to develop the GeoDNA database for the study.

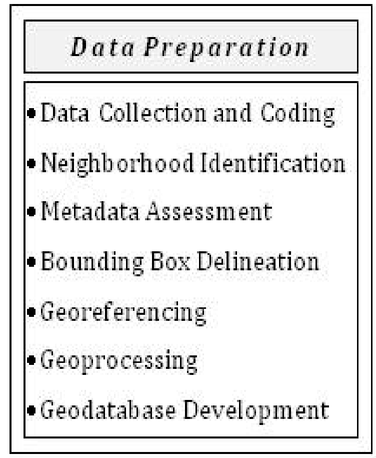


Figure 6.2 Data Preparation Steps

First, primary information was developed from data gathered during the semi-structured interviews with respondents from the selected cases. Participatory Action Research (PAR) principles guided the design of the research protocol to allow for the inclusion of knowledge from users and suppliers of local information. Therefore, qualitative and quantitative data gathered from respondents through the open-ended questionnaires form the basis of the data gathered for the discovery analysis.

Second, geographic and attribute datasets were gathered and archived into an FGDC/ISO compliant archival system of folders. This structure was also used during the demand and supply information gathering activities in coordination with a series of keywords obtained from an earlier version of the geodata.gov web portal to facilitate data lineage identification for the GeoDNA database assemblage.

Third, an initial database design process was performed to develop the structure for the data tables to house the information available and/or created from users engaged in local community and environmental planning. Qualitative information gathered from questionnaire responses was combined with quantitative information produced by the US

Department of Commerce Census of Population and Housing, and information developed from local planning reports produced by the New York City Department of City Planning (NYCDCP). In addition, information was developed for a group of neighborhood case samples selected from the list of users' neighborhoods of interest (see section 6.4 below).

6.1.1 Data Collection

A database assessment was performed using a data normalization approach to identify the most basic data elements from the different datasets assembled during the initial phases of the study including coded data from respondents' questionnaires. Therefore, the GeoDNA database model combines elements from both secondary datasets with primary information developed through direct research with respondents. Extant dataset files were gathered from several sources (see Appendix L) and combined with information developed from data collected through the open-ended questionnaires used as protocol for the interviews conducted with research participants (see Appendix G and Appendix I, respectively).

6.1.2 Data Coding

A series of four semi-structure interviews were conducted to assess the local dynamics of neighborhood information with members of the selected CBOs and library cases. Two interrelated questionnaires were developed to assess the demand and supply of geospatial and attribute information at the neighborhood level. Responses obtained during the semi-structured interviews with respondents from the four selected cases were coded in preparation for data quantification and analysis. Coding occurred through both manual data inserts and updates and as well as geoprocessing which included data geocoding, digitizing, extraction, and analysis.

6.1.2.1 Information Demand

A semi-structured questionnaire was developed to assess the demand side of information discovery among local CBOs. Organized into seven interrelated sections, the questionnaire was designed as an open-ended research protocol to assess how the selected organizations use, gather and demand data and geospatial information for community development and environmental planning at the local neighborhood level. The questionnaire contains open-ended questions regarding any potential unmet demands for geospatial and attribute information encountered by participants. The seven sections are:

1. Organization Information
2. Participant's Information
3. Information Usage Assessment
4. Information Gathering Assessment
5. Information Demand Assessment
6. Geospatial Information Extent Assessment
7. Additional Information

1. Organizations and Participants Information

The organization of each CBO participating in the research was described in *Chapter 4 - Information Demand*. The two selected *demand* cases have provided a variety of services to Bronx neighborhoods for over half a century in environmental and community planning. These cases also represent key players within the nonprofit sector in the borough because they work with a number of smaller local planning groups many of which are part of their board of directors and/or advisory teams.[1]

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[1] Information about the participating CBOs is found in Chapter 4 –Information Demand.

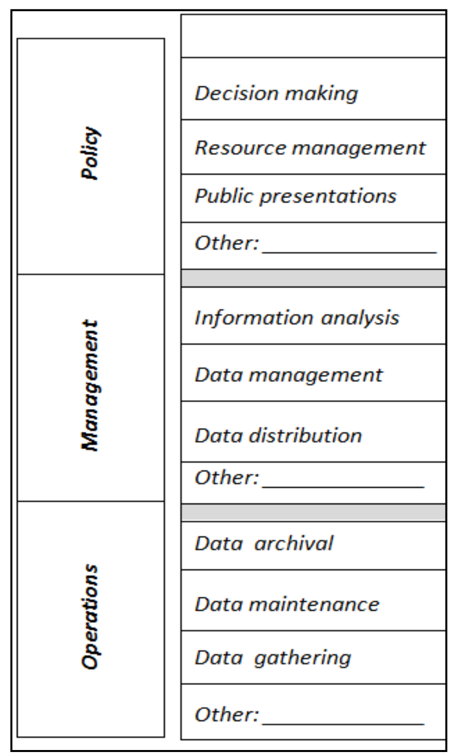
2. Information Usage, Gathering and Demand

Research participants indicated they need to produce primary data not only to manage projects and to meet program goals, but also to produce project deliverables for funders. For example, community development participants collect primary data about individuals receiving assistance through their programs to meet project goals and also per funding requirements. Likewise, environmental planning participants collect multiple types of local data for project management and also for funding compliance. Moreover, in this manner, these CBOs contribute to local environmental protection and community sustainability by producing data that do not exist anywhere else.

a. Information Usage

Respondents were presented with an adaptation of Huxhold's (1991) information management pyramid for them to identify their roles within the information life cycle that takes place within their organizations. *Figure 6.3 Information Demand Management* shows the data elements and processes identified by Huxhold in 1991. Overall, demand case participants indicated being involved at the operational and managerial levels but not at the policy making level where analyzed information is utilized by directors and program managers to develop policy recommendations.

Figure 6.3 Information Demand Management



Randolph's (2004:19) environmental planning processes were adapted to pair data functionality with their main tasks. *Figure 6.4 Planning Information Usage* shows the basic four data tasks elements used to group functional information usage: 1) Inventory, 2) Needs Assessment, 3) Strategic Management, and 4) Implementation and Monitoring.

Figure 6.4 Planning Information Usage

INVENTORY	1. Identify main issues		
	2. Identify stakeholders		
	3. Identify participatory tools		
	4. Create project timeline		
	5. Assemble draft plan		
	6. Determine data sources and availability		
	7. Assess data needs		
	8. Evaluate data fitness		
	9. Develop data gathering		
NEEDS ASSESSMENT	10. Identify data limitations		
	11. Evaluate legal, institutional, technical opportunities		
	12. Evaluate existing questionnaires		
STRATEGIC MANAGEMENT	13. Environmental Impact Statement		
	14. Social Impact Statement		
	15. Cost- Benefit analysis		
	16. Create knowledge matrices		
	17. Create negotiating advocacy tools		
IMPLEMENT MONITOR	18. Stakeholder identification		
	19. Assess plan functioning		
	20. Adaptive process		
	21. Reevaluate		

**Adapted from Randolph's Process for Environmental Planning (2004:19-20) in Environmental Land Use Planning and Management.*

Overall, respondents indicated they conduct data inventory and assessment tasks for planning activities, but fail to use geospatial data 'to create project timeline' or to 'evaluate data fitness'. Environmental planning respondents use data for monitoring and reassessment and community development specialists concentrate more in primary data collection and analysis to meet project goals and to produce deliverables for funders.

The research also sought to assess the types of library materials respondents most often use for planning activities. *Figure 6.5 Library Resources Used by Data Seekers* shows a comprehensive list of the resources found in most libraries.

Figure 6.5 Library Resources Used by Data Seekers

	Y/N	*Please specify*
Scholarly Articles		
Newspapers		
Whitepapers		
Microforms		
Books		
Encyclopedias		
Blogs		
Websites		
Maps		
Attribute Data		
GIS Data		
Library/Museum Collections		
Environmental Impact Statements		
Other Governmental Reports / Plans		
Community Plans / Reports		
Community Newsletter/other		
Television Programs/News		
Sound Recordings		
Video/Film		
Oral Histories		
Other		

While community development participants reported producing primary data rather than using library resources, environmental planning participants indicated they produce primary data and also access materials both online and from traditional libraries. One respondent indicated using the New York City Department of Records and Information Services (DORIS) to obtain planning information. In addition, they reported using other planning resources such as social media, postcards, and fliers to disseminate information about their planning activities and events.

Respondents from both cases reported having to conduct additional steps to prepare datasets to analyze data. For example, community development participants indicated using SPSS (Statistical Package for the Social Sciences) for numerical data analysis, and environmental participants found "there is a need for extra importing of data from a variety of resources to create meaningful maps/data."[2] Some participants also indicated that although standalone GIS software packages are becoming more available for local planning, "online features are easier to use than software but there is a level of comfort that is not shared throughout the organization"[3] when using online services.

b. Information Gathering

All participants indicated their organizations conduct primary data collection activities on a regular basis. Community development programs employ trained personnel to collect data from individual clients to produce aggregate information for project management and reporting. Environmental planning participants rely on volunteers working in conservation crews within the catchment area to collect local data. While data gathered by environmental groups can be made available since they are about public spaces, data collected by community development participants is subject to strict privacy regulations and can only be used in aggregate format for internal purposes.

All participants reported using survey sheets to collect primary data for their projects. These sheets are developed on a project by project basis and without any data normalization or congruity between different projects' database. Environmental planning participants incorporate Global Positioning System (GPS) technology occasionally into some studies to collect local geospatial and environmental data.

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[2] Part of open-ended answer to question #3.10 in Case #1's Demand Questionnaire.
[3] Ibid.

Participants from environmental organizations indicated a higher frequency of use of federal and city level data than community development specialists who mostly rely on internally produced primary data. While all participants indicated using the US Census webpage to gather socioeconomic data, environmental group participants pointed to the use of National Oceanic and Atmospheric Administration (NOAA) to gather ecological data. All users also reported using the New York City Department of City Planning (NYCDCP); New York City Department of Parks and Recreation (NYCDPR), New York City Department of Environmental Protection (NYCDEP), New York City Department of Transportation (NYCDOT) and New York City Department of Education (NYCDOE).

Figure 6.6 Rating Information Searches Results

	Very Useful	Useful	Somewhat Useful	Not Useful	Disappointing
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					
Other (Google, etc,)					
Other sources					

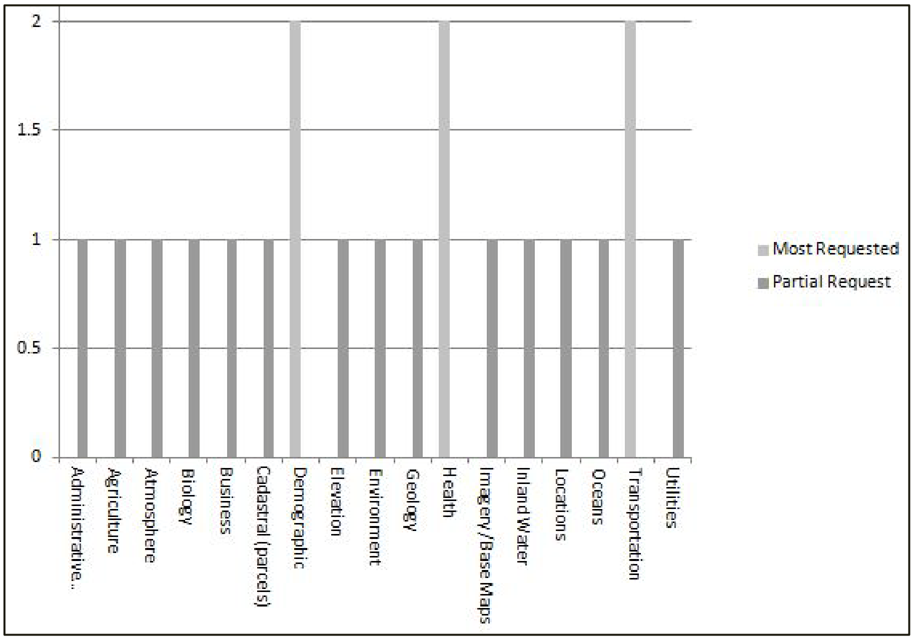
Participants were also asked to rate their experiences with searching for local information from digital libraries, warehouses, and clearinghouses. *Figure 6.6 Rating Information Searches Results* shows the table items presented to respondents. In general, Google was ranked a common source to find information by all participants; it was characterized as a 'very useful' and 'useful' tool. Environmental participants also found federal, state, and city level clearinghouses and warehouses 'very useful' to find information for local planning; online library 'somewhat useful'; and a lack of a GIS network groups to support their research activities. Community development participants mostly relied on secondary information from previous projects by other agencies.

Figure 6.7 Data Type Usage by Local CBOs

Public Access	***Type****	***Special Request***
	• Administrative Boundaries	
	• Agriculture	
	• Atmosphere	
	• Biology	
	• Business	
	• Cadastral (parcels)	
	• Demographic	
	• Elevation	
	• Environment	
	• Geology	
	• Health	
	• Imagery /Base Maps	
	• Inland Water	
	• Locations	
	• Oceans	
	• Transportation	
	• Utilities	

Figure 6.7 Data Type Usage by Local CBOs shows the 17 topic categories presented to respondents to identify the themes most closely related to the type of data they use for local neighborhood planning. These categories were obtained from an early US Geospatial One Stop (GOS) search query window available from the geodata.gov web portal; they also overlap the 19 ISO categories discussed in the literature review (see Appendix J). Overall, environmental planners indicated using all data types and gathering them through public online portals. Community development participants' information usage was more narrowly focused on demography, health, education, and public transportation. These results are shown in graphic form in *Figure 6.8 CBOs' Information Requests by Data Types* below.

Figure 6.8 CBOs' Information Requests by Data Types



Environmental planning participants indicated having submitted special requests for information for cadastral, elevation, environment, imagery/base maps, inland waters, transportation, and utilities features data. Such special requests are indicative of the types of information demands experienced by CBOs at the local neighborhood level.

c. Information Demands

As indicated above, information demands are shaped by the functions of each organization. For example, community development planners reported needing local data on social and human issues including demography, health, education, and transportation. Environmental planners indicated needing data about built and natural features for larger geographic areas. *Figure 6.9 Special Information Request Types* shows a list of methods used to request information. Environmental planners reported submitting information requests "…in partnership with NYCDPR…" and also obtaining "positive results".[4]

[4] The New York City Department of Parks and Recreation (NYCDPR) is a member of the Bronx River Alliance.

Figure 6.9 Special Information Request Types

Letter / Email	
Freedom of Information Law	
Freedom of Information Act	
Phone Call	
Other (personal, etc.)	
Other	

Participants also ranked the usability of the data and metadata obtained from a number of sources. Participants found all of the resources types listed on *Figure 6.10 Types of Information Sources* either ‘useful’ and/or ‘very useful’. All participants indicated they lacked an understanding of metadata availability and usage.

Figure 6.10 Types of Information Sources

	Very Useful	Useful	Somewhat Useful	Not Useful	Disappointing
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					
Other (Google, etc,)					
Other					

d. Information Improvement

In addition, participants were asked to express their views on how to improve the usability of the datasets they use to conduct local planning. An open-ended question allowed users to indicate they would like ‘clear labeling’ of the fields within each dataset and ‘smaller packaging of information’.

6.1.2.2 Information Supply

The *supply* questionnaire also contains seven sections that closely correspond to the seven sections found in the *demand* questionnaire. It seeks to investigate how information is collected, organized, and disseminated by libraries to satisfy users' demands. It contains questions about the organizations' structures; the participants' roles in information finding; and the types of information that is requested, found, produced, and/or accessed by users to conduct neighborhood planning. The seven sections are:

1. Organization Information
2. Participant's Information
3. Information Production
4. Information /Resource Access
5. Information Demand Assessment
6. Geospatial Information Extent Assessment
7. Additional Information

1. Organizations and Participants Information

Description of each library organization participating in the research was detailed in *Chapter 5 - Information Supply*. Two *supply* cases were selected from the universe of local libraries providing information and/or access to resources for local community development and environmental planning. One of the selected cases is the only four-year public college in Bronx County and is representative of the system of educational libraries distributing data, information, and providing access to resources pertaining to the study area. The second selected case represents a specialty governmental library where all public records issued by agencies are maintained for public dissemination.[5]

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[5] Information about participating libraries is found in *Chapter 5 –Information Supply*.

2. Information Production, Access and Demand

This portion of the questionnaire sought to find out about the internal data records and information cycles used by the selected libraries to facilitate access to information and resources for users' consumption.

a. Information Production

Both cases participating in the study indicated being involved in the production and/or archiving of informational resources for community and environmental planning, particularly through their special collections. An open-ended response from one of the supply respondents indicated the importance of creating more narrowly focused PURLS (Persistent Uniform Resource Locator) for directing students to particular websites where they could find more precise geospatial and other public information.

Figure 6.11 Library Resources Available to Users

	Y/N	*Please specify*
Scholarly Articles		
Newspapers		
Whitepapers		
Microforms		
Books		
Encyclopedias		
Blogs		
Websites		
Maps		
Attribute Data		
GIS Data		
Library/Museum Collections		
Environmental Impact Statements		
Government Documents (federal, State, local)		
Community Plans / Reports		
Community Newsletter/other		
Television Programs/News		
Sound Recordings		
Video/Film		
Oral Histories		
Other		

Figure 6.11 Library Resources Available to Users shows the list of resources presented to respondents. Most of the resources are available through both library cases except for the lack of access to television programs and news. Another important aspect pertains to the educational library's lack of access to community newsletters which, on the other hand, are available through the governmental library's collection of 'historical' community newsletters. However, while the former provides access to scholarly articles, whitepapers, blogs, sound recordings and GIS data as well, the latter does not.

Next, participants were asked to list their special collections. *Chapter 5 – Information Supply* contains a review of the special collections available at each institution. In general, the educational institution's collections cover a much wider and diverse range of topics than the governmental library whose collections are more narrowly focused on city issues. The latter also maintains historical collections and tools including: 1) collection of historical newspaper clippings, 2) old maps, 3) the Street Name File Index (which includes valuable original historical local information), 4) Historical Manual Index of records. The governmental library has an original collection of vertical files clippings. Neither library is currently engaged in georeferencing materials in their collections or in the creation of FGDC compliant metadata production.

b. Information Access

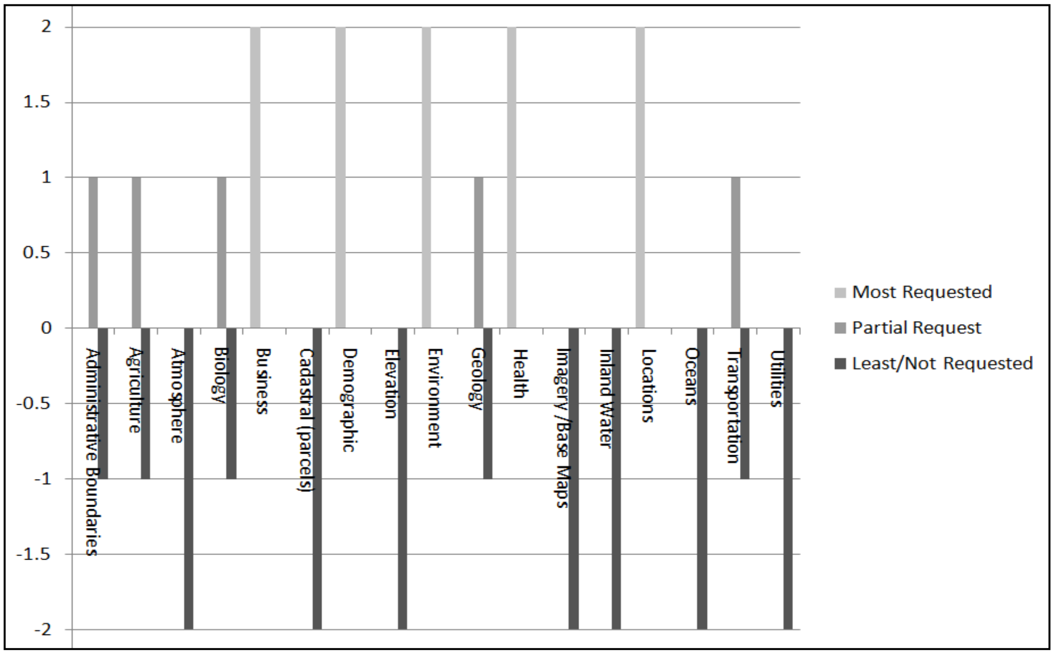
The next section on the *supply* questionnaire sought to assess the types of data, information, and other library resources requested by users about the communities of The Bronx. *Figure 6.12 Information Frequently Requested by Library Users* lists the 17 topic keywords included on the questionnaire. As stated above, these categories were obtained from an early US Geospatial One Stop (GOS) search query window from the geodata.gov portal; they overlap the 19 ISO categories discussed in the literature review (see Appendix J).

Figure 6.12 Information Requested by Library Users

Type*	
• Administrative Boundaries	
• Agriculture	
• Atmosphere	
• Biology	
• Business	
• Cadastral (parcels)	
• Demographic	
• Elevation	
• Environment	
• Geology	
• Health	
• Imagery /Base Maps	
• Inland Water	
• Locations	
• Oceans	
• Transportation	
• Utilities	

In general, participants reported having received requests from users to find and access information in a variety of these categories. However, users' requests were mostly concentrated in only 29% of the categories selected by users with another 29 % only partially requested, and 41 % that had been not requested at all. *Figure 6.13 Library Users Information Requests by Data Types* illustrates the distribution of users' information requests by category types including: 1) Most Requested, 1) Partially Requested, and 3) Least/Not Requested. According to this graph, information requested by library users are mostly concentrated around social and environmental aspects including those related to business, demographic, environment, health, and location.

Figure 6.13 Library Users Information Requests by Data Types



Other community related topics were either partially requested, such as administrative, agriculture, biology, geology and transportation, or not requested at all including atmosphere, cadastral, elevation, imagery/base maps, inland water, oceans and utilities. In addition, educational respondents reported the frequent use of secondary sources such as the city published Community Profiles[6] and the New York City Green Book[7] to find local information. Governmental library respondents also indicated using primary sources, including traditional manual vertical files organized by borough to find information about the history, population, and other aspects of local neighborhoods.

Respondents also ranked the usability of information supply engines including online libraries, warehouses, and clearinghouses. *Figure 6.14 Rating Usability of*

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[6] Produced by the New York City Department of City Planning (NYCDCP) http://www.nyc.gov/html/dcp/html/lucds/cdstart.shtml

[7] The New York City Green Book is the official guide published with updated contact information by the City since 1918. http://www.nyc.gov/html/dcas/html/features/greenbook.shtml

Information Search Sources shows the different types of the information supply group sources rated by participants.

Figure 6.14 Rating Usability of Information Search Sources

	Very Useful	Useful	Somewhat Useful	Not Useful	Disappointing
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					
Other (Google, etc,)					
Other					
Other					

In general, local governmental library users get information through the New York Public Library and the New York City Department of Information Technology and Telecommunications (DOITT)[8]. Educational library users' geospatial search extent is much larger and include all levels of information suppliers. City and private data vendors were characterized as 'useful', federal sources are perceived as being 'somewhat useful'. Some of the issues reported include a lack of usability due to 'complex front-end designs' and the lack of 'relatable website templates' that librarian and users can intuitively use to find local information. Google was ranked as 'very useful' and a common information source by all participants.

[8] http://www.nyc.gov/html/doitt/html/home/home.shtml

c. Information Demands

The information demand section was designed to assess participants' requests for unavailable information from other organizations. *Figure 6.15 Library Resources Requests Types* shows the main types of resources normally found in library collections.

6.15 Library Resources Requests Types

	Y/N	*Please specify*
Scholarly Articles		
Newspapers		
Whitepapers		
Microforms		
Books		
Encyclopedias		
Blogs		
Websites		
Maps		
Attribute Data		
GIS Data		
Library/Museum Collections		
Environmental Impact Statements		
Government Documents (federal, State, local)		
Community Plans / Reports		
Community Newsletter/other		
Television Programs/News		
Sound Recordings		
Video/Film		
Oral Histories		
Other		

All participants reported never having had to submit a special request for information or any other unavailable resources. They all rely on the interlibrary loan system to request primarily printed materials such as books, encyclopedias, whitepapers, and newspapers from other libraries. During the on-site interview process at one of the participating libraries, a library client came in and asked for geopolitical information about the "City Council District overlapping [his] local neighborhood". The librarian looked for the information online at the Council's map-based search window[9]. This website provides a search tool for users to enter an address and borough to find the district area's representative contact information.

Overall, other than occasional phone calls to city departments, such as Department of Education, respondents reported they never submitted a formal request for information to satisfy users' demands. All participants reported positive outcomes from their basic requests for materials from other organizations supplying the information.

d. Information Improvement

Information suppliers were asked to share their views on how to improve access to information to satisfy users' demands. Responses addressed a variety of issues ranging from the production of new digital collections to the digitalization of historic resources, such as the New York City original Street Names Index mentioned above, to the improvement of datasets by narrowing the extent of their geographic regions as well as better field labeling and simpler data tables.

[9] Online users can search http://council.nyc.gov/html/home/home.shtml

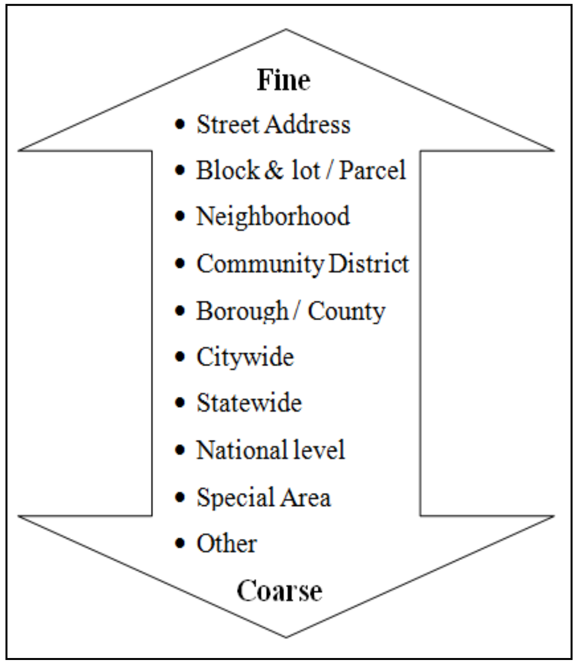
6.2 Geospatial Information Extent Analysis

Information collected during the *Geospatial Information Extent Assessment* section of the demand and supply questionnaires was used to assess the local extent of the participants' geospatial information needs and demands. Results from this analysis were quantified and incorporated into the GIS analysis to identify a group of neighborhoods of interest to be included in the information discovery portion of the study.

To assess the overall extent of the neighborhood geospatial information interests, respondents were asked to identify on a borough base map, which showed Community District (CD) boundaries and major parklands areas, the location and/or geographic extent of their neighborhood planning activities. In order to facilitate the identification of the local neighborhoods of interest, the questionnaires also provided a list of neighborhood names for referential purposes.

While the information *demand* questionnaire aimed to assess the geographic level of interest of the respondents, the *supply* questionnaire sought to identify the geographic extent of the datasets, information, and other resources individual client users most frequently request from the participating libraries. The information model presented to participants included from nationwide to street level geographic categories. *Figure 6.16 Geographic Levels of Information Interest* shows the ten categories included on the assessment tables presented on both questionnaires.

Figure 6.16 Geographic Levels of Information Interest



In general, respondents indicated a variety of local information demands related to the primary functions of their organizations. For example, while community development groups seek to gather socioeconomic and demographic data about clients' defined neighborhoods, environmental planning participants' main interests are more focused on information about administrative, physical, and natural features such as water, watersheds, local landmarks, school districts and public parklands within the study area.

Table 6.1 Users' Ranked Geographic Information Interests shows how users search for different levels geospatial information to conduct local planning activities. Respondents ranked these geographic levels using their own qualitative statements in the open-ended section of the questionnaires. Responses characterized information widely from being "too-broad" to use for local neighborhood planning including city, county, and statewide, to needing local administrative, watersheds and also user defined areas.

Table 6.1 Users' Ranked Geographic Information Interests

Level	***Demand Case 1***	***Demand Case 2***
Street, block/lot and parcel level	Not regularly	Yes
Neighborhood	Citizens/Community Definitions	Yes
Community District	Yes, used very frequently	Yes
Borough or County	Too broad	Yes
Citywide	Too broad	Yes
Statewide	Too broad	Yes
National level	For comparison only	Yes
Special Area	N/A	Watershed/Sewershed
Other (i.e. zip code)	Yes	Zip code/School District

Overall, local geospatial information gathering in New York City occurs at the Community District (CD) level which, besides being an important geographic unit, is also the only participatory geographic link (geolink) individuals have to exchange information with top administrative units providing governmental services and functions. In fact, CD Planning Boards are required by City Charter mandate to hold open public meetings for individuals and organizations to comment on proposals and other planning matters affecting local neighborhoods as part of the citywide participatory planning process.

However, finer geographies at the neighborhood, street, parcel, and individual levels are often used by participants to carry out local planning activities such as lot clean-up, outreach campaigns, and to update funders with aggregate information about the composition of the local populations being serviced. *Table 6.2 Levels of Geographic Information Interest by Suppliers' Users* shows responses from respondents about the geographic level of information demand they normally receive from library users. In both cases, users seek information in a wide variety of levels; these are all below the city level including county, community, neighborhood, street, and parcel data.

Table 6.2 Levels of Geographic Information Interest by Suppliers' Users

Level	Supply Case 1	Supply Case 1
Street, block/lot and parcel level	YES	YES
Neighborhood	YES	YES
Community District	YES	YES
Borough or County	YES	YES
Citywide	N/A	N/A
Statewide	N/A	N/A
Special Area	N/A	N/A
Other (i.e. zip code)	N/A	City Council District

6.2.1 Neighborhood Identification

Next, the study identifies neighborhoods of interest by assessing participants' data demands and their relative locations. A base map of the study area depicting Community District boundaries and public parklands for orientation purposes was provided in the questionnaire for respondents to identify the location of their neighborhoods of interest.

Figure 6.17 Users' Cognitive Neighborhood Recognizance

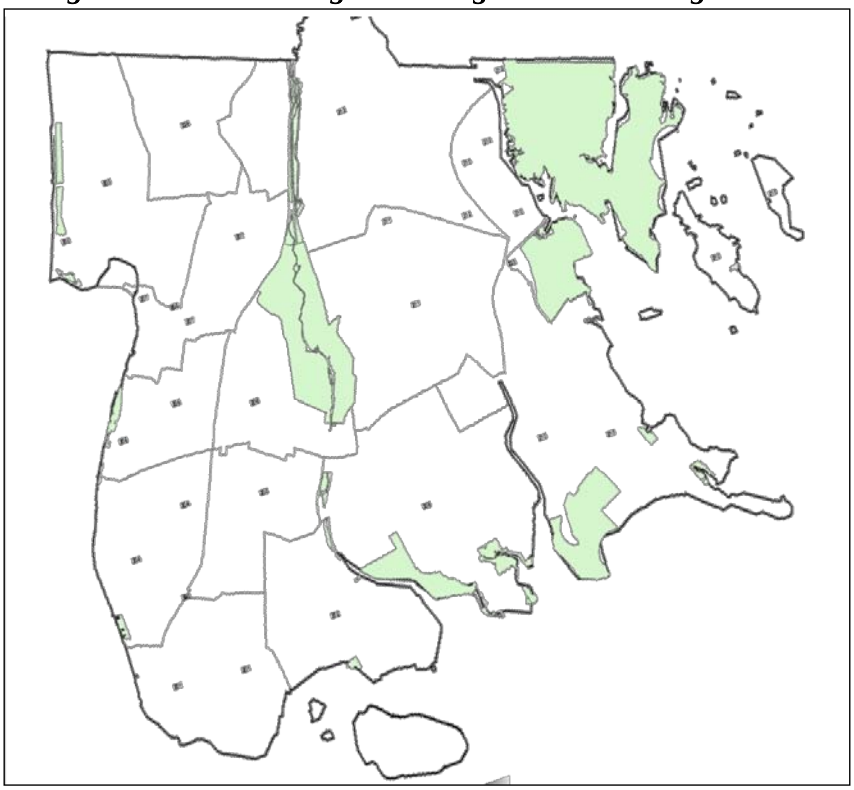


Figure 6.17 Users' Cognitive Neighborhood Recognizance shows the map utilized during the research phase of the study. Only 25 % of the respondents utilized the base map to locate their neighborhoods of interest. In addition, a preliminary list of neighborhood names compiled from two sources -1) NYCDCP Neighborhood Centroid file and 2) Wikipedia's List of Bronx Neighborhoods- was also provided to respondents.

Figure 6.18 Preliminary List of Bronx Neighborhood Names

West Bronx	*South Bronx*	*East Bronx*
Bedford Park	Claremont	Allerton
Belmont-Arthur Avenue	Concourse	Baychester
Fieldston	East Morrisania	Castle Hill
Hudson Hill	East Tremont	City Island
Kingsbridge	Fordham	Clason Point
Kingsbridge Heights	Fort Apache	Co-op City
Marble Hill	High Bridge	Country Club
Morris Heights	Hunts Point	Eastchester
Mount Hope	Longwood	Edenwald
North New York	Melrose	Edgewater Park
North Riverdale	Morris Heights	Locust Point
Norwood	Morrisania	Morris Park
Port Morris	Mott Haven	Olinville
Riverdale	Mount Eden	Parkchester
Spuyten Duyvil	North New York	Pelham Bay
University Heights	Port Morris	Pelham Gardens
Van Cortlandt Village	The Hub	Pelham Parkway
West Farms	Tremont / East Tremont	Schuylerville
Woodlawn	University Heights	Soundview
Other	West Farms	Throgs Neck
	Other	Unionport
		Van Nest
		Wakefield
		Williamsbridge
		Westchester Square
		Other

Figure 6.18 Preliminary List of Bronx Neighborhood Names lists a compilation of all the existing neighborhood names from the two sources mentioned above. It is organized by subregion and was presented to respondents of the demand and supply questionnaires for neighborhood name identification purposes. The list contains a few duplicate names because some neighborhoods may fall within two or more regions. In addition, the list excludes certain names of defunct neighborhoods.

Figure 6.19 The Bronx Neighborhood Centroids

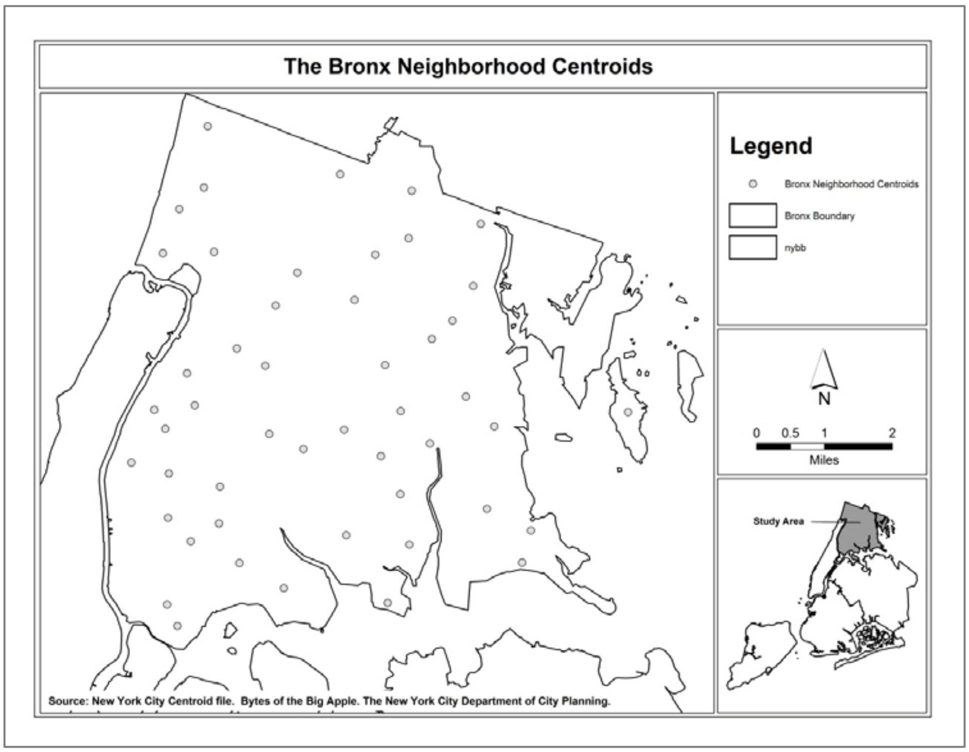


Figure 6.19 The Bronx Neighborhood Centroids shows the locations of the neighborhood centroids. The neighborhood centroids file is produced by the NYCDCP based on the *New York: A City of Neighborhoods* map which, according to its metadata, does not contain a complete list of all neighborhoods. The centroid file contains a total of 49 unique neighborhood names which were extracted from labels printed on the original neighborhood map.

A total of 59 unique names were included in the combined list used for assessing users' neighborhoods of interest. *Table 6.3 Unique Bronx Neighborhood Names* shows the list of unique names that were included on the questionnaires. This list also includes the neighborhood of Crotona Park which was added to the study after being identified by a research participant during the qualitative information demand assessment phase.

Table 6.3 Unique Bronx Neighborhood Names

Allerton	High Bridge	Pelham Bay
Baychester	Hudson Hill	Pelham Gardens
Bedford Park	Hunts Point	Pelham Parkway
Belmont-Arthur Avenue	Kingsbridge	Port Morris
Castle Hill	Kingsbridge Heights	Riverdale
City Island	Locust Point	Schuylerville
Claremont	Longwood	Soundview
Clason Point	Marble Hill	Spuyten Duyvil
Concourse	Melrose	The Hub
Co-op City	Morris Heights	Throgs Neck
Country Club	Morris Park	Tremont/East Tremont
Crotona Park*	Morrisania	Unionport
East Morrisania	Mott Haven	University Heights
East Tremont	Mount Eden	Van Cortlandt Village
Eastchester	Mount Hope	Van Nest
Edenwald	North New York	Wakefield
Edgewater Park	North Riverdale	West Farms
Fieldston	Norwood	Westchester Square
Fordham	Olinville	Williamsbridge
Fort Apache	Parkchester	Woodlawn

Next, neighborhoods selected by all the respondents were tabulated to develop a list of neighborhoods of interest. *Table 6.4 Users' Identified Neighborhoods of Interest* shows the final list of neighborhood cases with their respective total scores. With 55% of the originally identified neighborhood names, 33 cases were selected by the respondents which yielded a neighborhood of interest mean of 1.8. The top ranking 18 cases with scores above the mean (highlighted in bold) were selected for further analysis.

Table 6.4 Users' Identified Neighborhoods of Interest

	Demand		*Supply*		
Neighborhood	**BRA**	**PCDC**	**LLCUNY**	**NYCHL**	**Total**
Baychester			1		1
Bedford Park			1		1
Belmont-Arthur Avenue				1	1
Castle Hill				1	1
City Island				1	1
Clason Point			1		1
Concourse			1		1
Co-op City				1	1
Crotona Park		1			1
Fieldston				1	1
Edgewater Park	1				1
Marble Hill				1	1
Parkchester				1	1
University Heights				1	1
Van Cortlandt Village				1	1
Claremont		**1**		**1**	**2**
Highbridge			**1**	**1**	**2**
Kingsbridge			**1**	**1**	**2**
Longwood	**1**		**1**		**2**
Melrose		**1**		**1**	**2**
Morris Heights			**1**	**1**	**2**
Pelham Parkway	**1**		**1**		**2**
Port Morris	**1**			**1**	**2**
Riverdale	**1**			**1**	**2**
Soundview	**1**	**1**			**2**
Throgs Neck		**1**		**1**	**2**
Woodlawn	**1**		**1**		**2**
Fordham	**1**		**1**	**1**	**3**
Hunts Point	**1**		**1**	**1**	**3**
Morrisania	**1**	**1**		**1**	**3**
Mott Haven	**1**	**1**	**1**	**1**	**4**
Tremont / East Tremont	**1**	**1**	**1**	**1**	**4**
West Farms	**1**	**1**	**1**	**1**	**4**

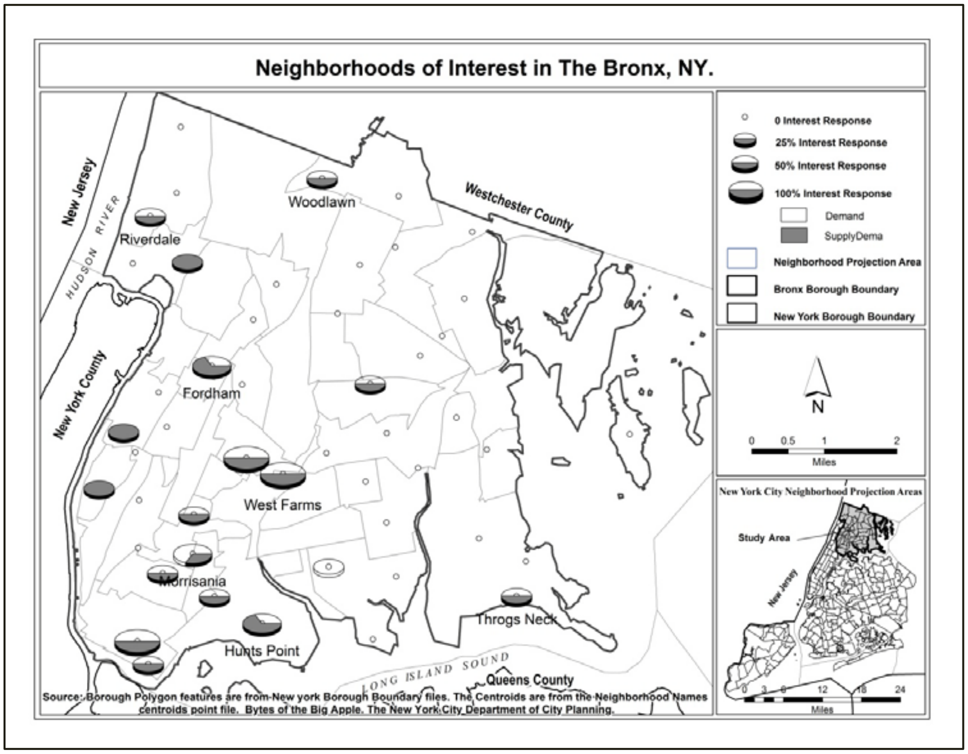
Table 6.5 High-Demand Neighborhoods of Interest below shows the top 18 cases of Bronx neighborhoods of interest selected by research participants through the combined users' demand and supply questionnaires.

Table 6.5 High-Demand Neighborhoods of Interest

Claremont
Highbridge
Kingsbridge
Longwood
Melrose
Morris Heights
Pelham Parkway
Port Morris
Riverdale
Soundview
Throgs Neck
Woodlawn
Fordham
Hunts Point
Morrisania
Mott Haven
Tremont / East Tremont
West Farms

Figure 6.20 Neighborhoods of Interest in The Bronx, NY, shows a proportional pie charts map adjusted with Flannery Appearance Compensation to avoid user's underestimation of the map symbols. The map illustrates the concentration of local planning interests among research participants and library users by variations in the pie size of each neighborhood group. Three major pie size groups show the concentration of interest at 25%, 50% and 100% of respondents. In addition, single dots show the centroid locations of those neighborhoods that were not selected by the respondents.

Figure 6.20 Neighborhoods of Interest in The Bronx, NY.



Overall, the map shows higher concentrations of neighborhood information interest around the south and western portions of the borough. In addition, it also shows that, whereas information requests from library users were dispersed throughout the study area, CBOs' demands were mostly concentrated around the southern section of the borough. Moreover, seven neighborhoods of interest are labeled on this map since they met additional geographic selection criteria set by the research (see section *6.4.1 Neighborhood Sample Selection Criteria* in the next section of this chapter).

The second half of this chapter contains the discovery analysis portion of the study. It first describes the steps performed to assemble the geodatabase and then expands on a series of GeoDNA analyses, including a socio-demographic analysis, an information discovery analysis, a neighborhood geospatial analysis, a final knowledge interpretation analysis and the conclusions.

6.3 Urban GeoDNA Structure - Phase III

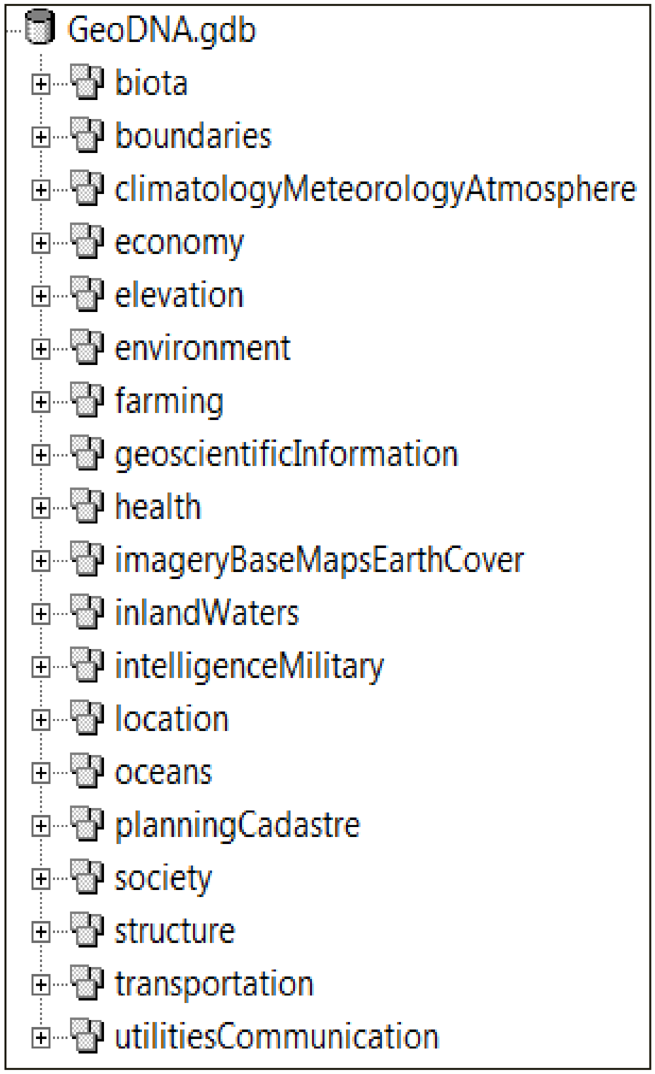
This section contains the final portion of the GeoDNA discovery analysis. It describes the high level structure and the most basic data elements used to develop the urban GeoDNA database. The last section contains the information discover analysis.

6.3.1 GeoDNA Database Development

In order to organize information gathered during the previous two phases, a GeoDNA database was developed in an ArcGIS 9.3.1 environment and later migrated to an ArcGIS 10 version. A total of 19 feature datasets were created based on the FGDC /ISO metadata keyword topic categories described in *Chapter 2-Literature Review* of this study. *Figure 6.21 The GeoDNA Database Structure* shows the top level FGDC/ISO compliant dataset features used to develop the main data frames to load data classes. After declaring the main dataset features, individual feature classes were created to match FGDC/ISO definitions for each metadata class type using the International Standardization Organization (ISO) 19 metadata data examples (See *Appendix J).*

First, the geographic datasets mentioned above were gathered and normalized to identify the most basic data elements from each file. Then, feature classes were created and populated by first importing their fields as basic data field elements and subsequently loading data from the datasets into them. To maintain compatibility with local GIS applications developed by city agencies, the GeoDNA geodatabase was georeferenced to the Lambert Conformal Conic projection, NAD 1983, State Plane Project Coordinate System for New York Long Island (FIPS 3104) in Feet. This is the projection established as a GIMP by the New York City for local agencies to georeference information. The complete set of geospatial specifications used to develop the GeoDNA for the study was imported from the NYCDCP's Bytes of the Big Apple metadata specifications and is available in *Appendix K-GeoDNA Geodatabase Specification*.

Figure 6.21 The GeoDNA Database Structure



6.3.2 High Level GeoDNA Database Model

Greene and Pick (2006) outlined a framework useful to analyze urban places based on an earlier model postulated by Frey and Zimmer (2001). This study expands the former by adding a geospatial component to the original framework. *Table 6.6 Urban Places Assessment Elements* lists the main data elements used to create the GeoDNA research model which is presented in *Figure 6.22 Urban GeoDNA Database Model.*

Table 6.6 Urban Places Assessment Elements

1. Ecological Elements
Size of population
Density of population
Space (natural and built) -landmarks
2. Economic Elements
Economic function
Labor supply and demand
Transportation
Economic organization
3. Social Elements
Social organization
Social character
4. Administration
Geopolitical divisions
Administrative
5. Geospatial Elements
Boundary definitions
Imagery and Maps
Locational elements

Figure 6.22 Urban GeoDNA Database Model

FGDC / ISO Metadata Categories

Ecological	**Economic**	**Social**	**Administration**	**Geospatial**
Biota	*Farming*	*Society*	*Boundaries*	*Climatology* *Meteorology* *Atmosphere*
Geoscientific Information	*Economy*	*Health*	*Utilities* *Communications*	*Elevation*
Environment	*Transportation*	*Education**	*Locations*	*Planning* *Cadastre*
InlandWaters		*Police**	*Intelligence* *Military*	*Imagery* *BaseMaps* *EarthCover*
Oceans			*Structure*	

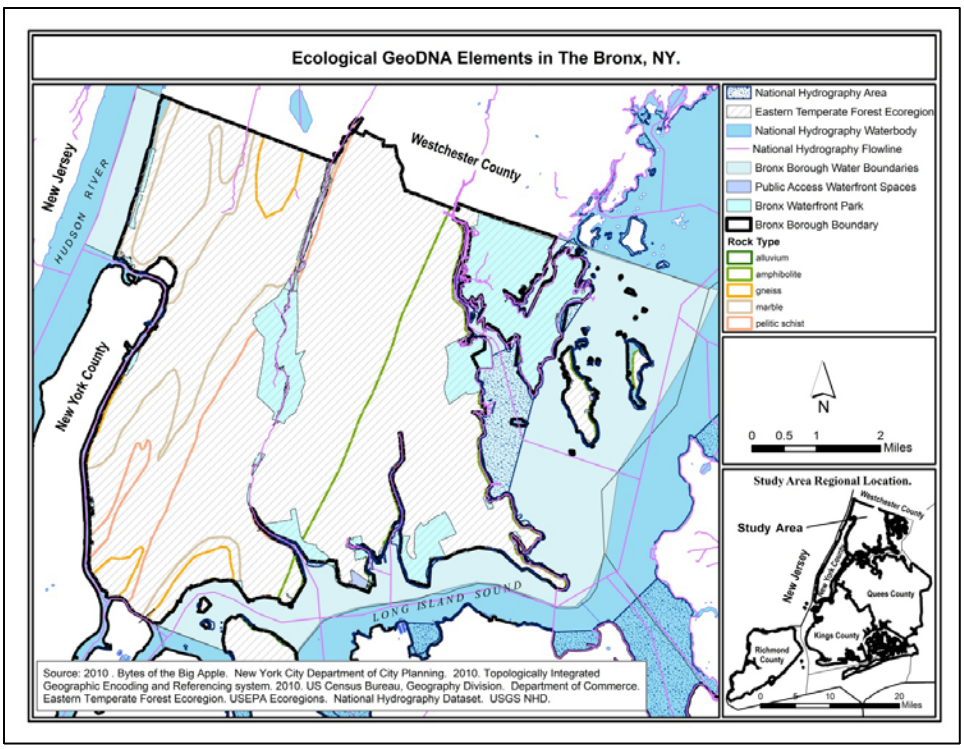
**Education Districts and Police Precincts are not separate ISO metadata keywords; they are noted above for modeling and mapping purposes.*

As illustrated in *Figure 6.22 Urban GeoDNA Database Model* above, the 19 metadata elements are grouped under specific urban places assessment elements including ecological, economic, social, administrative and the newly added geospatial category. In this study, population elements are examined under the social strand of the urban GeoDNA database model. Next, data available for the study are reviewed and mapped under their corresponding GeoDNA strand.

6.3.2.1 Ecological GeoDNA Elements

The ecological strand includes physical and natural areas such as ecoregions, geological rock types, waterfront parks, in-land and surrounding water bodies, as well as built facilities. *Figure 6.23 Ecological GeoDNA Elements in The Bronx, NY,* shows the distribution of natural geological features found within the borough.

Figure 6.23 Ecological GeoDNA Elements in The Bronx, NY.

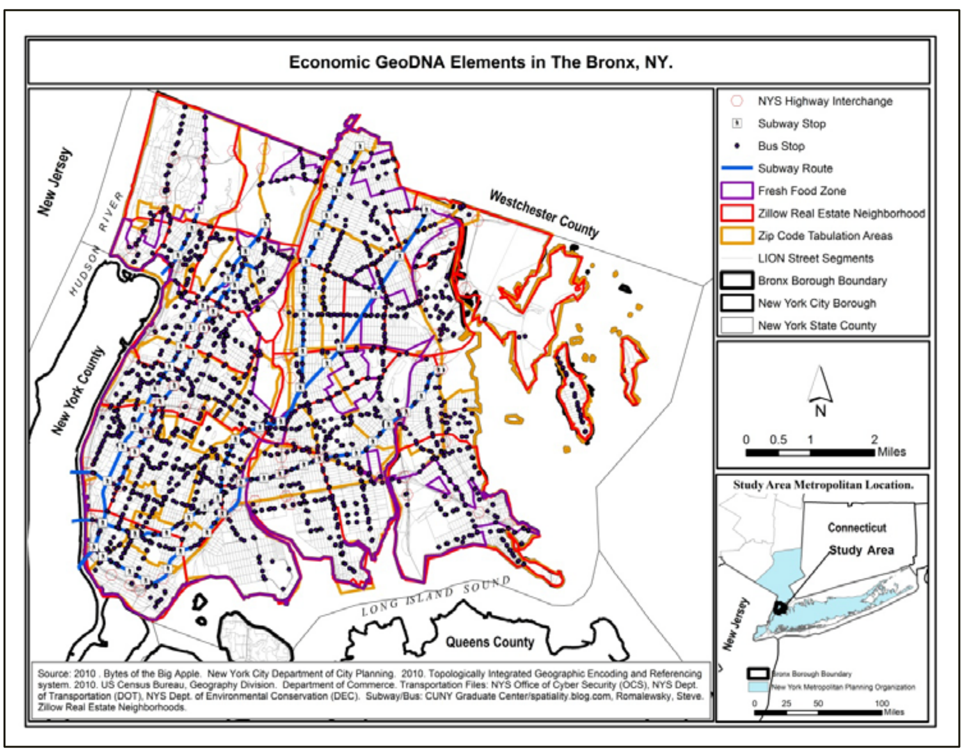


6.3.2.2 Economic GeoDNA Elements

As specified in *Figure 6.22 Urban GeoDNA Database Model*, the primary data elements that make up the economic GeoDNA strand include agricultural, business and transportation. A number of different point, line, and polygon datasets were found under this category including zip code postal areas, center street line transportation, subway/ bus stops and routes, and special commercial district layers such as real estate and fresh food geographic areas from Zillow and the NYCDCP, respectively.

Figure 6.24 Economic GeoDNA Elements in The Bronx, NY, below shows the distribution of these elements within the study area. Since the economic strand includes transportation related information, this figure also shows in the inset map the extent of the New York Metropolitan Transportation Council (NYMTC) area, which is the regional Metropolitan Planning Organization (MPO) overlapping the study area.

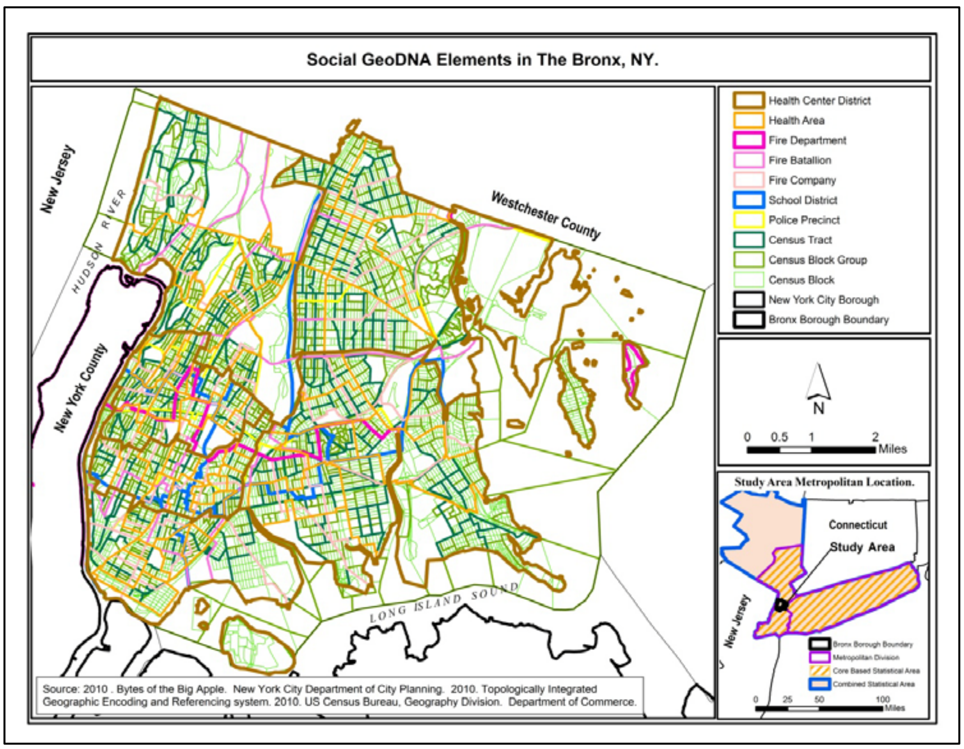
Figure 6.24 Economic GeoDNA Elements in The Bronx, NY.



6.3.2.3 Social GeoDNA Elements

The social GeoDNA elements include demographic and health components and group data such as Census boundaries such as blocks, block groups and tracts; health area boundaries such as health area and health district; and other districts such as education; fire; and police precincts. In addition, Census Metropolitan areas are also part of this strand and for visualization purposes are shown in the metropolitan regional inset map in *Figure 6.25 Social GeoDNA Elements.*

Figure 6.25 Social GeoDNA Elements in The Bronx, NY.

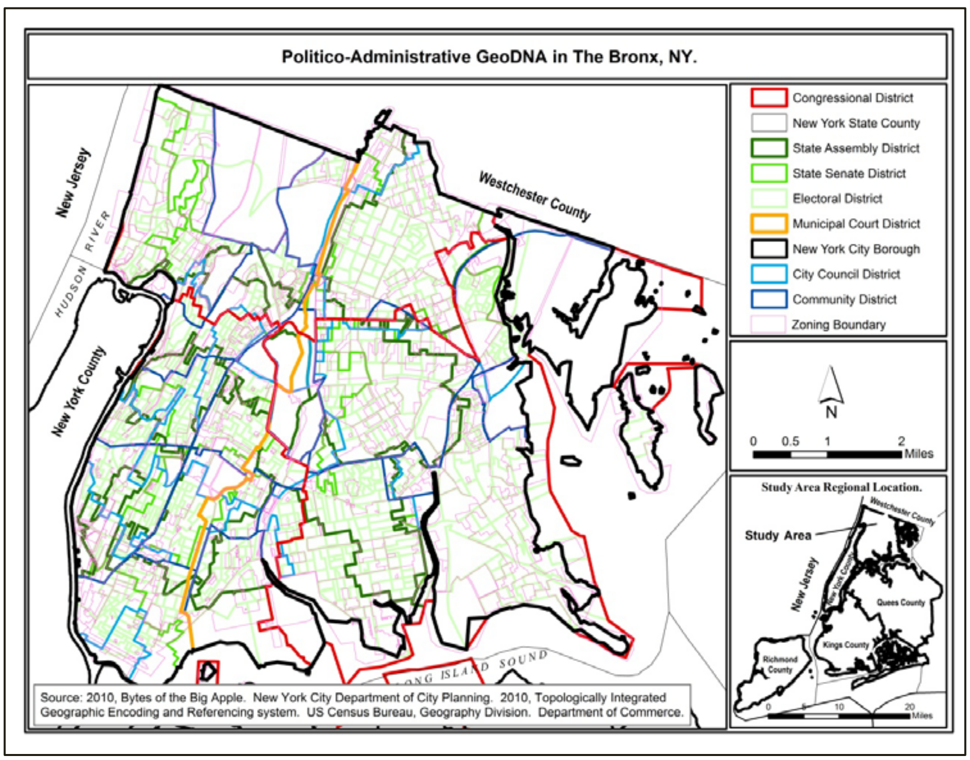


Located in the northeast region of the US Census, the study area is found within the Core Based Statistical Area (CBSA) of the Metro New York-Northern New Jersey-Long Island, NY-NJ-PA and within the larger Combined Statistical Area (CSA) of 'New York-Newark-Bridgeport, NY-NJ-CT-PA.

6.3.2.4 Administrative GeoDNA Elements

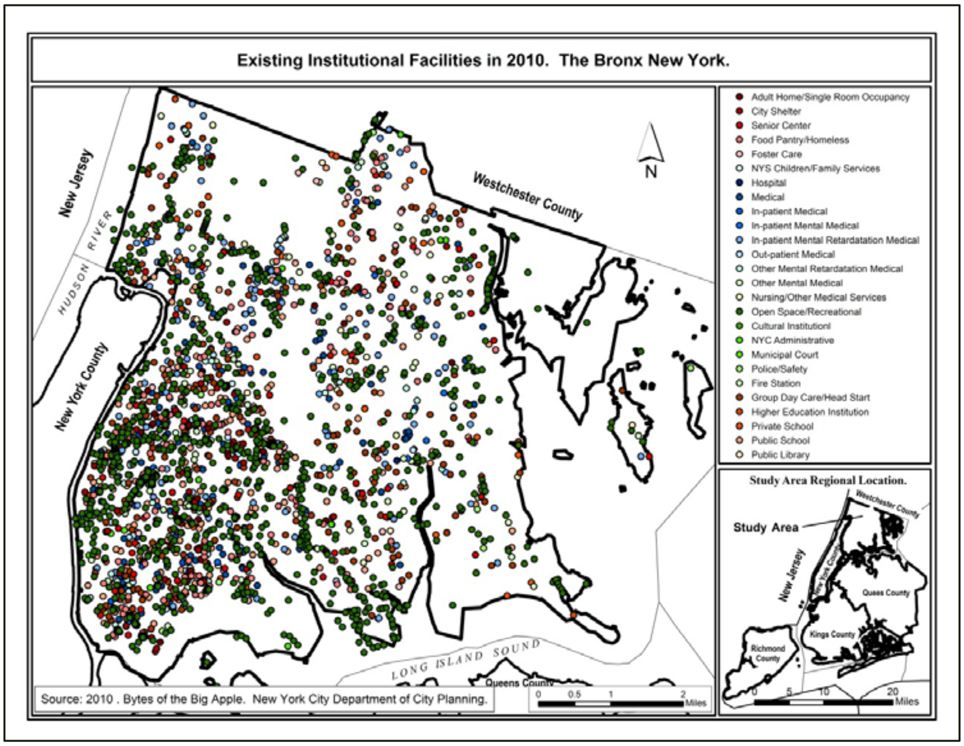
The administrative strand of GeoDNA includes a wide range of data elements. *Figure 6.26 Politico-Administrative GeoDNA in The Bronx, NY*, shows the three major levels of geopolitical and administrative geographies that intersect the borough including: 1) Federal: Congressional Districts; 2) State: Assembly, Senate, and Electoral Districts; and 3) City: Community Districts, Council Districts, Municipal Courts, and main zoning areas. *Appendix M-Politico-Administrative Strand* shows a table containing the distribution of geopolitical areas at the state and federal levels overlapping all city boroughs.

Figure 6.26 Politico-Administrative GeoDNA in the Bronx, NY.



In addition, built city facilities are also important elements of the administrative GeoDNA strand that contribute to the makeup of the distinct characteristics of each neighborhood. *Figure 6.27 Physical GeoDNA Elements in The Bronx, NY,* shows the location of existing institutional facilities within the study area. This map organizes the local facilities into 26 major group types according to their primary land use function.

Figure 6.27 Physical GeoDNA Elements in The Bronx, NY.



According to the NYCDCP's Byte of the Big Apple dataset, a total of 3,162 built facilities existed within the borough in 2010. *Table 6.7Neighborhood Facilities in the Bronx, NY,* shows the total number of facilities by major group type. Open spaces and recreational facilities accounted for the largest group followed by educational institutions second and medical facilities in third place.

Table 6.7 Neighborhood Facilities in The Bronx, NY.

Group	Facility Type	Number
1	Adult Home/Single Room Occupancy	32
2	City Shelter	54
3	Senior Center	63
4	Food Pantry/Homeless	134
5	Foster Care	28
6	NYS Children/Family Services	2
7	Hospital	11
8	Medical	192
9	In-patient Medical	28
10	In-patient Mental Medical	30
11	In-patient Mental Retardation Medical	201
12	Other Mental Retardation Medical	72
13	Out-patient Medical	72
14	Other Mental Medical	95
15	Nursing/Other Medical Services	46
16	Open Space/Recreational	1154
17	Cultural Institutional	5
18	NYC Administrative	14
19	Municipal Court	3
20	Police/Safety	26
21	Fire Station/Other	43
22	Group Day Care/Head Start	344
23	Higher Education Institution	12
24	Private School	109
25	Public School	358
26	Public Library	34

6.3.2.5 Geospatial GeoDNA Elements

As indicated in the literature, neighborhoods are defined by variety of different players. This study groups neighborhood geospatial data producers using a top-down to bottom-up range. *Table 6.8 GeoDNA Information and Participants* shows some of the main players involved in the production of local geospatial data.

Table 6.8 GeoDNA Information and Participants

Bottom-Up 'Novice'	Volunteers and other individuals	Internet users	***Fine Data***
	Web 2.0 mapping participants	Wikimapia, Google, etc.	
	Community Based Organizations, charettes, specialty groups	Asset mapping, watershed, other studies	
	Value-added commercial data resellers and producers	Real estate and private companies (Zillow, etc.)	
	Administrative, geopolitical, socioeconomic and demographic	Service delivery Local plans	
	Regional planning units	Metropolitan Planning Organizations (MPOs)	
Top-Down 'Expert'	Federal, state and local Departments	US Census, USGS, NYSDEC, NYCDCP	***Coarse Data***

Based on this framework, the study combines neighborhood definitions from top-down and bottom-up users to study the seven selected case samples. Specifically, the study includes geographic boundary information produced by the following sources:

- NYCDCP –Neighborhood Centroid file contains 49 neighborhood placenames
- NYCDCP –Neighborhood Projection Areas (NPA) file contains 38 names
- NYCDCP –Microneighborhoods file lists 92 combined neighborhood names
- Wikimapia.org –Online map currently lists 58 unique neighborhood names

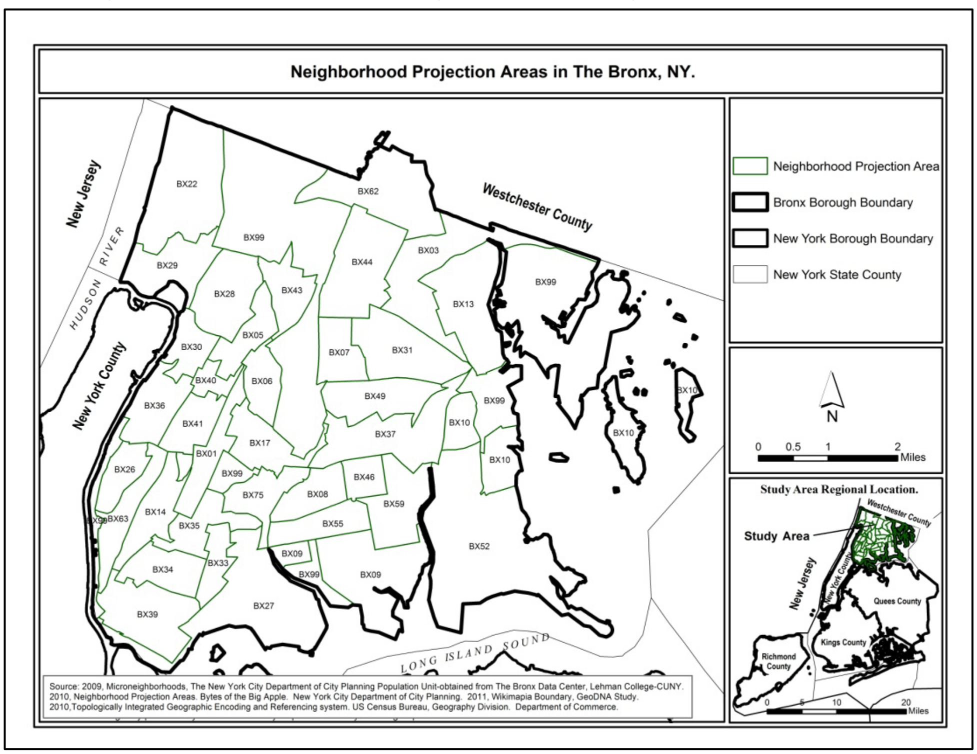
6.3.3 Top-Down Neighborhood Definitions

The list of existing top-down neighborhood definitions contains several different geographies including point and polygon files that range from large to smaller areas. Originally defined for administrative purposes, many of these definitions are now being used by scientists, advocates, planners, commercial vendors, local organizations and others to conduct research, planning, and marketing activities.

6.3.3.1 Neighborhood Projection Areas

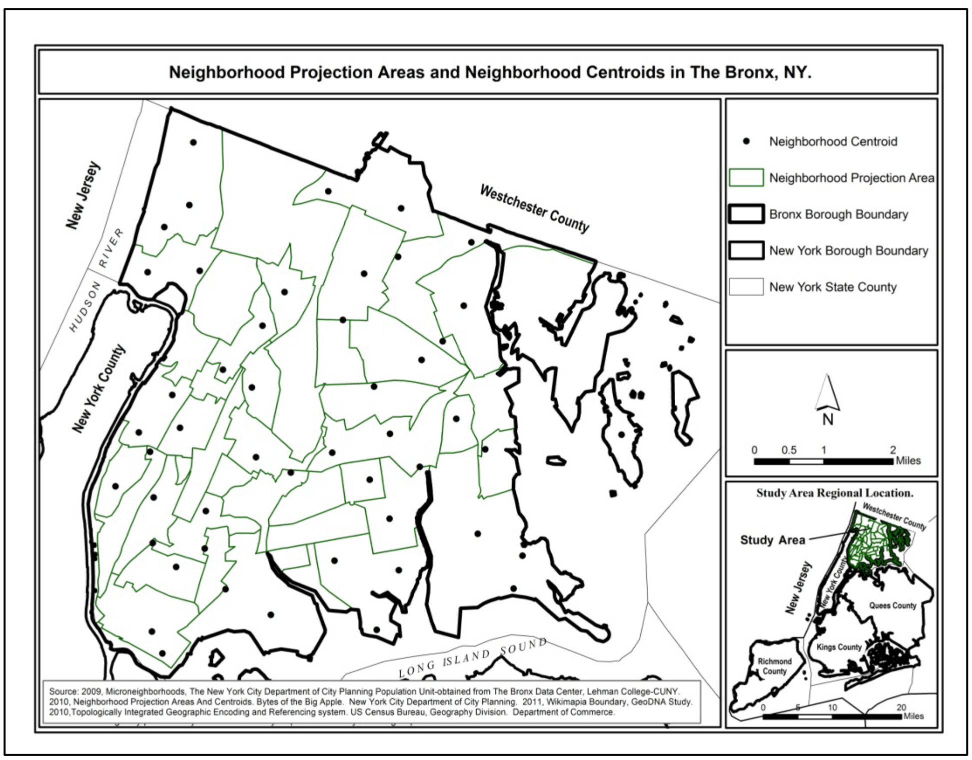
The Neighborhood Projection Areas (NPA) file is produced by the NYCDCP to project population figures throughout the city (see Appendix N). Formerly known as the New York City Projection Areas, this file contains polygon features that conflate with aggregate census tracts and PUMAS (Public Use Microdata Areas) boundaries.

Figure 6.28 The Bronx Neighborhood Projection Areas (NPA)



According to the NYCDCP, the NPA file only includes neighborhoods with population figures at or above 15,000; areas with smaller populations are combined with adjacent ones to reduce the amount of error for projecting population at this scale. The NYCDCP also points out that NPA boundaries may not always coincide with local or historic neighborhoods. Such discrepancy is observed on *Figure 6.29 Neighborhood Projection Areas and Neighborhood Centroids* which shows centroid points overlaid on top of NPA polygons. This map shows several many-to-many, one-to-many, and zero-to-many combinations of points and polygons emanating from the same governmental agency. A complete list of neighborhood names with codes, and latitude and longitude of their centroids is included in *Appendix N-Neighborhood Geographies*.

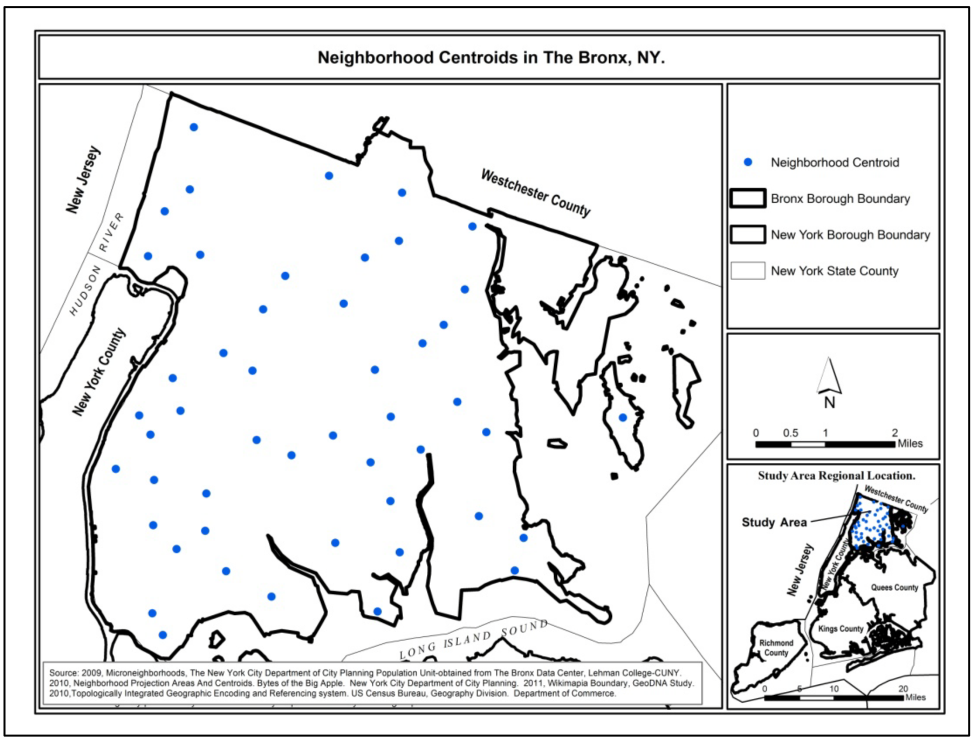
Figure 6.29 Neighborhood Projection Areas and Neighborhood Centroids



6.3.3.2 The New York City Neighborhoods Centroid File

The New York City Neighborhoods Centroid file is a point file produced by the NYCDCP from label names extracted from the New York City Neighborhood Map, also by the same agency. According to the centroids' metadata, this file was digitized at a scale of 1:1,000 but it is better viewed at a smaller scale of 1:50,000 because it represents relative location of labels digitized without any official designations. Moreover, the New York City Neighborhood Map is an unofficial information resource.

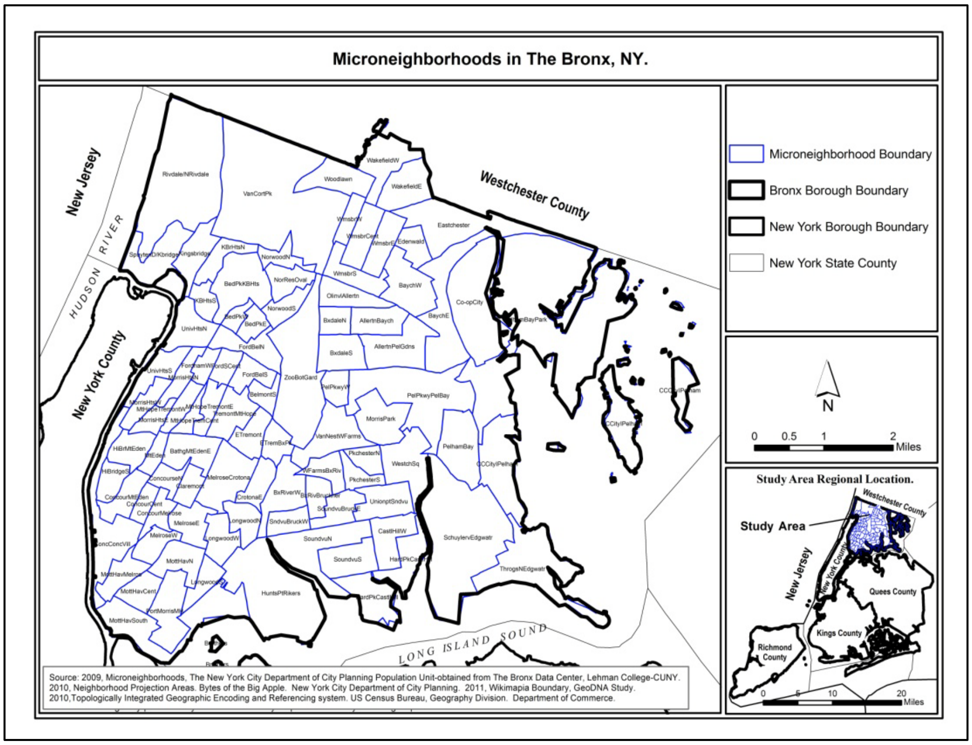
Figure 6.30 The Bronx Neighborhood Centroids



6.3.3.3 The New York City Microneighborhoods Layer

The New York City microneighborhoods file was obtained through The Bronx Data Center which is part of Lehman College of the City University of New York (CUNY). According to the Center's Director, the original polygon file was created by the Population Unit of the NYCDCP to project population at a fine scale. Although this file is not publicly accessible, it is incorporated here to assess its usability to discover local neighborhood information.

Figure 6.31 The Bronx Microneighborhood Areas



6.3.4 Bottom-Up Neighborhood Boundary Definitions

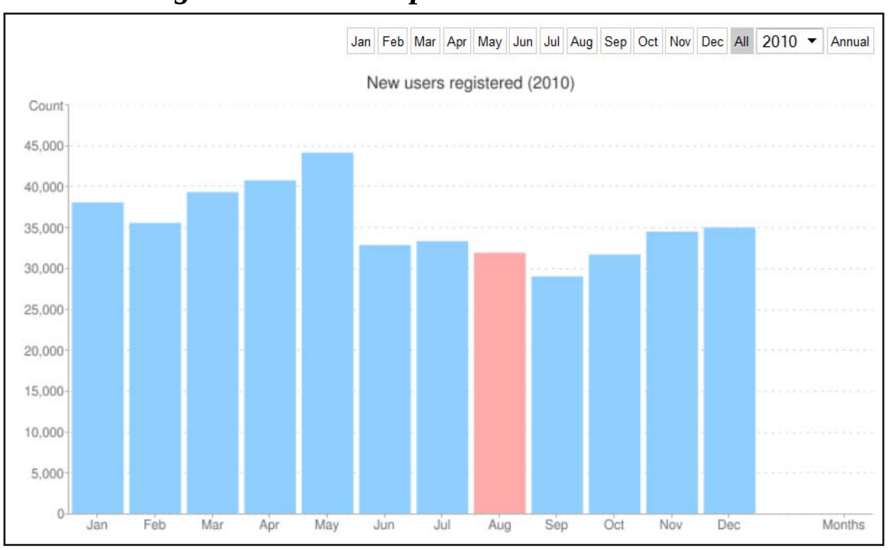
Currently, there is no local law, mandate, or authority in place to assign to any public, private or any other agency the tasks associated with the production of geographic and/or attribute information for local neighborhoods in New York City. These data are produced in an ad hoc manner by different governmental planning agencies, or even their separate units, independent from each other and for a variety of different purposes. In addition, despite the large amounts of local information being produced by bottom-up CBOs engaged in community development and local environmental planning, there is no quasi-public, non-profit, or for-profit agency engaged in the maintenance and distribution of such important and largely coveted information.

6.3.4.1 Wikimapia Geospatial Boundaries

As indicated by the literature, besides top-down neighborhood information, bottom-up information produced by CBOs is also important to conduct local planning activities. Since neighborhood boundaries were not available from local participants or other CBOs, this study incorporates geospatial information from Wikimapia.org which is maintained by online users through an open environment. Even before Google.com started its current practices of collecting local knowledge (see section 6.3.3.2 below), Wikimapia had already launched one of the earliest Web 2.0 open-access online mapping tools for users to create, update, and share geospatial data.

Through this site, registered users can disseminate information about local neighborhoods by making it viewable to a worldwide audience. *Figure 6.32 Wikimapia's New Users in 2010* shows that in this year an average of over 30,000 new users registering each month on this website.

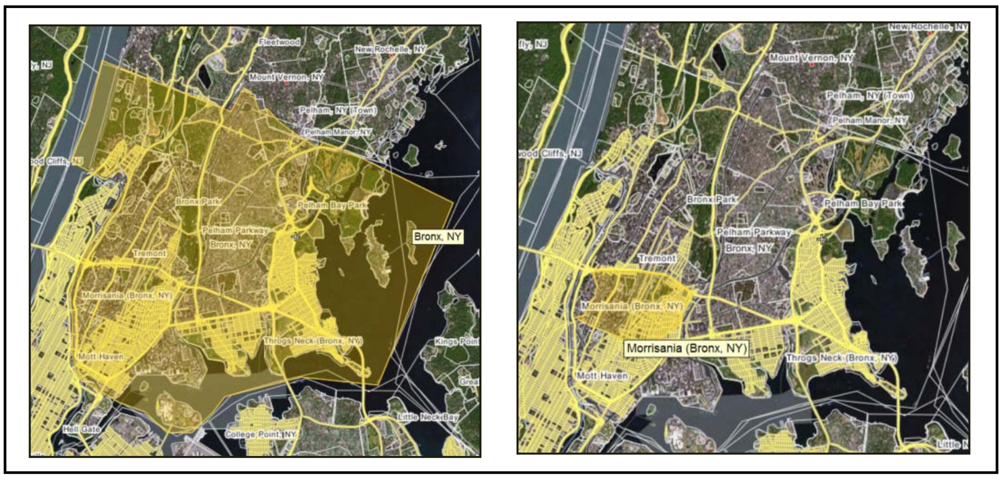
Figure 6.32 Wikimapia's New Users in 2010



Source: Wikimapia. http://wikimapia.org Accessed 20110802

This website offers a set of basic interactive mapping tools for users to define neighborhoods and their overlapping boundaries. While all visitors can find geospatial information at multiple scales by hovering around the map image, only registered users are allowed to digitize, update, and maintain local neighborhood geographic information. *Figure 6.33 Wikimapia Frontend Neighborhood Mapping* shows examples of county and neighborhood level map displays available for users to obtain geospatial information.

Figure 6.33 Wikimapia Frontend Neighborhood Mapping



6.3.4.2 Google Geospatial Boundaries

With the motto ***"****Start adding your local knowledge to the map"* (see Appendix N) Google recently launched its new Map Maker, a Web 2.0 application for users to create and edit maps for local places around the world. This application allows users to create points, lines, and polygons that become permanent visible features to worldwide audiences. However, local neighborhood boundaries are not yet available through this application and therefore are not part of this study.

6.3.5 Commercial Neighborhood Boundary Definitions

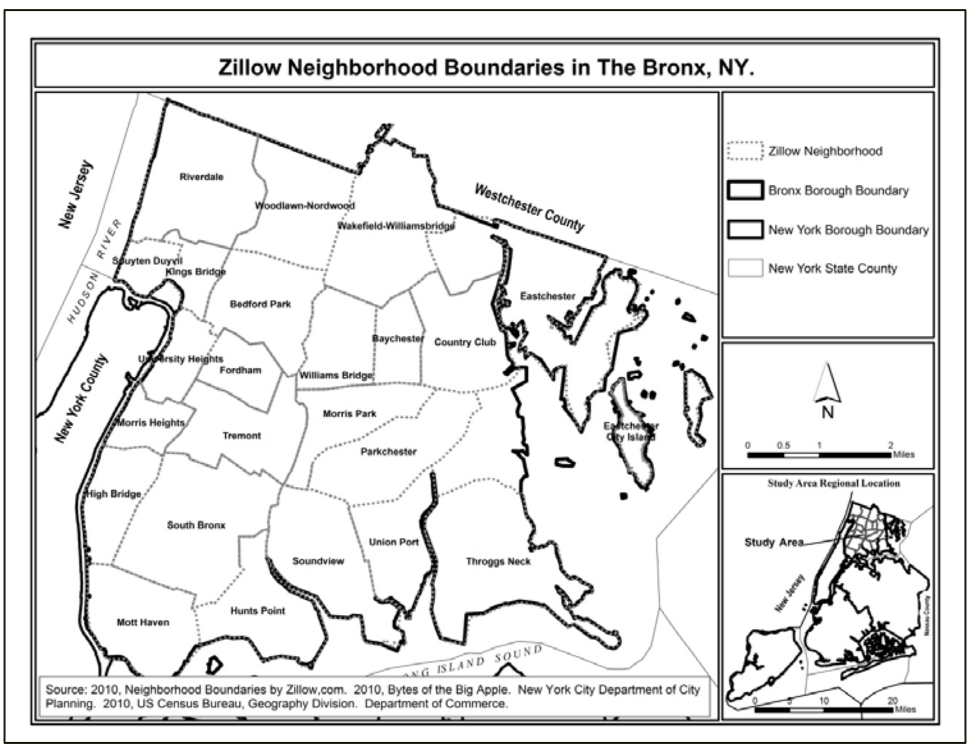
Given the widespread interests for such coveted geographies, there exist a number of additional neighborhood boundary files from commercial vendors. *Table 6.9 Other Neighborhood Boundary Definitions* lists some examples of the variety of different files found during the research.

Table 6.9 Other Neighborhood Boundary Definitions

Zillow
Maponics
Google

Figure 6.34 Zillow.com Bronx County Neighborhood Boundaries shows how Zillow.com, a real estate commercial company, defines local neighborhoods in The Bronx, NY. It uses many of the same place names utilized by other players producing local boundary files and divides the study area into 27 different neighborhoods.

Figure 6.34 Zillow.com Bronx County Neighborhood Boundaries



6.4 GeoDNA Analysis

The GeoDNA information discovery analysis contains four interrelated areas:

1. **L**ocal Socioeconomic Analysis
2. **I**nformation Relevance Analysis
3. **N**eighborhood Geospatial Analysis
4. **K**nowledge Interpretation Analysis

This series of analyses, referred here by its acronym **LINK**, forms the basic structure of the GeoDNA discovery analysis. During this process, these analyses are performed sequentially using a set of selected neighborhood cases. First, the final set of neighborhoods of interest cases is defined by applying sample selection criteria to the top set of user selected neighborhoods from the qualitative assessment described above. Second, the LINK analyses are performed for each neighborhood case to examine their distinct makeup. Third, the results are used to examine the impacts of their GeoDNA on local information discovery through a library resource assessment.

6.4.1 Neighborhood Sample Selection Criteria

The processes employed to select neighborhood cases combines findings from the qualitative assessment described in section *6.2.1- Neighborhood Identification* with study area boundary information gathered subsequently. Therefore, qualitative and quantitative findings were integrated to create a group of sample cases using the following criteria:

1) A case sample must have an average score above the neighborhood of interest mean of 1.8.

2) Only one sample can be selected within each neighborhood region as defined by the New York City United Hospital Fund (NYCUHF).

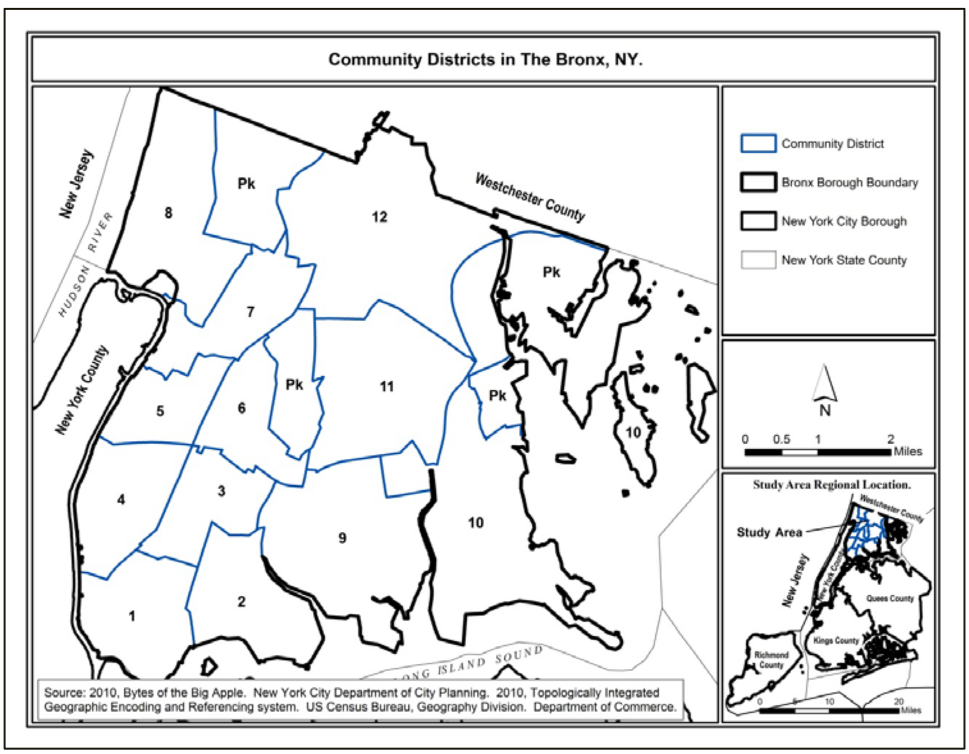
3) A selected neighborhood must fall within a distinct Community District (CD) as identified by the New York City Department of City Planning (NYCDCP).

6.4.1.1 The New York City Community Districts

Community District (CD) boundaries are the most basic geographic units used by individuals and organizations to participate in local planning activities in New York City. According to the NYCDCP, "Community-based planning often begins at the community board level." Community boards are fully staffed administrative bodies charged with managing CDs. Each CD is administered by its own board.

The NYCDCP produces the CD polygon file as part of the Bytes of the Big Apple GIS data series. According to this file, a total of 59 CDs exist in the city and 12 of them are located in the Borough of The Bronx. *Figure 6.35 The Bronx Community Districts* shows the location of the 12 Bronx CDs.

Figure 6.35 The Bronx Community Districts



6.4.1.2 The New York City United Hospital Fund (NYCUHF)

The NYC United Hospital Fund (NYCUHF) produces the Neighborhood Regions dataset based on zip code aggregates. The citywide file contains a total of 42 regions.

Figure 6.36 The Bronx United Hospital Fund Neighborhood Regions

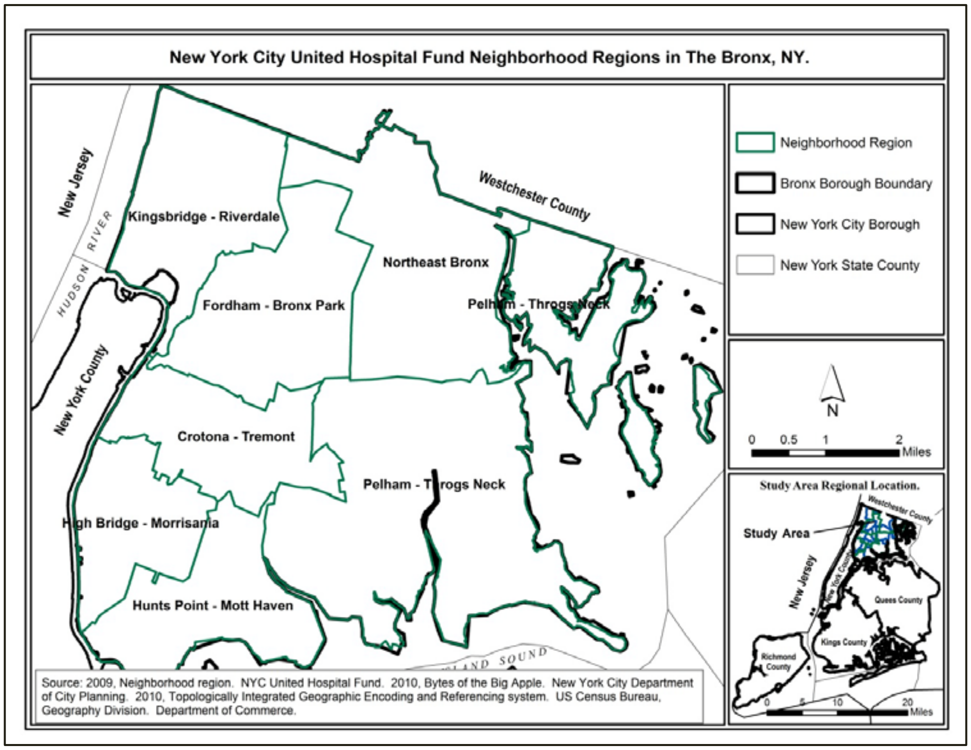


Figure 6.36 The Bronx United Hospital Fund Neighborhood Regions shows the seven NYCUHF regions located in The Bronx. These regions are named as follows:

1. Kingsbridge-Riverdale
2. Northeast Bronx
3. Fordham-Bronx Park
4. Pelham-Throgs Neck
5. Crotona-Tremont
6. High Bridge-Morrisania
7. Hunts Point-Mott Haven

6.4.2 Selected Neighborhood Cases

After applying the selection criteria, the final set of study cases contains a total of 7 neighborhoods. Besides having mean interest values above the 1.8 threshold, they are also located in different Community Districts and different NYCHUF Neighborhood Regions. *Figure 6.37 Selected Neighborhood Case Studies* shows the location of these cases and the three different boundary definitions used in the analysis. The cases are:

1. Fordham
2. Hunts Point
3. Morrisania
4. Riverdale
5. Throgs Neck
6. West Farms
7. Woodlawn

Figure 6.37 Selected Neighborhood Case Studies

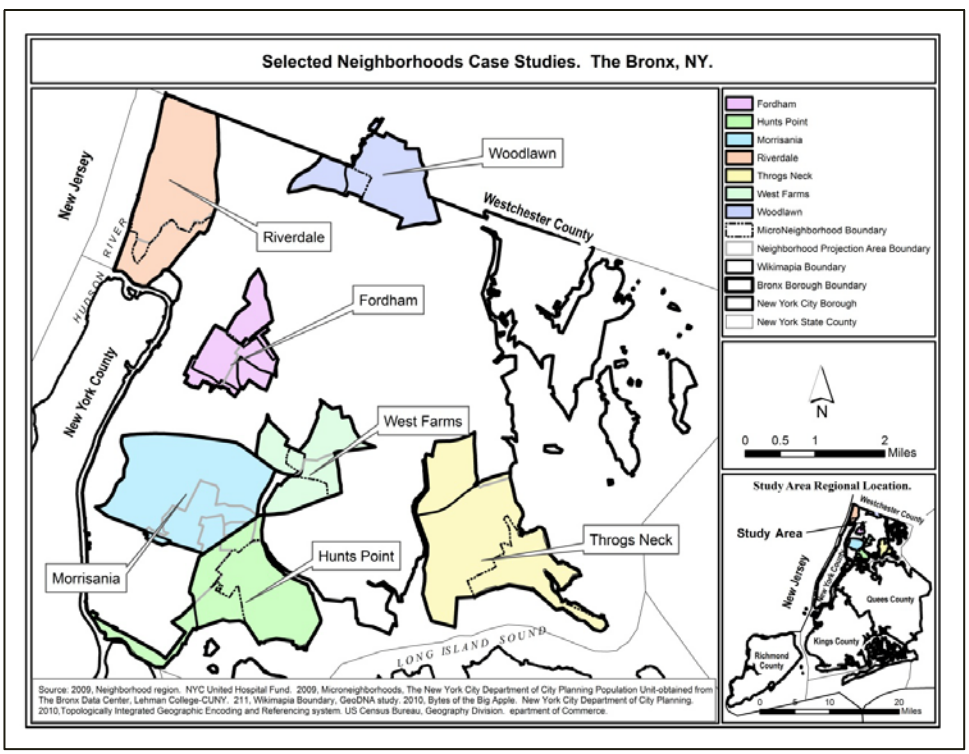


Table 6.10 Selected Cases' Geopolitical and Administrative Geographies shows the different politico and administrative boundary types that overlap the selected neighborhood sample cases.

Table 6.10 Selected Cases' Geopolitical and Administrative Geographies

	Community Districts	***NYC UHF Neighborhood Region***	***Congressional District***	***Assembly District***	***State Senate***	***City Council District***	***Municipal Court District***
Fordham	5, 7	103	7, 16, 17	78, 79, 80, 86	33, 34	5, 11, 14, 16	1, 2
Hunts Point	2	107	7, 16	79, 84, 85	28, 32	8, 17	1, 2
Morrisania	3	106	16	76, 77, 78, 79, 84, 85, 86	28, 32, 33, 36	14, 15, 16, 17, 18	1, 2
Riverdale	8	101	17	78, 81	31, 33, 34	11	2
Throgs Neck	10	104	7	82	34	13	1
West Farms	6	105	7, 16	76, 78, 79, 80, 85	32	13, 15, 17, 18	1, 2
Woodlawn	12	102	17	81, 83	34, 36	11, 12	1, 2

The next section provides an overview of each neighborhood case selected for the study. In addition, it provides information about the geospatial extent of each neighborhood according to the three boundary versions used during the analysis: 1) microneighborhoods, 2) Neighborhood Projection Areas (NPA), and 3) Wikipedia neighborhoods.

6.4.2.1 Fordham

The neighborhood of Fordham is located in the western section of the borough. Originally named in 1671, when John Archer received a patent from the manor of Fordham (Bronx Historical Society), today it extends across Fordham Road, which boasts one of the largest business districts of New York City. This vibrant commercial district is now managed by the Fordham Road Business Improvement District (BID), which was officially incorporated on May 24, 2005[10] Pursuant to the New York City Charter[11].

Figure 6.38 Fordham Neighborhood Boundaries

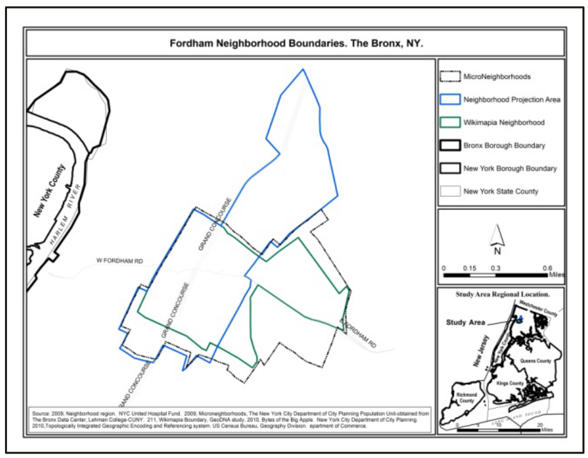


Figure 6.38 Fordham Neighborhood Boundaries shows the three boundary versions used in the study. A small shift on the microneighborhoods boundaries can be observed for this neighborhood. The geographic files used for the analysis showed the following extent variations:

1) The Wikimapia boundaries cover the smallest area with 0.53 $Miles^2$
2) The NPA version represents the second largest area with 0.76 $Miles^2$
3) The microneighborhood area, which is composed of Fordham north and Fordham south, covers the largest area with 0.83 $Miles^2$.

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[10] http://fordhamroadbid.org/608_Fordham_Final_Financial_Statements.pdf

[11] http://law.onecle.com/new-york/new-york-city-administrative-code-new-/ADC025-464_25-464.html

6.4.2.2 Hunts point

The neighborhood of Hunts Point is located in the southernmost area of the borough which is commonly known as the South Bronx. It is intercepted by the Bruckner Blvd. which is a major city road which also carries segments of the Interstate 278 and Interstate 95.

Figure 6.39 Hunts Point Neighborhood Boundaries

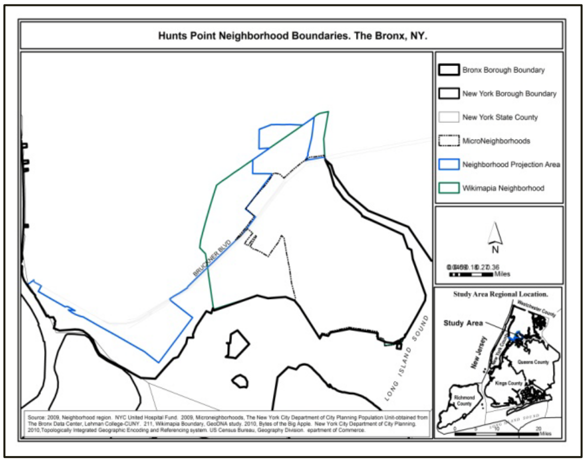


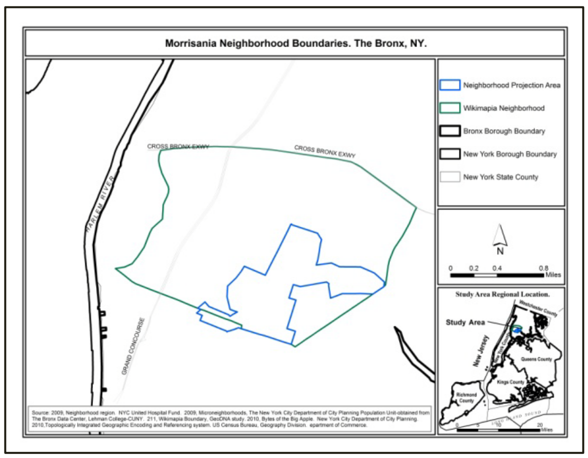
Figure 6.39 Hunts Point Neighborhood Boundaries shows the three different boundary representations found for this neighborhood. Their geographic files show the following extent variations:

1) The microneighborhood version overlaps the smallest area with 1.3 $Miles^2$
2) The Wikimapia's version covers the second largest area with 2.0 $Miles^2$
3) The NPA version contains the largest area with 2.08 $Miles^2$

6.4.2.3 Morrisania

Morrisania is located in the southern section of the borough and abuts the neighborhood of Hunts Point described above. Its origins date back to 1697 when Young Lewis Morris received a patent to make the area the manor of Morrisania, which later in 1783 was proposed by Lewis to become the first capital of the United States (Bronx Historical Society).

Figure 6.40 Morrisania Neighborhood Boundaries



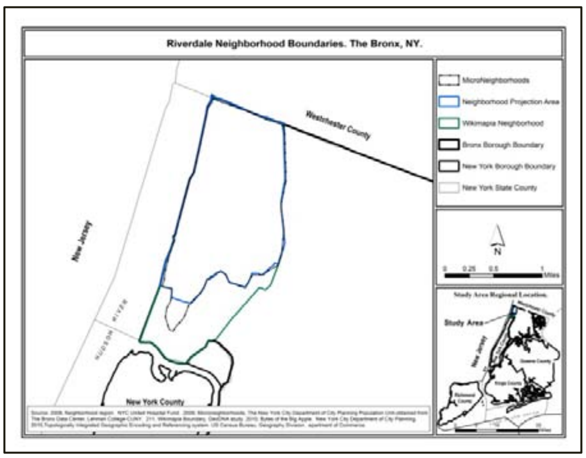
The NPA labels this neighborhood using a composite name from the neighborhoods of Morrisania and Melrose. The geographic extents for this neighborhood showed a large variation between the two neighborhood boundary files used for the analysis. Specifically, Wikimapia users defined a much larger neighborhood than the NPA top-down version. Their geographic extents are as follows:

1) the NPA version, which contains the neighborhoods of Morrisania and Melrose, is the smallest area with 0.60 Miles^2
2) The Wikimapia's version is the largest area representation with 2.93 Miles^2
3) The microneighborhood file did not have an area representation with this neighborhood's name

6.4.2.4 Riverdale

The neighborhood of Riverdale is located in the northwestern corner of the borough and is considered one of the most affluent neighborhoods in New York City. According to the Lehman College Library Digital Collections, this neighborhood expands over a "…ridge above the station filled with the estates of wealthy commuters... mansions [and] also a Riverdale Historic District…many of the original estates have been sold or donated to institutions - the Wave Hill Center for Environmental Studies, Riverdale Country School and the Greyston Conference Center, among others."[12]

Figure 6.41 Riverdale Neighborhood Boundaries



There was little variation between the geographic extents for this neighborhood between the three different representations. Specifically, the two top-down boundary versions have very similar extents, but the Wikimapia representation occupies a much larger area as follows:

1) The NPA version covers the smallest area with 1.80 Miles^2
2) The microneighborhood version is the second smallest with 1.83 Miles^2
3) The Wikimapia version covers the largest area with 2.41 Miles^2

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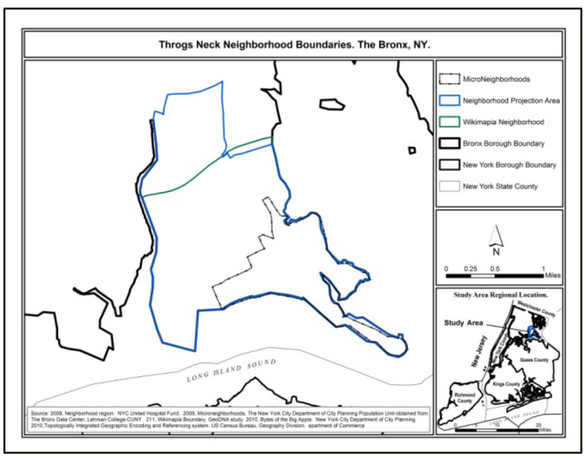
[12] http://www.lehman.edu/vpadvance/artgallery/arch/neighborhoods/riverdale.html

6.4.2.5 Throgs Neck

The neighborhood of Throgs Neck is located in the southeastern most corner of the borough. The neighborhood has a history of combining military and residential land uses. John Throckmorton settled in Throg's Neck in 1642 and in 1776 The British landed there forcing George Washington and the US Army to withdraw north to White Plains. (Bronx Historical Society). Today, the neighborhood contains Fort Schuyler, which was built in the 1830s, and two main residential areas –Locus Point and Silver Beach- which developed into a residential neighborhood after 1945 from the original resort areas built at the turn of the Century. (New York Chamber of Commerce and Industry)

Figure 6.42 Throgs Neck Neighborhood Boundaries



This neighborhood shows the largest variations among its three different area representations. While the NPA and Wikimapia boundaries show the neighborhood as being very large, the microneighborhood shows it as one of the smallest.

1) The microneighborhood version covers the smallest area with 0.95 Miles^2

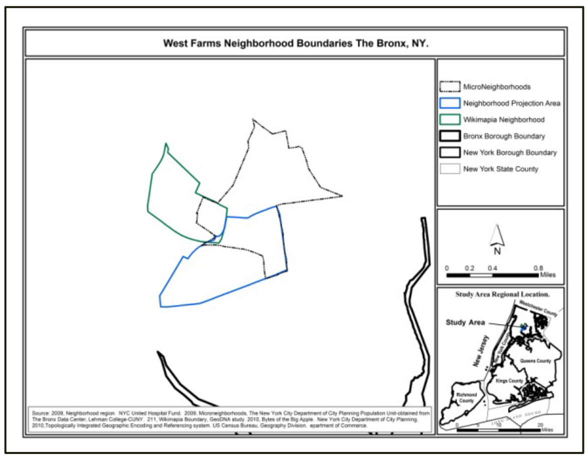
2) The Wikimapia version is the second largest with 2.77 Miles^2

2) The NPA version covers the largest area with 3.38 Miles^2

6.4.2.6 West Farms

The neighborhood of West Farms is located towards the south section and the middle of the borough. This neighborhood boasted *The Westchester Patriot,* the first newspaper published by Mattias Lopez in the borough in 1813 and in 1874 it was annexed into New York City and managed by the Department of Public Parks (Bronx Historical Society).

Figure 6.43 West Farms Neighborhood Boundaries



Although this neighborhood has the most varied locations with each version occupying a different geographic area in a different direction, their sizes are the most approximate among the rest of the neighborhoods. The area extents are as follows:

1) The Wikimapia version covers the smallest area with 0.32 $Miles^2$

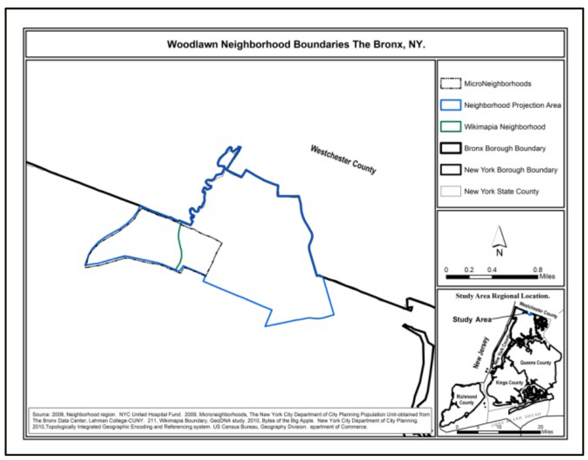
2) The NPA version is the second largest with 0.54 $Miles^2$

2) The microneighborhood version covers the largest area with 0.71 $Miles^2$

6.4.2.7 Woodlawn

Woodlawn is located in the northernmost section of the borough abutting Westchester County to the north. It is surrounded by open space including parklands and the large Woodlawn Cemetery to the west and south respectively. According to the Lehman College Library Digital Collections, this neighborhood developed from the adjacent Woodlawn Cemetery and after about fifty houses that were part of the 1873 Philipse manor, and later Gilbert Valentine's farm, that were incorporated into the village of Woodlawn. The Irish and Italian population predominance resulted from the 1890s Croton Aqueduct construction which attracted new workers to the area[13].

Figure 6.44 Woodlawn Neighborhood Boundaries



The three different boundary versions used for the analysis show a variety of areas overlapping this neighborhood as follows:

1) The Wikimapia version covers the smallest area with 0.27 $Miles^2$

2) The microneighborhood version is the second largest with 0.37 $Miles^2$

2) The NPA version covers the largest area with 1.43 $Miles^2$

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[13] http://www.lehman.edu/vpadvance/artgallery/arch/neighborhoods/woodlawn.html

6.4.3 Local Socio-demographic Analysis

This portion of the analysis contains a review of the basic socio-demographic and housing characteristics found within the selected neighborhood cases. First, the layout of the US Census tracts is reviewed to assess the distribution of tract boundary changes throughout the borough from 2000 to 2010. Next, tract boundary changes are further examined at the local level for the selected neighborhood cases and the results presented by neighborhood type including: 1) *Microneighborhoods;* 2) *Neighborhood Projection Areas (NPA); and 3)Wikimapia* neighborhood versions.

After reviewing the tracts layout, a discussion of the socio-demographic and housing characteristics is presented along with maps depicting the concentrations of major racial and ethnic groups by neighborhood version. Complete tables containing socio-demographic and housing characteristics information are included in *Appendix O-Socio-demographic and Housing Characteristics*.

6.4.3.1 Census tracts Characteristics

Before conducting the socio-demographic and housing characteristics analyses, the 2010 Census tract boundaries were compared against the previous 2000 Census to determine if any of the tracts changes occurred within the selected cases. The number of census tracts in the borough was reduced from 355 in 2000 to 339 in 2010.

Figure 6.45 Census Tracts Boundary Changes from 2000 to 2010 in The Bronx, NY, shows the location and dispersion of these merges. Many of these changes occurred within the selected neighborhood case samples and are discussed below preceding the discussion on socioeconomic characteristics under each neighborhood type.

Figure 6.45 Census Tracts Boundary Changes from 2000 to 2010 in The Bronx, NY.

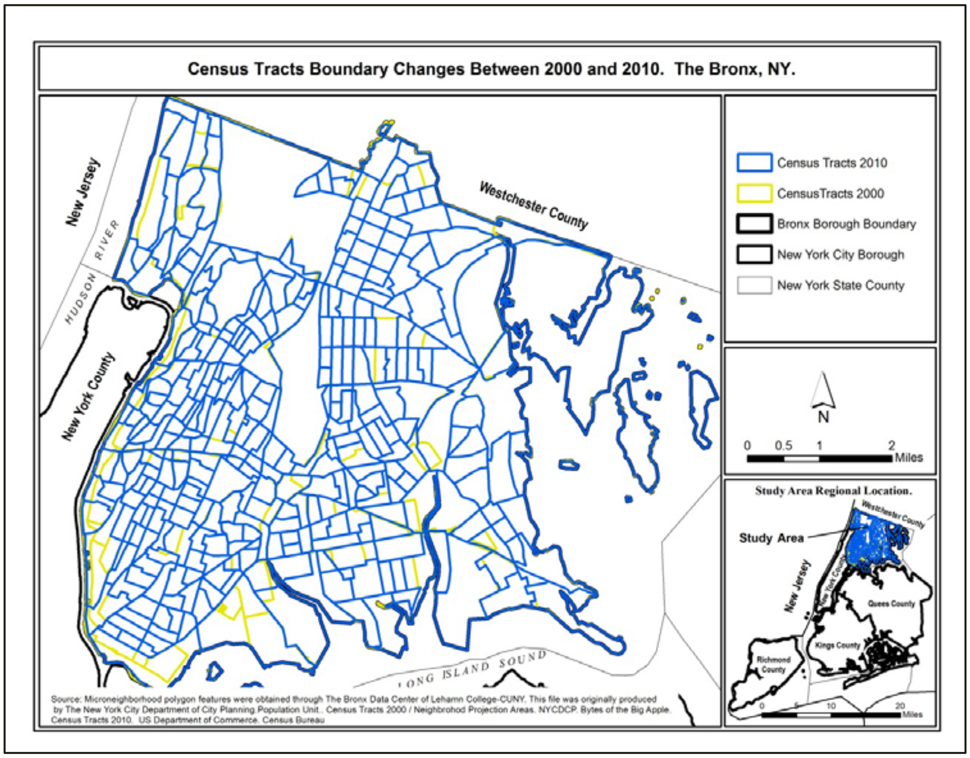


Table 6.11 Number of Census Tracts per Selected Neighborhood in 2010 shows the total number of census tracts contained for the three different boundary versions used for the study and for each neighborhood case sample.

Table 6.11 Number of Census Tracts per Selected Neighborhood in 2010

Neighborhood	Microneighborhoods	NPA	Wikimapia
Fordham	28	32	21
Hunts Point	12	20	19
Morrisania	N/A	24	73
Riverdale	16	15	18
Throgs Neck	8	21	17
West Farms	22	17	14
Woodlawn	8	21	6

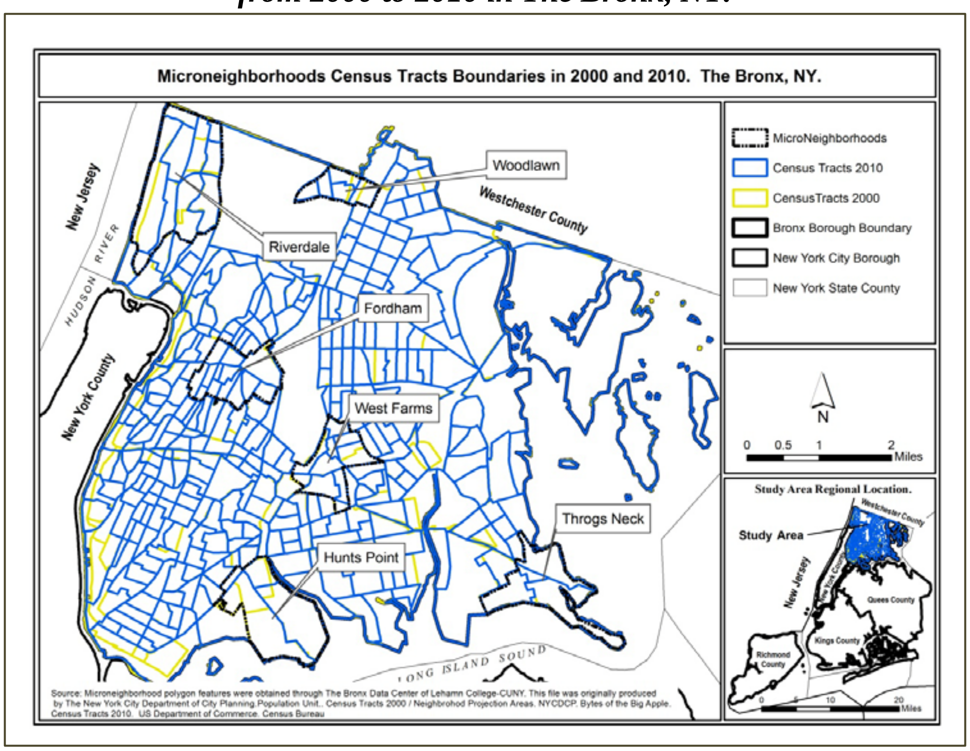
6.4.3.2 Socio-demographic Characteristics

As previously indicated, the socio-demographic analysis examines a series of variables produced by the US Census of Population and Housing pertaining to the race, ethnicity and housing characteristics of each case. The variables were downloaded from the NYCDCP webpage in table format, cleaned, and joined to the tract boundary file and then loaded into the GeoDNA database. The census tract boundary changes and socio-demographic variables are reviewed below for each neighborhood boundary version.

<u>1. Microneighborhoods GeoDNA Socio-demographic Characteristics</u>

Figure 6.46 Microneighborhoods Census Tracts Boundary Changes from 2000 to 2010 in The Bronx, NY, shows the dispersion of tract changes in yellow within the area. Except for Fordham, the rest of the microneighborhoods experienced a reduction in the number of tracts because of the merging of two or more tracts by the US Census Bureau.

Figure 6.46 Microneighborhoods Census Tract Boundary Changes from 2000 to 2010 in The Bronx, NY.



This final tract rearrangement resulted in similar socio-demographic conditions because high concentrations of ethnic and minority communities continue to be found in the southern section of the borough. *Table 6.12 Microneighborhood % Population Figures in 2010* shows the percent concentration of the borough's total major racial and ethnic population groups.[14]

Table 6.12 Microneighborhood % Population Figures in 2010[15]

Neighborhood	% of total Population	% White	% Black	% AIAN	% Asian	% NHOPI	% Hispanic
Fordham	10.53	6.38	7.35	10.13	10.46	12.81	12.75
Hunts Point	3.86	0.43	3.42	0.54	3.50	1.51	4.91
Morrisania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Riverdale	3.50	20.85	0.84	5.50	1.18	3.77	1.15
Throgs Neck	1.93	7.71	0.65	1.64	1.76	3.27	1.41
West Farms	6.39	6.01	4.96	14.55	6.73	8.04	6.34
Woodlawn	1.36	4.46	1.51	1.57	2.23	2.76	0.52

The largest concentrations of Black Population are found in the neighborhood cases located in the southern section of the borough such as Fordham and West Farms. These neighborhoods also have a larger concentration of Hispanic population than those in the northern section. Fordham, which has one of the highest concentrations of minority individuals, was also the most densely populated neighborhood case. The Asian population was mostly concentrated in the selected neighborhoods in the northern section of the borough. *Figure 6.47 Microneighborhoods Population Density by Census Tract in 2010. The Bronx, NY,* shows the percent distribution of the borough population by neighborhood according to this definition.

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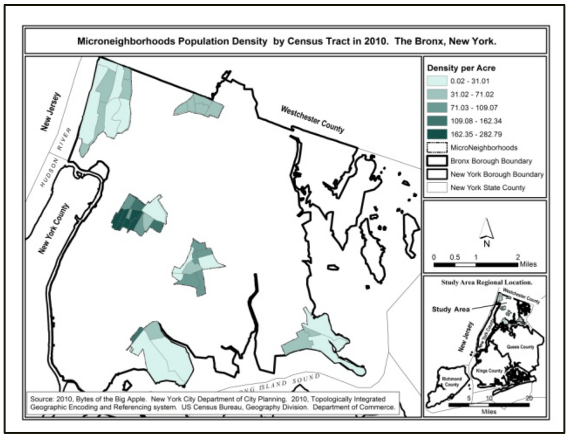
[14] The microneighborhoods table and its respective map above exclude information for Morrisania because this boundary file version does not have a polygon feature labeled with this neighborhood name.
[15] AIAN (American Indian and Alaska Native); NHOPI (Native Hawaiian and Other Pacific Islander)

Figure 6.47 Microneighborhoods Population Density by Census Tract in 2010. The Bronx, NY.



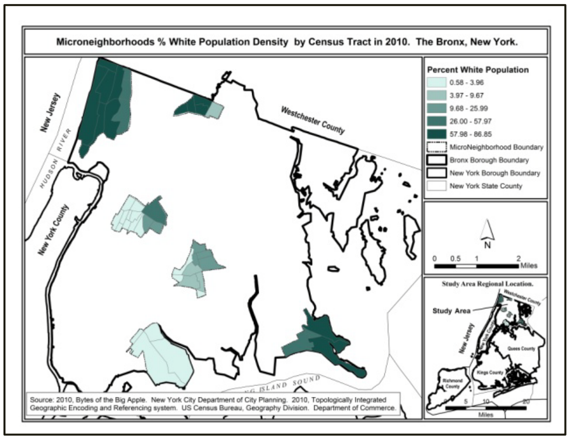
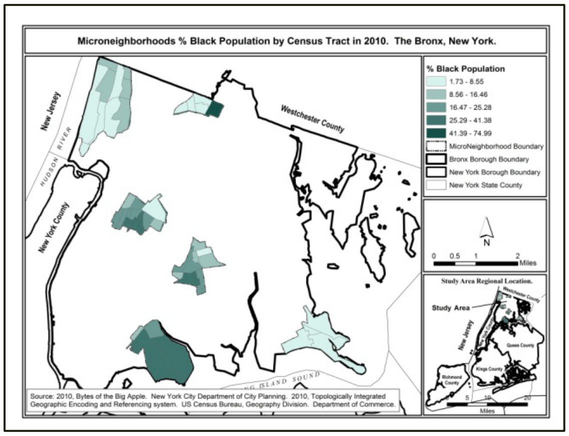


Figure 6.48 Microneighborhoods % Non-Hispanic White Population by Census Tract in 2010. The Bronx, NY.

Figure 6.49 Microneighborhoods % Non-Hispanic Black Population by Census Tract in 2010. The Bronx, NY.



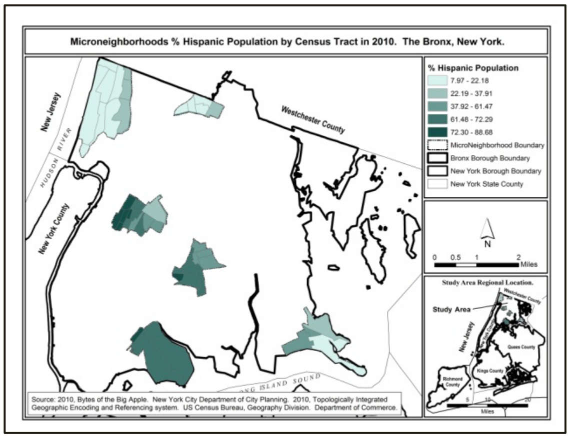


Figure 6.50 Microneighborhoods % Hispanic Population by Census Tract in 2010. The Bronx, NY.

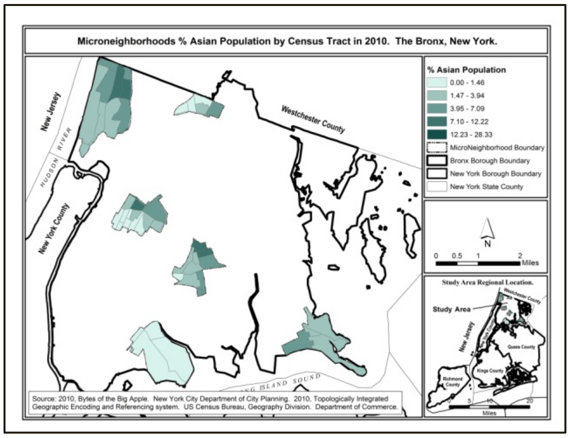


Figure 6.51 Microneighborhoods % Non-Hispanic Asian Population by Census Tract in 2010. The Bronx, NY.

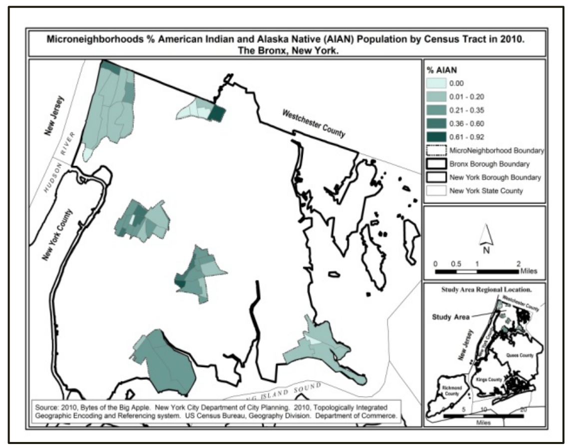


Figure 6.52 Microneighborhoods % Non-Hispanic American Indian and Alaska Native Population by Census Tract in 2010. The Bronx, NY.

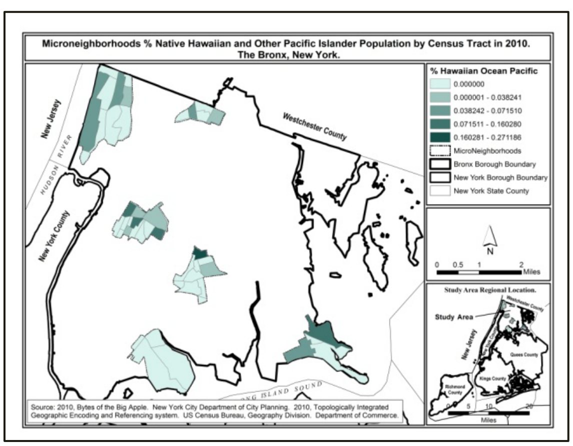


Figure 6.53 Microneighborhoods % Non-Hispanic Native Hawaiian and Other Pacific Islander Population by Census Tract in 2010. The Bronx, NY.

2. Neighborhood Projection Areas (NPA) GeoDNA Socioeconomic Characteristics

Figure 6.54 Neighborhood Projection Areas Census Tracts Boundary Changes between 2000 and 2010. The Bronx, NY, shows the tract changes that occurred within the NPA boundaries. According to the NPA definition, more changes occurred within the selected neighborhoods than the microneighborhood definitions which includes a smaller portion of land area than the NPA. Consequently, except for the neighborhood of Fordham, all other neighborhood cases had at least two or more tracts merged, including the neighborhood of Morrisania, which had the highest population increases in the borough and the third of all New York City's NPAs (See *Appendix O*).

Figure 6.54 Neighborhood Projection Areas Census Tracts Boundary Changes from 2000 and 2010. The Bronx, NY.

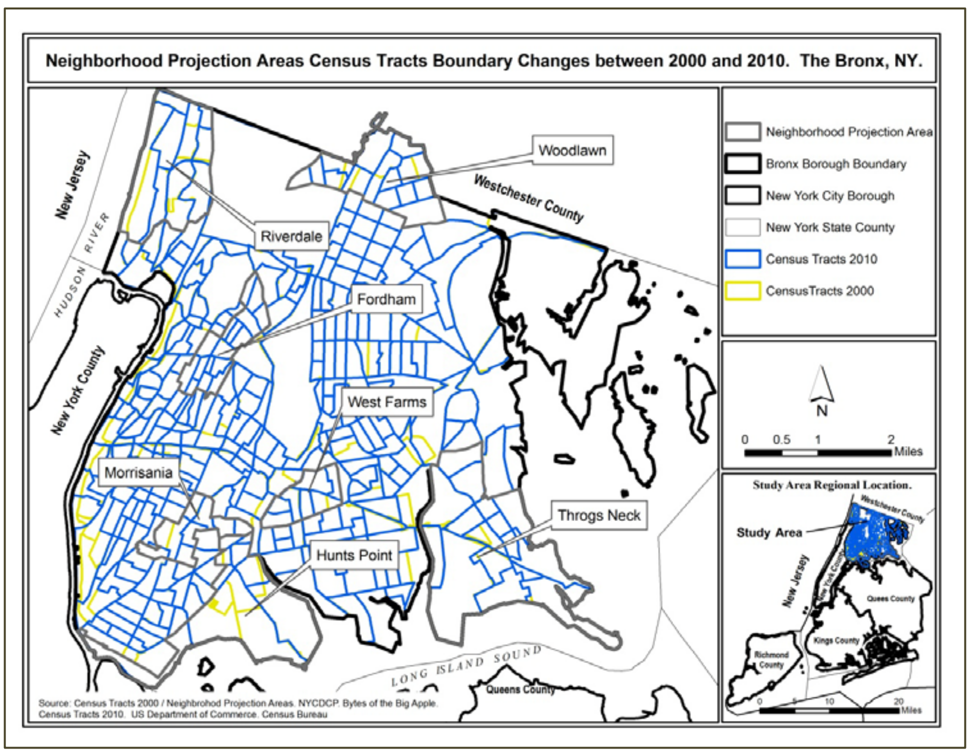


***Table 6.13 Neighborhood Projection Areas % Population in 2010*[16]**

Neighborhood	% of total Population	% White	% Black	% AIAN	% Asian	% NHOPI	% Hispanic
Fordham	12.43	6.83	8.45	16.87	12.08	11.06	14.97
Hunts Point	5.84	0.73	5.29	0.96	5.06	3.27	7.32
Morrisania	7.38	0.80	8.97	1.26	7.75	6.03	7.98
Riverdale	3.12	18.51	0.74	4.96	1.01	1.26	1.06
Throgs Neck	4.80	19.86	1.33	4.54	3.96	4.02	3.49
West Farms	5.57	1.28	4.56	9.09	7.51	6.53	6.42
Woodlawn	4.78	5.65	9.11	3.87	7.86	6.78	1.84

Table 6.13 Neighborhood Projection Areas % Population in 2010 shows the distribution of the major racial and ethnic groups in percent for each neighborhood case according to the NPA boundary version. These percentages are very similar to those associated with microneighborhood boundaries as described in the previous section. Specifically, neighborhoods in the north such as Riverdale and Throgs Neck contain a larger concentrations of White population and smaller concentrations of minority individuals than the neighborhoods in the south.

For example, except for Woodlawn which is located in the northern section and had a larger concentration of Black population, the neighborhoods located in the south such as Fordham, Morrisania, and Hunts Point contain larger proportions of the borough’s Black and Hispanic populations. Figures 6.55 through 6.61 show the distribution of the major racial and ethnic population groups throughout the neighborhoods selected for the study using the NPA boundaries.

[16] AIAN (American Indian and Alaska Native); NHOPI (Native Hawaiian and Other Pacific Islander)

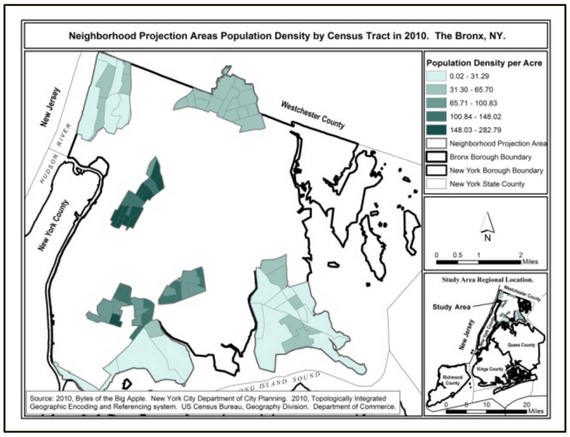
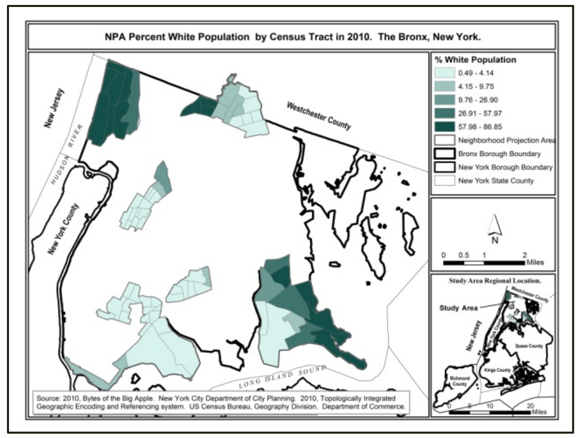


Figure 6.55 Neighborhood Projection Areas Population Density by Census Tract in 2010. The Bronx, NY.

Figure 6.56 Neighborhood Projection Areas % Non-Hispanic White Population by Census Tract in 2010. The Bronx, NY.



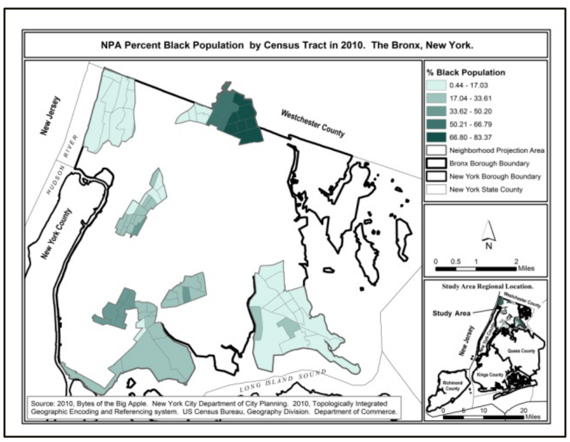
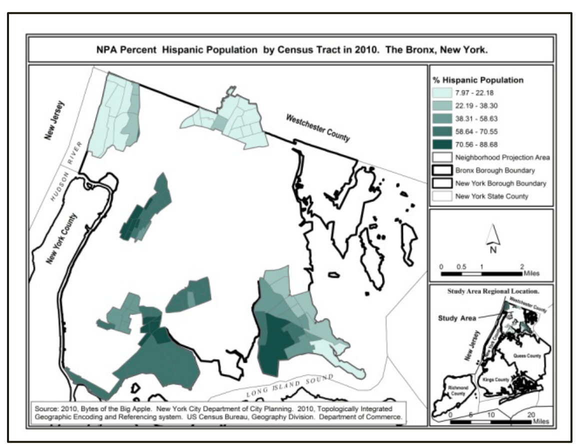


Figure 6.57 Neighborhood Projection Areas % Non-Hispanic Black Population by Census Tract in 2010. The Bronx, NY.

Figure 6.58 Neighborhood Projection Areas % Hispanic Population by Census Tract in 2010. The Bronx, NY.



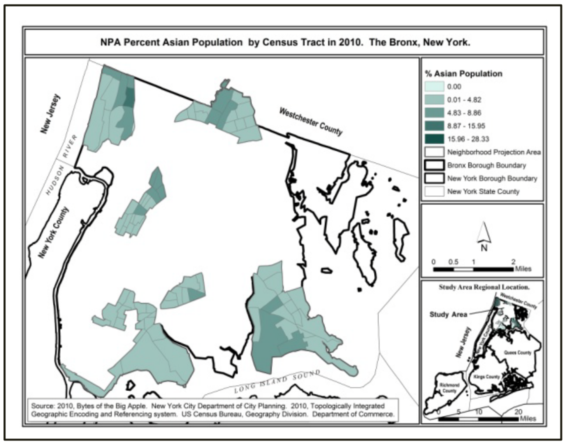


Figure 6.59 Neighborhood Projection Areas % Non-Hispanic Asian Population by Census Tract in 2010. The Bronx, NY.

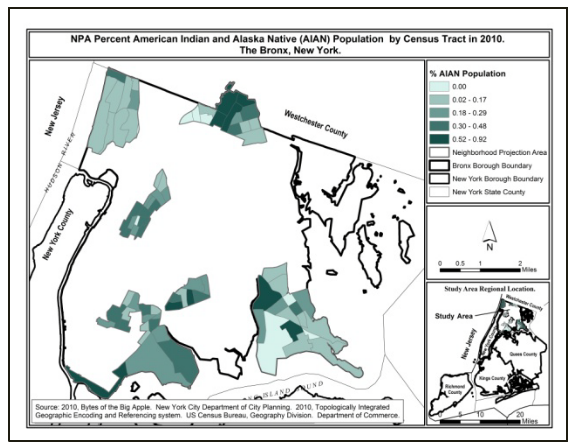


Figure 6.60 Neighborhood Projection Areas % Non-Hispanic American Indian and Alaska Native Population by Census Tract in 2010. The Bronx, NY.

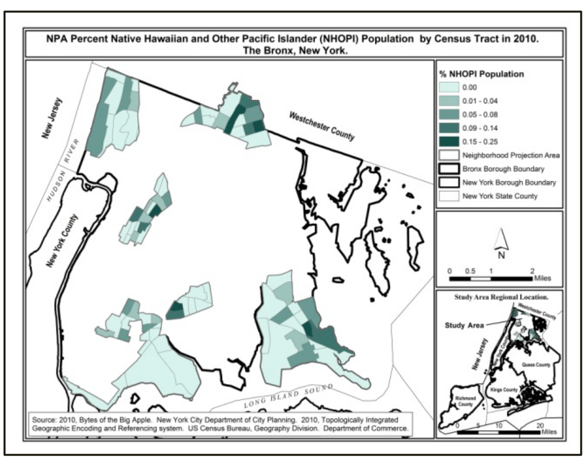


Figure 6.61 Neighborhood Projection Areas % Non-Hispanic Native Hawaiian and Other Pacific Islander Population by Census Tract in 2010. The Bronx, NY.

3. Wikimapia Neighborhoods GeoDNA Socioeconomic Characteristics

Figure 6.62 Wikimapia Census Tracts Boundary Changes between 2000 and 2010 shows the census tract changes that 9ccurred within the Wikimapia defined neighborhood cases. Similar to the two other boundary definitions discussed above, all neighborhoods defined by Wikimapia users experienced at least two or more census tracts merges. In addition, only the neighborhood of Fordham did not experience any changes despite having a very different boundary definition than the two other previous neighborhood versions detailed above.

Figure 6.62 Wikimapia Census Tracts Boundary Changes between 2000 and 2010.

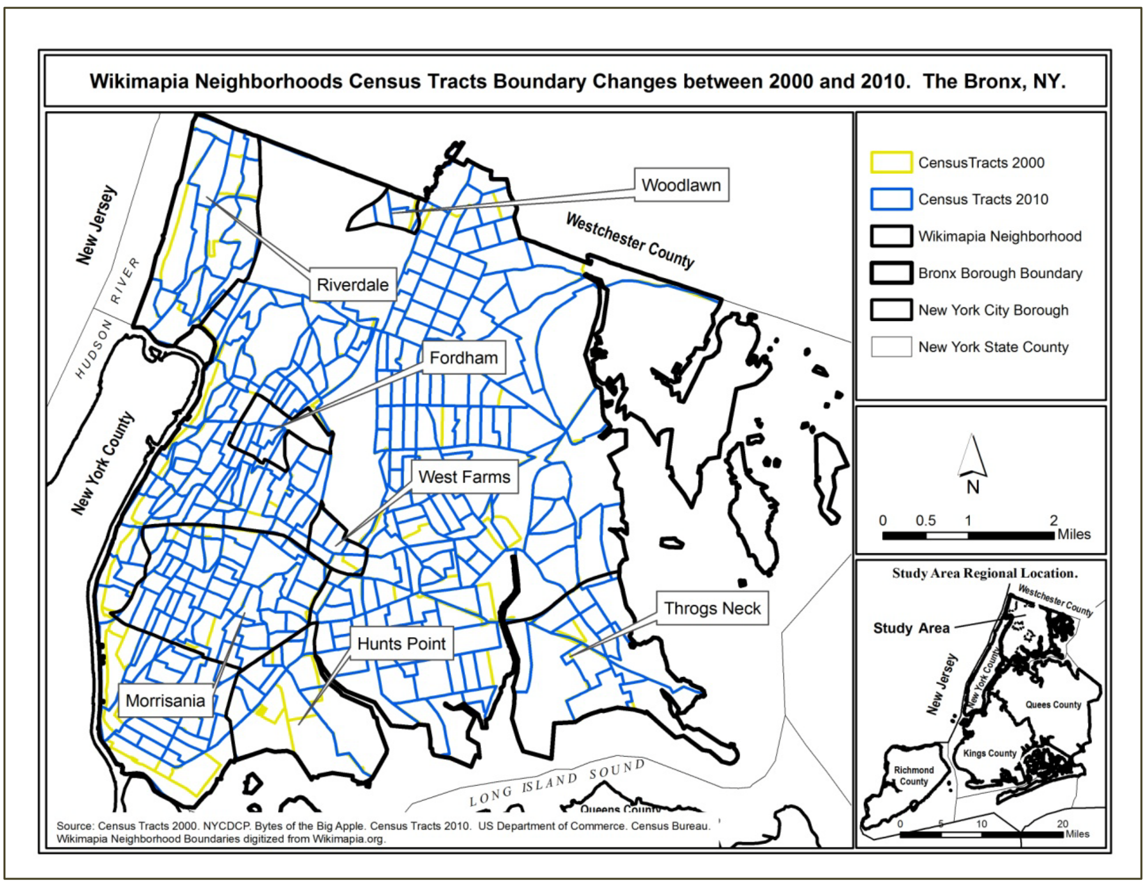


Table 6.14 Wikimapia Neighborhoods % Population by Census Tract in 2010

Neighborhood	% of total Population	% White	% Black	% AIAN	% Asian	% NHOPI	% Hispanic
Fordham	7.35	3.93	5.02	6.87	7.40	8.79	9.10
Hunts Point	5.43	0.70	4.76	0.83	5.00	2.26	6.91
Morrisania	21.41	2.70	22.94	6.92	20.00	17.59	24.54
Riverdale	4.06	22.13	0.96	6.56	1.47	4.77	1.78
Throgs Neck	3.78	16.13	1.07	3.05	2.92	4.02	2.70
West Farms	4.02	1.11	3.63	1.20	4.65	2.26	4.87
Woodlawn	0.81	4.18	0.51	0.69	1.01	0.50	0.24

As illustrated in *Table 6.14 Wikimapia Neighborhoods % Population by Census Tract in 2010*, the Wikimapia socio-demographic analysis produced similar results to the results obtained in the previous two neighborhood version analyses (microneighborhoods and NPA). However, the Wikimapia analysis was affected by the larger size of the neighborhood of Morrisania which resulted in much larger concentrations of Black, Asian, and Hispanic populations for this neighborhood than the previous two other analyses. Figures 6.63 through 6.70 show the distribution of the major racial and ethnic population groups throughout the neighborhoods selected for the study according to the Wikimapia users' defined neighborhood boundaries.

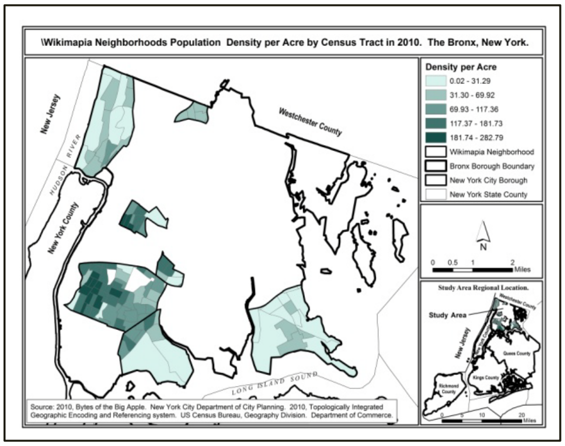
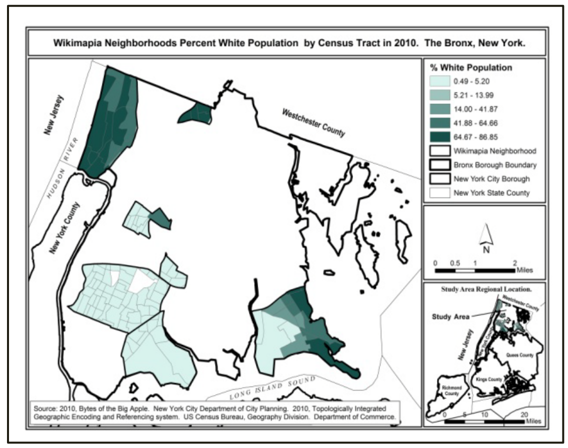


Figure 6.63 Wikimapia Neighborhoods Population Density by Census Tract in 2010. The Bronx, NY.

Figure 6.64 Wikimapia Neighborhoods % Non-Hispanic White Population by Census Tract in 2010. The Bronx, NY.



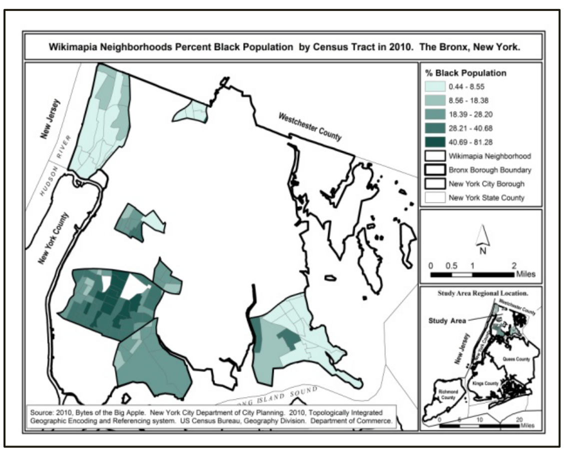
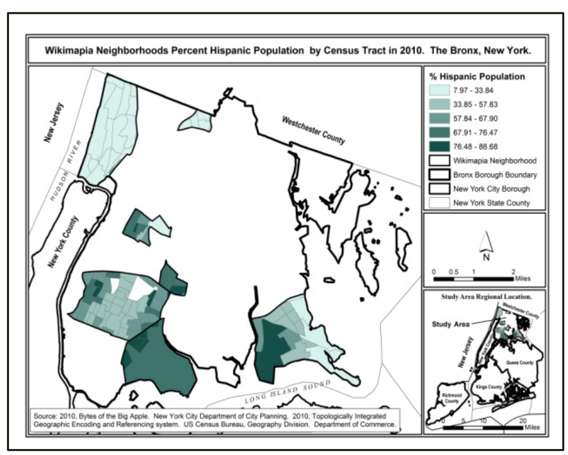


Figure 6.65 Wikimapia Neighborhoods % Non-Hispanic Black Population by Census Tract in 2010. The Bronx, NY.

Figure 6.67 Wikimapia Neighborhoods % Hispanic Population by Census Tract in 2010. The Bronx, NY.



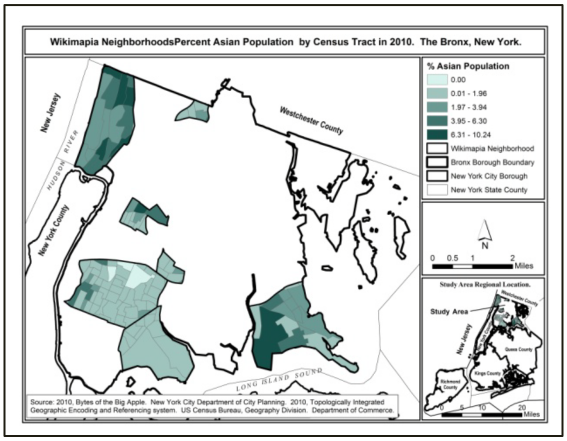


Figure 6.68 Wikimapia Neighborhoods % Non-Hispanic Asian Population by Census Tract in 2010. The Bronx, NY.

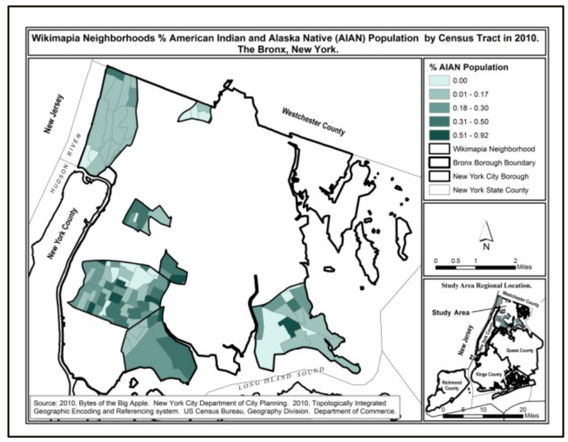


Figure 6.69 Wikimapia Neighborhoods % Non-Hispanic American Indian and Alaska Native Population by Census Tract in 2010. The Bronx, NY.

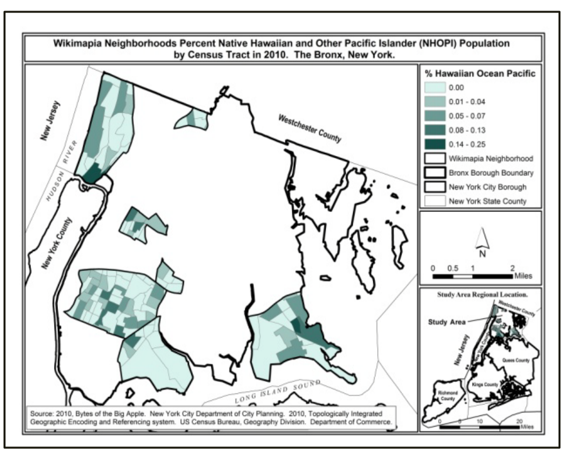


Figure 6.70 Wikimapia Neighborhoods % Non-Hispanic Native Hawaiian and Other Pacific Islander Population by Census Tract in 2010. The Bronx, NY.

6.4.1.3 GeoDNA Housing Characteristics

The seven selected cases contain different proportions of housing units according to each neighborhood boundary version. *Table 6.15 Percent Housing Figures* shows the percent of housing units, as well as the percent vacant and percent occupied units, of the borough's total each neighborhood has, organized by neighborhood boundary version.

Table 6.15 Percent Housing Figures

	# of Tracts	% Housing Units of Borough's Total	% of Borough's Vacant	% of Borough's Occupied
Microneighborhood				
Fordham	28	9.52	9.48	10.09
Hunts Point	12	3.59	3.55	4.29
Riverdale	16	4.47	4.33	6.87
Throgs Neck	8	2.03	2.01	2.38
West Farms	22	6.56	6.59	6.09
Woodlawn	8	1.57	1.55	1.79
NPA				
Fordham	32	11.21	11.23	10.87
Hunts Point	20	5.34	5.29	6.10
Morrisania	24	6.80	6.82	6.46
Riverdale	15	3.91	3.79	5.97
Throgs Neck	21	5.08	5.03	5.98
West Farms	17	5.37	5.32	6.23
Woodlawn	21	4.82	4.80	5.21
Wikimapia				
Fordham	21	6.33	6.33	6.35
Hunts Point	19	5.03	4.98	5.99
Morrisania	73	19.85	19.91	18.80
Riverdale	18	5.08	4.93	7.49
Throgs Neck	17	3.96	3.92	4.63
West Farms	14	3.94	3.96	3.68
Woodlawn	6	1.01	1.00	1.25

According to the microneighborhood definition, Fordham had the most residential land uses (9.52%), followed by West Farms (6.56 %) and Riverdale (4.47%). The NPA also depicts Fordham as the most residential area with a higher percentage of residential units (11.21%) than the rest of the neighborhoods. However, Wikimapia users perceive Fordham with a lower percentage (6.33%) of housing units and Morrisania as the most residential neighborhood (19.85%). The percent of the borough's total occupied and total vacant units were proportionally related in every neighborhood, except Riverdale which had higher proportions of the borough's total occupied when compared to its rate of vacant units. Figures 6.71 - 6.73 show the distribution of percent occupied housing units of the borough's total by tract.

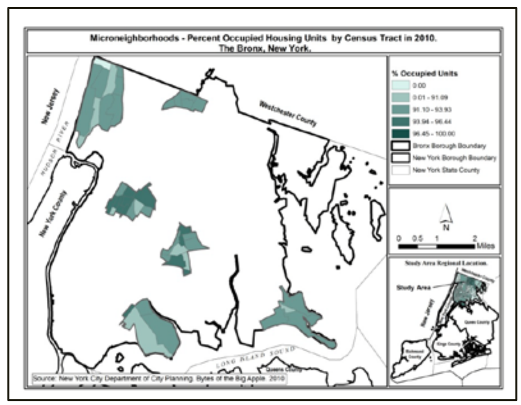


Figure 6.71 Microneighborhoods % Occupied Housing Units within Selected Neighborhood Cases

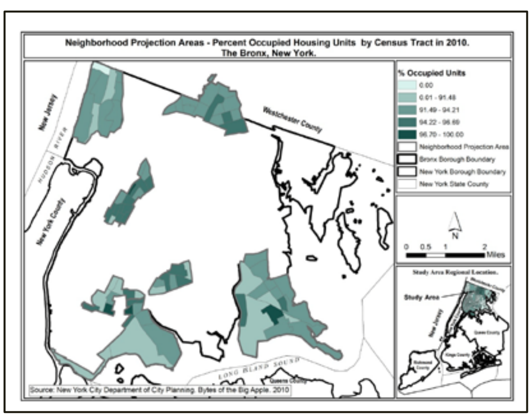


Figure 6.72 Neighborhood Projection Areas % Occupied Housing Units within Selected Neighborhood Cases

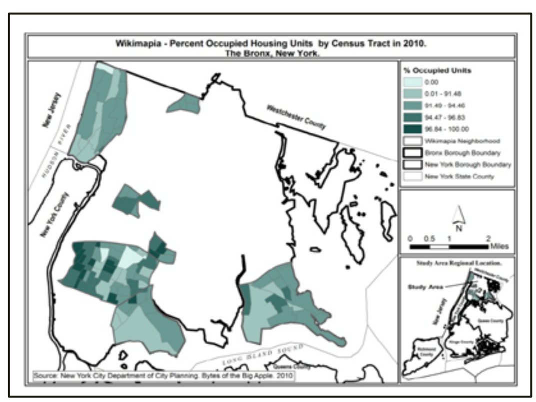


Figure 6.73 Wikimapia Neighborhoods % Occupied Housing Units within Selected Neighborhood Cases

6.4.4 Information Relevance analysis

Through a combination of online digital library searches and geospatial processes, the Information Relevance Analysis examines the amount and type of information available for each neighborhood case. The goal of this portion of the analysis is to assess the geospatial relevance of the resources found within digital libraries for local planning and community development by neighborhood version.

First, an information search is conducted via digital libraries, clearinghouses, and warehouses to evaluate the records available for each neighborhood. Second, a set of rezoning planning reports downloaded from the NYCDCP are codified and used to determine their levels of geospatial ranking and relevancy using the three neighborhood boundary versions identified during ***Part 1*** of the research. Minimum Bounding Boxes (MBB) are delineated (described in *section 6.4.5.3* below) for each neighborhood and used during the analysis to examine the impact of each boundary version on the amount and type of informational resources discovered by neighborhood type.

6.4.4.1 General Information Scope

A series of online libraries and clearinghouses were consulted during the first half of the information relevance assessment. The first group of libraries consulted includes a combination of public, research, and educational institutions. The research and educational libraries consulted are also the two supply cases selected for the study. The second group contains three clearinghouses that disseminate information about existing federal, state, and local geospatial datasets and other relevant information. *Table 6.16 Selected Libraries and Clearinghouses* lists the six institutions consulted to assess online information availability for the selected neighborhoods within the study area.

Table 6.16 Selected Libraries and Clearinghouses

Libraries
• ***NYPL.*** *The New York Public Library. Digital Gallery.*
• ***LLLCUNY*** *Leonard Lief Library*. Herbert H. Lehman College. City University of New York
• ***NYCHL***. *New York City Hall Library*. Department of Records and Information Systems.
Clearinghouses
• ***GOS***. *US Geospatial One Stop*. www.geodata.gov/
• ***NYSGIS***. *New York State GIS Clearinghouse* *http://www.nysgis.state.ny.us/*
• ***NYCWP.*** *New York City Web Portal*. http://www.nyc.gov/

Results from the information search are presented below in *Table 6.17 Neighborhood Information Availability* below. Some queries produced large numbers of different records when using neighborhood names alone without other place name qualifiers, such as 'Bronx', because neighborhood names are never unique and can also be part of the names of other features. For example, the words '*point*, *west*, and *neck*', which are part of the names of some of the neighborhoods in the sample case group, are also used as part of other geographic feature names.

This table also shows two sets of numbers that resulted from the library searches; the first set of numbers refers to the results of broad queries using neighborhood names alone, and the second set shows the results when the queries are narrowed by conditioning them with the borough's name. Although these two sets of numbers are indicative of information relevance using textual searches, the number of records returned for the narrower search (neighborhood + borough) does not always represent records for particular neighborhoods either. Instead they may represent different areas or geographic features, such as roads or park names.

Table 6.17 Neighborhood Information Availability

	Local Sources			Regional/National Sources		
	LLL-CUNY[17]	*NYPL*	*NYCHL*	*GOS*	*NYSGIS*[18]	*NYCWP*
Fordham	34	164	218	6/0	2,490 / 1,670	20,600 / 9,460
Hunts Point	245	19 / 14	4,803	384,065/ 2,937	1,390 / 7,110	14,500 / 10,400
Morrisania	8	59 / 28	5,284	0/0	4,330 / 3,980	5,190 / 4,530
Riverdale	10	108 / 35	203	43/4	1,850 / 1,130	15,400 / 7,800
Throgs Neck	20	8 / 6	81	239/30	3,470 / 3,080	6,910 / 4,800
West Farms	429	81 / 65	276	243,119/ 122,201	2,010 / 1,020	7,610 / 6,720
Woodlawn	5	41 / 22	87	54/0	2,510 / 1,770	2,130 / 2,130

Overall, searching for neighborhood information through federal, state, and local agencies, as well as educational libraries, produces results related to the scale of the query. Specifically, increasing levels of lower relevancy resulted from queries at the city, state and federal levels, in that order. Unexpected results were produced for Hunts Point in the NYSGIS Clearinghouse which, despite cross listing records with NYCDCP, DORIS and the NYCHL supplied larger number of records when conditioning the query with county name than when using the neighborhood names alone.

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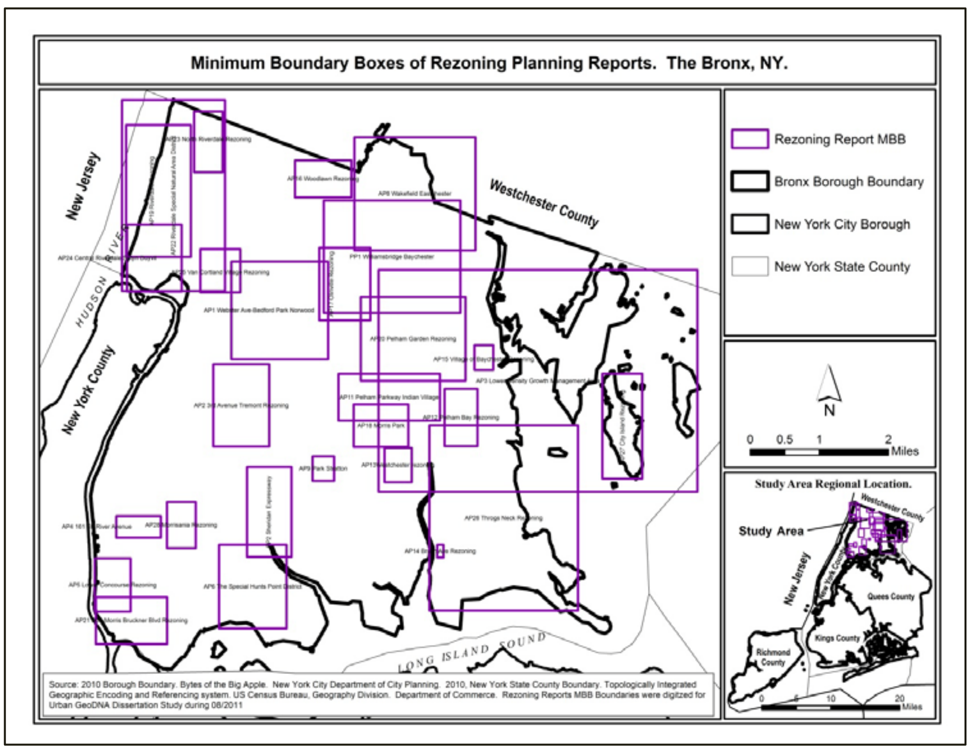
[17] The Lief Library of Lehman College-CUNY records were searched by querying its digital collections website under the Bronx Business which links users to the Metropolitan New York Library Council Digital Collections at http://www.lehman.edu/provost/library/BronxBusiness/search.htm. By linking users to a regional library this local library expands its information dissemination to wider audiences.

[18] [18] The New York State digital Library can be searched online at http://search.state.ny.us/search?sort=date%3AD%3AL%3Ad1&output=xml_no_dtd&ie=UTF-8&oe=UTF-8&client=default_frontend&proxystylesheet=default_frontend&site=default_collection&q=fordham+bronx

6.4.4.2 Local Information Relevance

Next, the study examines the levels of relevant information found for each case using the geospatial search ranking methods described in the literature review. A set of 28 planning reports from the NYCDCP were used to examine information relevancy between their geospatial extents and each neighborhood area by neighborhood boundary version (bottom-up vs. top-down). *Figure 6.74 Minimum Bounding Boxes of Rezoning Plannign Reports* shows the geogrpahic extents of the 28 reports' MBBs used in the study.

Figure 6.74 Minimum Bounding Boxes of Rezoning Plannign Reports



The amount of geospatial overlapping in square miles between the MMBs of these reports and the neighborhoods are used to assess the interrelationships between their geographic extents and the objects found through the geospatial searches.

The following three maps are used to illustrate the overall information relevance found per neighborhood version. Their relevance ranking results are discussed in more detail in subsequent sections for each neighborhood. *Figure 6.75Microneighborhoods Minimum Bounding Boxes Reports Overlaps* shows the combined results from geospatial searches for the neighborhoods in question when using microneighborhood Minimum Bounding Boxes (MBB) as the queries' footprint extents.

Figure 6.75 Microneighborhoods Minimum Bounding Boxes Reports Overlaps

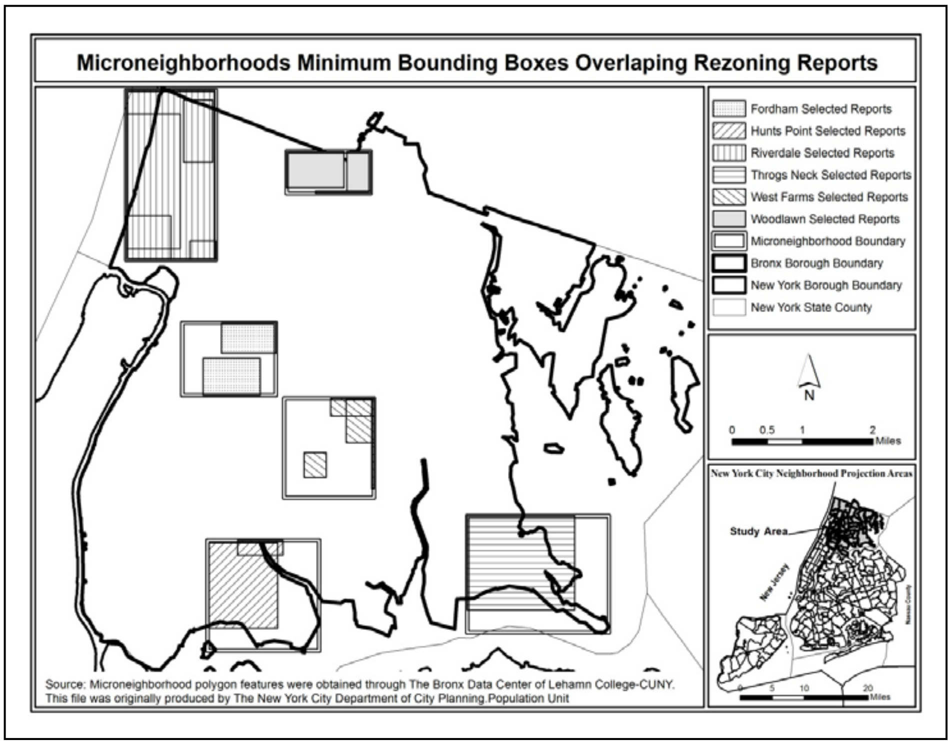


Figure 6.76 NPA Minimum Bounding Boxes Reports Overlaps shows the amount of overlapping that occurred between the planning reports and each neighborhood's MBB when using the NPA boundary versions for the neighborhoods. Such large coverage results are related to NPA having larger areas than those defined by microneighborhoods as well as some of Wikipedia users' defined neighborhoods. NPA areas also have more elongated shapes than the other two neighborhood versions and, as a result, their MBBs are larger and overlap larger areas of the objects found during the geospatial queries.

Figure 6.76 NPA Minimum Bounding Boxes Reports Overlaps

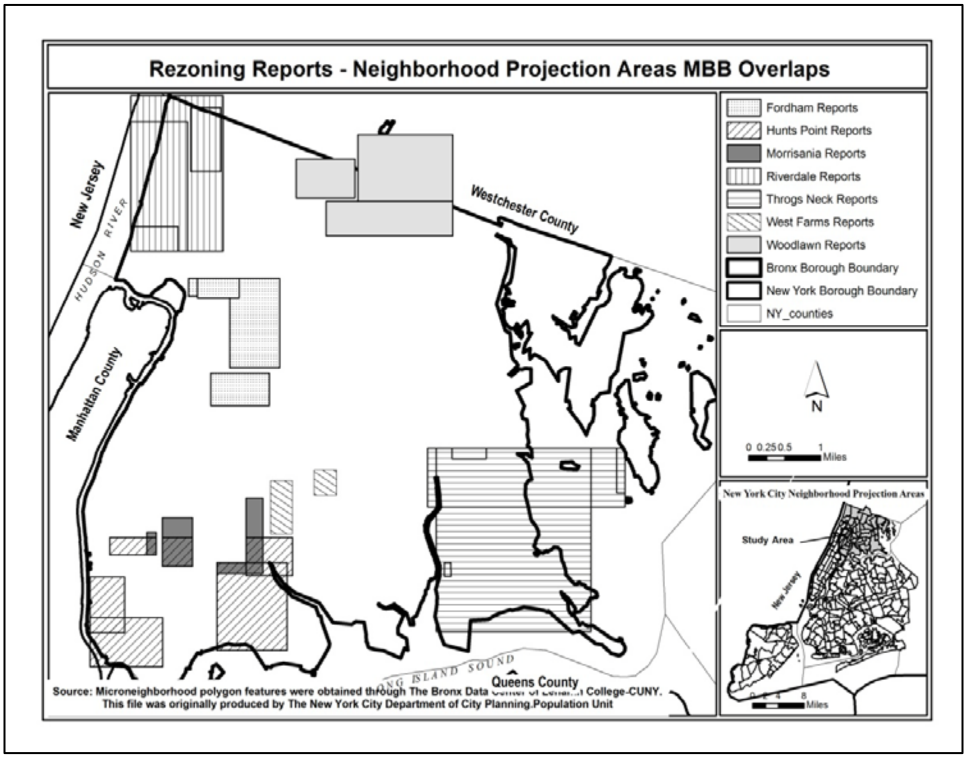


Figure 6.77 Wikimapia Minimum Bounding Boxes Reports Overlaps

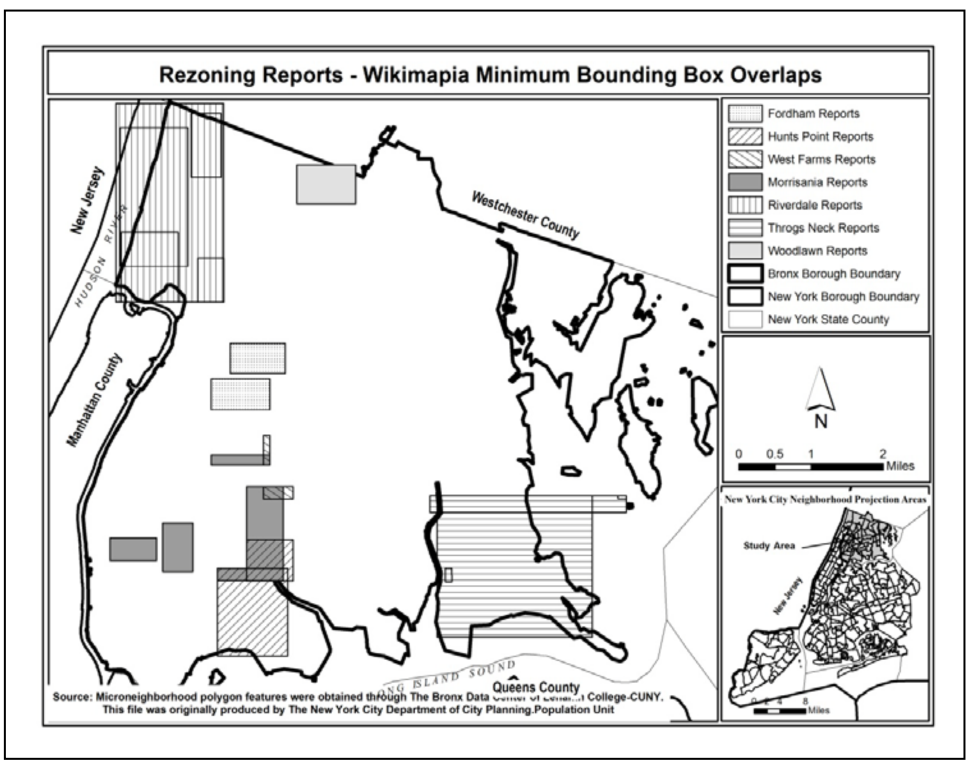


Figure 6.77 Wikimapia Minimum Bounding Boxes Reports Overlaps shows the coverage of the search results found when using neighborhood Wikimapia boundaries. In general, a few more reports are selected when these geographies are used than the microneighborhoods boundary. However, fewer reports were found from this search than from the NPA search. In addition, some reports also had higher ranking scores. The ranking results from the information queries are presented below for each neighborhood.

1. Fordham Information Relevance

Table 6.18 Fordham GeoDNA Information Relevance shows the information sources found for the three different versions of this neighborhood's boundaries. In general, this neighborhood's GeoDNA samples permitted the discovery of similar types of information with only small variations in ranking values. The Fordham NPA GeoDNA resulted in a larger number of records selected and loaded slightly higher rankings scores for the same records in the other two GeoDNA samples; Wikimapia loaded second in ranking values and the microneighborhoods GeoDNA third.

Table 6.18 Fordham GeoDNA Information Relevance

Microneighborhood Reports	Ranking
3rd Avenue Tremont Rezoning	0.36
Webster Ave-Bedford Park Norwood	0.19
Neighborhood Projection Area (NPA) Reports	Ranking
Webster Ave-Bedford Park Norwood	0.41
3rd Avenue Tremont Rezoning	0.23
Van Cortland Village Rezoning	0.12
Riverdale Special Natural Area District	0.04
Wikimapia Reports	Ranking
3rd Avenue Tremont Rezoning	0.33
Webster Ave-Bedford Park Norwood	0.21

2. Hunts Point Information Relevance

Table 6.19 Hunts Point GeoDNA Information Relevance shows the planning reports found for each geospatial information search along with their respective ranking scores for the neighborhood of Hunts Point. As it illustrates, the NPA search produced a much larger number of records due to the fact that this neighborhood version includes a long census tract protruding from the main neighborhood area around the borough's southern edge. Such arrangement creates a prorupt boundary shape that produces a very large MBB with low BBF values.

Table 6.19 Hunts Point GeoDNA Information Relevance

Microneighborhood Reports	Ranking
The Special Hunts Point District	0.65
Sheridan Expressway	0.08
Neighborhood Projection Area (NPA) Reports	Ranking
The Special Hunts Point District	0.28
Port Morris Bruckner Blvd Rezoning	0.17
Lower Concourse Rezoning	0.10
Sheridan Expressway	0.08
Morrisania Rezoning	0.04
161 St. River Avenue	0.04
Wikimapia Reports	Ranking
The Special Hunts Point District	0.49
Sheridan Expressway	0.16

3. Morrisania Information Relevance

The neighborhood information analysis for the neighborhood of Morrisania was affected by the lack of geographic boundary definition in the microneighborhood file. This neighborhood did appear in the top-down NYCDCP's Neighborhood Projection Area (NPA) and the bottom-up Wikimapia users' defined neighborhoods, but not in the microneighborhoods file. Therefore, queries were performed using NPA and Wikimapia boundary definitions only.

As *Table 6.20 Morrisania GeoDNA Information Relevance* shows, the NPA search resulted in the selection of fewer and more relevant records for this neighborhood than the search based on Wikimapia's footprint. For example, the NPA search ranked reports on Morrisania much higher and in first raking order than the Wikimapia version.

Table 6.20 Morrisania GeoDNA Information Relevance

Microneighborhood Reports	Ranking
N/A	N/A
Neighborhood Projection Area (NPA) Reports	Ranking
Morrisania Rezoning	0.29
Sheridan Expressway	0.19
The Special Hunts Point District	0.07
161 St. River Avenue	0.04
Wikimapia Reports	Ranking
Sheridan Expressway	0.25
Morrisania Rezoning	0.12
161 St. River Avenue	0.09
The Special Hunts Point District	0.06
3rd Avenue Tremont Rezoning	0.04

4. Riverdale Information Relevance

Table 6.21 Riverdale GeoDNA Information Relevance shows the records and their respective ranking scores of the reports found for the neighborhood of Riverdale. Although a few minor variations are noted in the ranking of the reports selected, all three boundary versions used for the analysis rendered comparable scores for this neighborhood. The NPA search failed to select the rezoning report for the Van Cortland Village, which is located adjacent to Riverdale. Therefore, the NPA search produced more precise results than the other two boundary versions for this neighborhood.

Table 6.21 Riverdale GeoDNA Information Relevance

Microneighborhood Reports	Ranking
Riverdale Special Natural Area District	0.84
Riverdale Rezoning	0.60
North Riverdale Rezoning	0.21
Central Riverdale Sputyn Duyvil	0.20
Van Cortland Village Rezoning	0.06
Neighborhood Projection Area (NPA) Reports	Ranking
Riverdale Special Natural Area District	0.80
Riverdale Rezoning	0.62
North Riverdale Rezoning	0.23
Central Riverdale Sputyn Duyvil	0.13
Wikimapia Reports	Ranking
Riverdale Special Natural Area District	0.99
Riverdale Rezoning	0.61
Central Riverdale Sputyn Duyvil	0.31
North Riverdale Rezoning	0.16
Van Cortland Village Rezoning	0.10

5. Throgs Neck Information Relevance

Table 6.22 Throgs Neck GeoDNA Information Relevance shows the reports and the ranking scores of the records discovered for this neighborhood when using all three boundary versions used during the analysis. Overall, while the NPA search resulted in a larger number of records selected, the search was less precise than Wikimapia and the Microneighborhood queries.

For example, the NPA identified a zoning report for the neighborhood of Pelham Bay, which is located north of Throgs Neck. The NPA and the Wikimapia searches also selected a rezoning report for City Island which is also located further north and is also detached from the mainland. The Microneighborhood search failed to identify relevant information for this neighborhood and only produced one record with a high score.

Table 6.22 Throgs Neck GeoDNA Information Relevance

Microneighborhood Reports	Ranking
Throgs Neck Rezoning	0.45
Neighborhood Projection Area (NPA) Reports	Ranking
Throgs Neck Rezoning	0.80
Lower Density Growth Management Area	0.20
Pelham Bay Rezoning	0.02
City Island Rezoning	0.02
Brush Ave Rezoning	0.01
Wikimapia Reports	Ranking
Throgs Neck Rezoning	0.70
Lower Density Growth Management Area	0.06
City Island Rezoning	0.01
Brush Ave Rezoning	0.01

6. West Farms Information Relevance

Table 6.23 West Farms GeoDNA Information Relevance shows the records selected for this neighborhood under each neighborhood boundary version. This neighborhood has the most diverse boundary definitions of all the sample cases (see *Figure 6.43 West Farms Neighborhood Boundaries)* and, as a result, different reports were selected when using each boundary version footprint for the spatial search. While the microneighborhood version selected the largest number of records, the NPA and the Wikimapia only selected 2 records each, and only one report in common. However, the microneighborhood version failed to select the one report these two other boundary footprints had in common.

Table 6.23 West Farms GeoDNA Information Relevance

Microneighborhood Reports	Ranking
Morris Park	0.21
Park Stratton	0.17
Pelham Parkway Indian Village	0.11
Lower Density Growth Management Area	0.01
Neighborhood Projection Area (NPA) Reports	Ranking
Sheridan Expressway	0.25
Park Stratton	0.20
Wikimapia Reports	Ranking
Sheridan Expressway	0.10
3rd Avenue Tremont Rezoning	0.05

7. Woodlawn Information Relevance

Table 6.24 Woodlawn GeoDNA Information Relevance shows the selected reports and their ranking scores resulting from the three different boundary searches. As it illustrates, the NPA and the microneighborhoods queries found the same number and type of records but assigned them different ranking scores.

The microneighborhoods ranked the Woodlawn Rezoning report much higher (0.73) than the other two reports it found. The NPA scores were ranked more closely together but placed the Woodlawn Rezoning Report last giving it less precision despite its importance for local neighborhood planning. The Wikimapia search ranked this report higher than the other two boundary versions but failed to identify any other reports that could be relevant for planning activities adjacent and within this neighborhood.

Table 6.24 Woodlawn GeoDNA Information Relevance

Microneighborhood Reports	Ranking
Woodlawn Rezoning	0.73
Wakefield Eastchester	0.11
Williamsbridge Baychester	0.01
Neighborhood Projection Area (NPA) Reports	Ranking
Wakefield Eastchester	0.58
Williamsbridge Baychester	0.25
Woodlawn Rezoning	0.23
Wikimapia Reports	Ranking
Woodlawn Rezoning	0.96

6.4.5 Neighborhood Geospatial Analysis

A neighborhood geospatial analysis is conducted to assess the interrelationships that exist between the different boundary versions used in the study. First, the geographic boundaries gathered are modeled and organized according to the 19 ISO compliant GeoDNA database specifications. The original datasets are stored according to their lineage: 1) Federal, 2) State, 3) City and 4) Other. The two top-down boundary versions used in the analysis are archived into the 'City' folder and the bottom-up Wikimapia users' boundary definitions in the 'Other' folder. Next, the dataset files are unzipped, reprojected, and loaded into the Administrative feature dataset of the GeoDNA database.

Next, variations in geospatial characteristics are examined using a variety of analyses described in the literature review. For example, Caldwell (2005) developed a Bounded Box Factor (BBF) to compare census tracts with other geographies; Coulton et al. (2001) used centroids and circular buffers to examine interrelationships between census geographies and residents' boundary perceptions; Wilson et. al (2004) employed centroids to calculate circular footprints of neighborhoods to test for their information discovery; Frontiera (2004) (quoted by Hill:2010) compared Minimum Bounding Boxes (MBB) and convex hulls as footprints to test Geographic Information Retrieval (GIR).

This study incorporates a neighborhood shape analysis, a MBB analysis, a BBF analysis, and a centroid distance analysis into a Geospatial Digital Neighborhood Analysis (GeoDNA) to assess the interrelationships that exist between top-down and bottom-up neighborhood boundary versions. Results obtained from this analysis are used in Section 6.4.6 Knowledge Interpretation Analysis to examine the interrelationships that exist between each neighborhood boundary version an

6.4.5.1 Neighborhood Shape Analysis

This portion of the analysis examines the areal definitions of the selected sample cases. Getis et. al. (2006) outlined the types of shapes most often used by geographers to define nations and states. In increasing order of complexity, these shape types include:

1. Compact –areas uniform in shape lacking intricate, jagged edges.
2. Prorupt – areas showing somewhat disjointed and elongated sections
3. Elongated – areas with land shapes that are less compact and longer on a side
4. Fragmented – exclave shapes which are separated from their main areas
5. Perforated – enclave areas surrounded by other states

This framework of area shape analysis is used to compare the different versions of neighborhood boundaries gathered for the study. All three neighborhood versions used in the analysis reflect traits of many of these shapes. *Figures 6.78-6.80* show the different neighborhood representations for each of the three selected boundary versions.

Microneighborhoods show the largest scale boundaries because they cover the smallest geographic areas. Due to their census tract lineage, these areas appear more prorupt than the other two versions which show more defined and compact boundaries. Neighborhood Projection Areas (NPA) cover larger areas than the microneighborhoods and generally have more elongated and less intricate boundary definitions.

Besides Fordham, which has intricate and jagged edges, neighborhoods defined by Wikimapia users are more compact and less defined than two top-down definitions. Such differences seem to contradict issues previously mentioned in the literature about locally defined boundaries being more defined than administrative, census tract based boundaries. Perhaps, this is a reflection of the number and types of online users currently defining local neighborhoods through new web 2.0 applications.

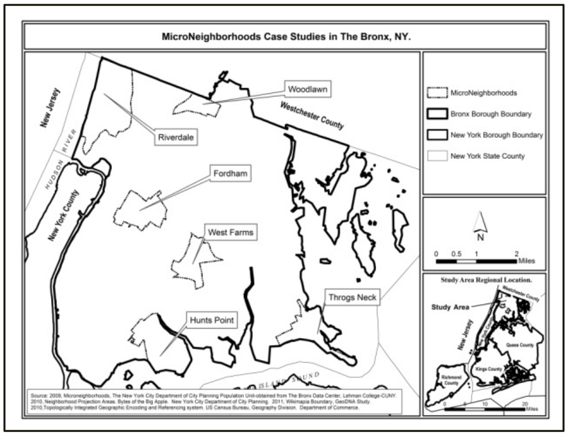


Figure 6.78
Microneighborhood Case Studies Geographic Boundaries.

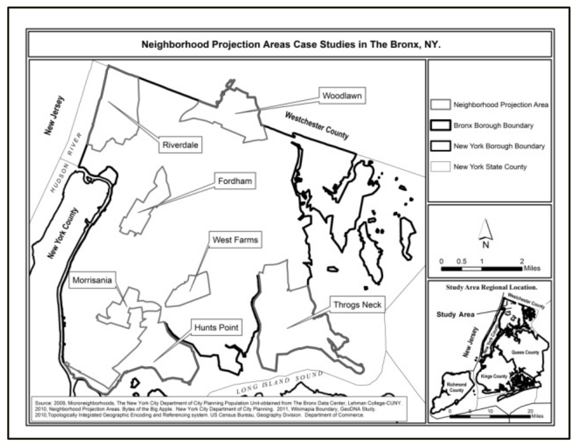


Figure 6.79
Neighborhood Projection Areas (NPA) Case Studies Geographic Boundaries.

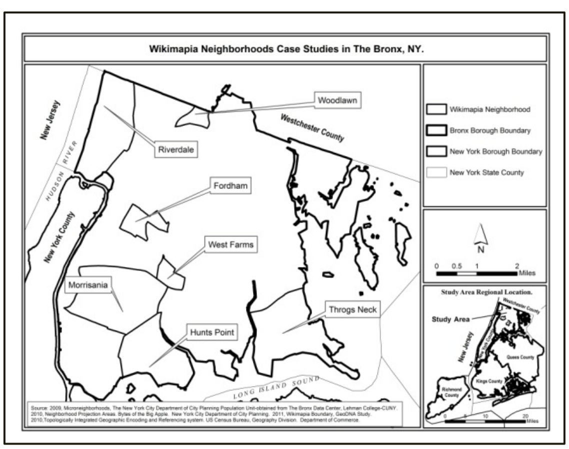


Figure 6.80
Wikimapia Users' Defined Case Studies Geographic Boundaries.

6.4.5.2 Centroid Distance Analysis

A mean distance analysis is used to study variations among all boundary versions and their combined areal centroids. First, all boundary versions are merged to create a combined GeoDNA extent for each neighborhood. Second, X/Y coordinates are used to geocode the centroid of each polygon. Hawths' distance-between-points function is subsequently used to measure the distance between all three different neighborhood versions and each neighborhood centroid. These values are grouped by neighborhood version into *Table 6.25* Combined Neighborhoods' Distance Matrix below[19].

Table 6.25 Combined Neighborhoods' Distance Matrix

	Neighborhood Type	Distance to Combined Area Centroid
Fordham	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	1,139 909 952
Hunts Point	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	2,307 309 1,159
Morrisania	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	N/A 2,339 46
Riverdale	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	1,405 1,596 22
Throgs Neck	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	4,508 50 1,249
West Farms	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	1,631 1,953 2,324
Woodlawn	▪ Micro-Neighborhood ▪ NPA ▪ Wikimapia	3,453 57 4,187

[19] Distances are shown in feet.

Table 6.25 Combined Neighborhoods' Distance Matrix shows the resulting distance values in feet from each neighborhood version's centroid to its corresponding aggregate area's mean centroid. An expanded matrix containing distances between each neighborhood version to one another is included in *Appendix P-Discovery Analysis Results*.

Figure 6.81 Combined Neighborhood Areas' Centroid, shows the combined neighborhood extents, their centroids, and the centroids of all microneighborhoods, Neighborhood Projection Areas (NPA), and Wikimapia's users defined neighborhoods. The largest distance variations between the centroid locations are observed for the neighborhoods of Woodlawn, West Farms, and Throgs Neck.

Figure 6.81 Combined Neighborhood Areas' Centroid

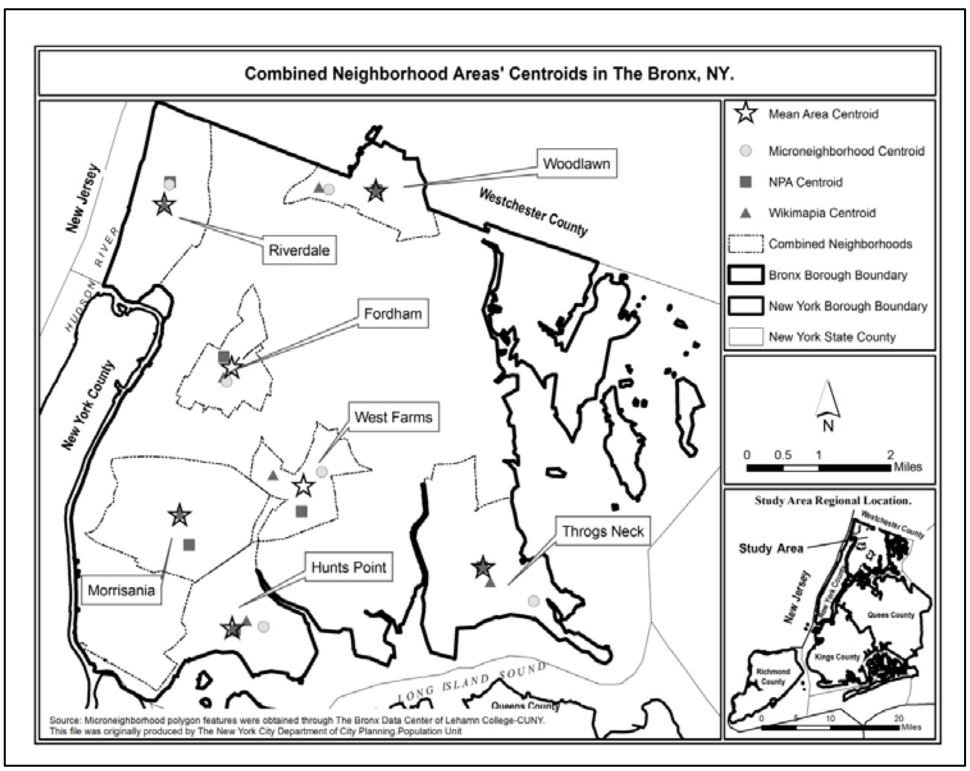


Table 6.24 Mean Distance shows the mean distance variation from the combined area's centroid to all the combined centroids. The top three neighborhoods with the highest mean distance variation between the three different neighborhood boundary versions are Woodlawn, West Farms, and Throgs Neck, in that order.

Fordham	1,000.00
Hunts Point	1,258.33
Morrisania	1,192.50
Riverdale	1,007.67
Throgs Neck	1,935.67
West Farms	1,969.33
Woodlawn	2,565.67

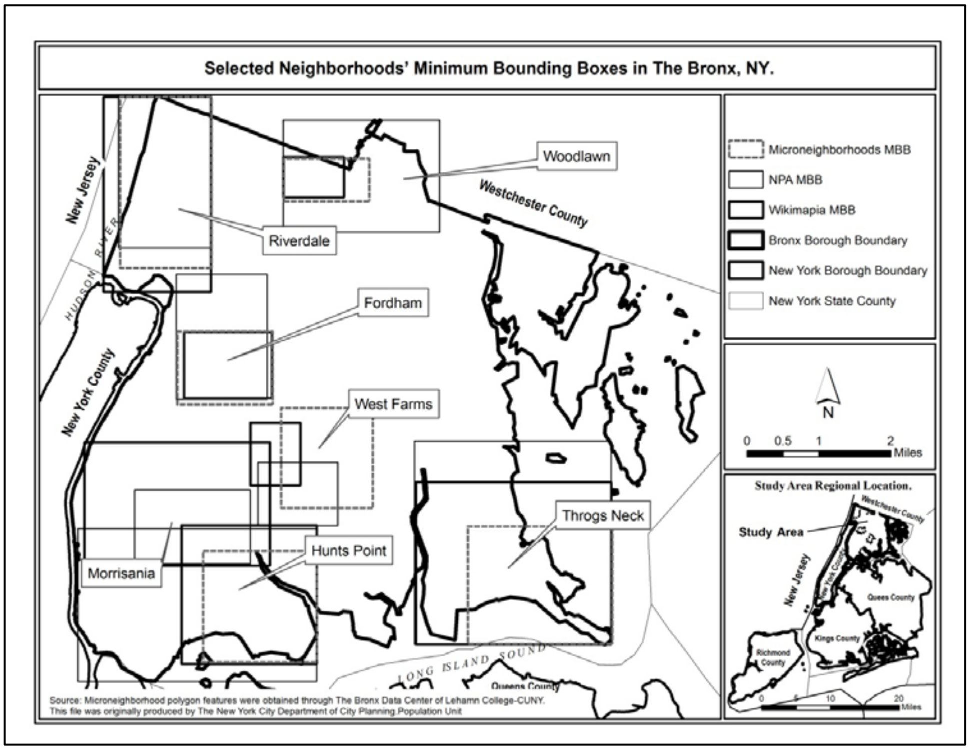
Table 6.26 Mean Distance

6.4.5.3 Minimum Bounding Box (MBB) Analysis

Minimum Bounding Boxes (MBB) are delineated for the selected neighborhood cases to produce data for both, the Bounded Box Factor (BBF) and Information Relevance Analysis described below. After collecting information about the geospatial characteristics for the seven sample cases, their MBBs are produced using envelopes shapes by identifying the maximum and minimum coordinates of the bounding boxes surrounding each neighborhood.

MBBs are developed for the seven selected cases during the data preparation stage to transform data between ***Part 1*** and ***Part 2*** of the study. *Figure 6.82 Selected Neighborhoods' Minimum Bounding Boxes* shows the MBB extents of the different neighborhood cases by version including Microneighborhoods, Neighborhood Projection Areas (NPA) and Wikimapia. In general, the neighborhood of West Farms showed the most ill-defined MBB variations among the three different boundary versions.

Figure 6.82 Selected Neighborhoods' Minimum Bounding Boxes



Except for Morrisania, which did not have a microneighborhood polygon, three different MBBs are calculated for each neighborhood. *Table 6.27 Neighborhood Minimum Bounding Box Scores* lists in increasing order, from the largest scale (microneighborhood) to the smallest scale (Wikimapia) the different neighborhood MBBs values. Located in the northern section of the borough, Riverdale and Throgs Neck, which are the largest neighborhood cases, have the largest MBBs in the top-down NPA boundary versions. Hunts Point also had a large NPA MBB score because its NPA boundary version includes a long stretch of tract land protruding around the borough's southern edge.

Table 6.27 Neighborhood Minimum Bounding Box (MBB) Scores

	ID	Neighborhood	MBB
Microneighborhoods	**1**	Fordham	1.36
	2	Hunts Point	2.47
	4	Riverdale	3.05
	5	Throgs Neck	3.32
	6	West Farms	1.79
	7	Woodlawn	0.71
NPA	**1**	Fordham	2.21
	2	Hunts Point	7.12
	3	Morrisania	1.67
	4	Riverdale	2.77
	5	Throgs Neck	7.81
	6	West Farms	0.98
	7	Woodlawn	3.42
Wikimapia	**1**	Fordham	1.13
	2	Hunts Point	3.66
	3	Morrisania	4.46
	4	Riverdale	4.07
	5	Throgs Neck	6.19
	6	West Farms	0.61
	7	Woodlawn	0.47

6.4.5.4 Bounded Box Factor (BBF) Analysis

A Bounded Box Factor analysis (BBF) was conducted to examine relationships between MBB and neighborhood extent for both top-down and bottom-up boundary versions. BBF values are calculated as a ratio using the following formula:

$$\text{BBF} = \frac{2 \text{ x (overlapping area between neighborhood and MBB Area)}}{\text{Neighborhood Area + MBB Area}}$$

In the next section the formula above is used to calculate the BBF for the seven selected neighborhood cases. Results obtained from these calculations are reviewed by neighborhood boundary version and incorporated into a composite table which is presented under *Section 6.4.6 Knowledge Interpretation Analysis* in *Table 6.28 Geospatial Analysis Results Matrix* below. The goal is to examine the variations found between the neighborhoods' BBF and other geospatial scores to identify any potential interrelationships between the different boundary versions.

1. Microneighborhoods Bounded Box Factors (BBF)

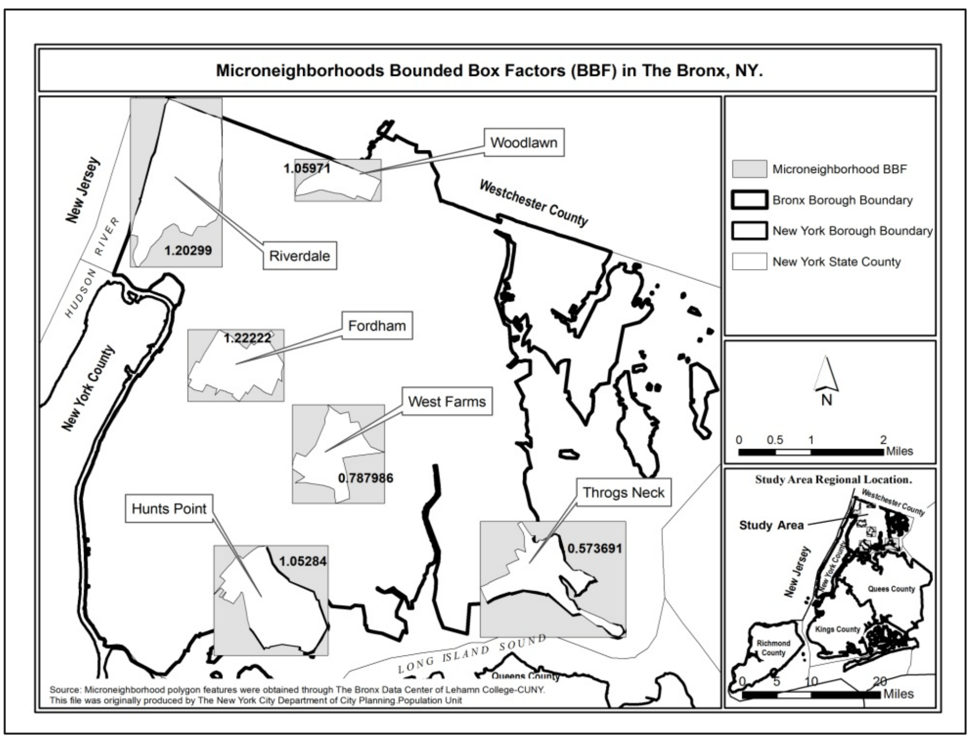
According to the microneighborhood boundary version, the neighborhoods of Fordham and Riverdale have the highest BBF scores. West Farms and Throgs Neck have the lowest BBF scores among all neighborhoods.

ID	Microneighborhood	BBF
1	Fordham	1.22
2	Hunts Point	1.05
4	Riverdale	1.20
5	Throgs Neck	0.57
6	West Farms	0.79
7	Woodlawn	1.06

Table 6.28 Microneighborhood BBF Scores

Table 6.28 Microneighborhood BBF Scores shows the factor scores for the bounding boxes and the seven selected cases and *Figure 6.83 Microneighborhoods Bounded Box Factors* depicts their geographic extents.

Figure 6.83 Microneighborhoods Bounded Box Factors



2. Neighborhood Projection Areas (NPA) Bounded Box Factors (BBF)

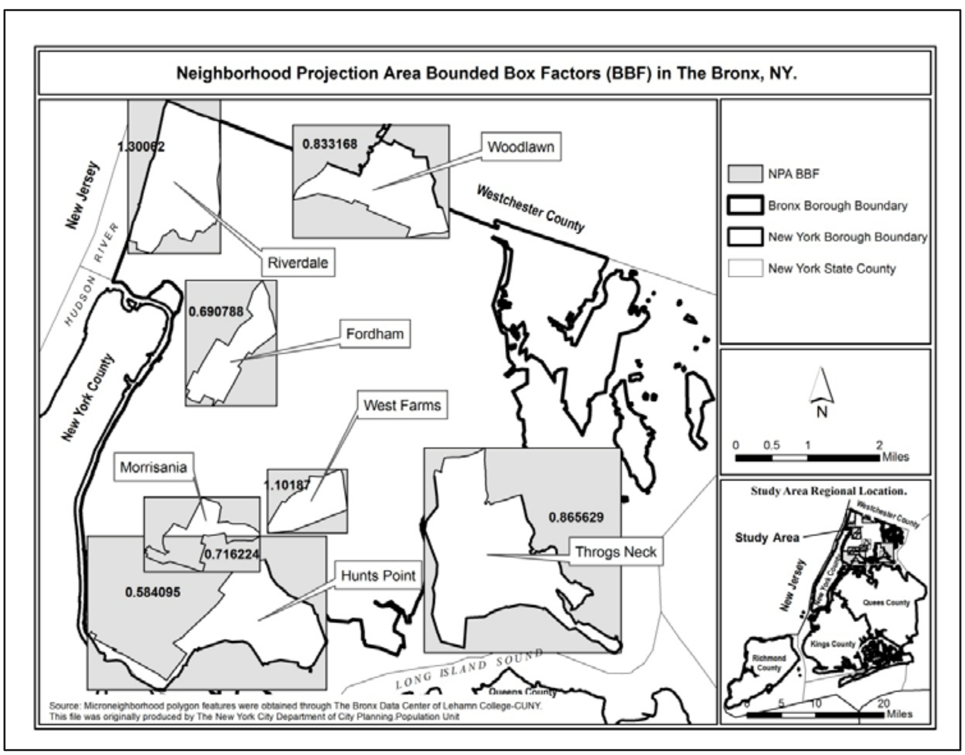
According to the NPA boundary version, Riverdale also has the highest score followed by West Farms. Throgs Neck and Woodlawn came in close second. Except for West Farms, which is in the south Bronx, all NPAs with the highest BBF scores that are close or above 1 are located in the northern section of the borough.

ID	NPA	BBF
1	Fordham	0.69
2	Hunts Point	0.58
3	Morrisania	0.72
4	Riverdale	1.30
5	Throgs Neck	0.87
6	West Farms	1.10
7	Woodlawn	0.83

Table 6.29 NPA BBF Scores

Table 6.29 NPA BBF Scores shows the factor scores for the bounding boxes and the seven selected cases using NPA boundaries. *Figure 6.84 NPA Bounded Boxes* shows their geographic extents.

Figure 6.84 NPA Bounded Box Factors



3. Wikimapia Neighborhoods Bounded Box Factors (BBF)

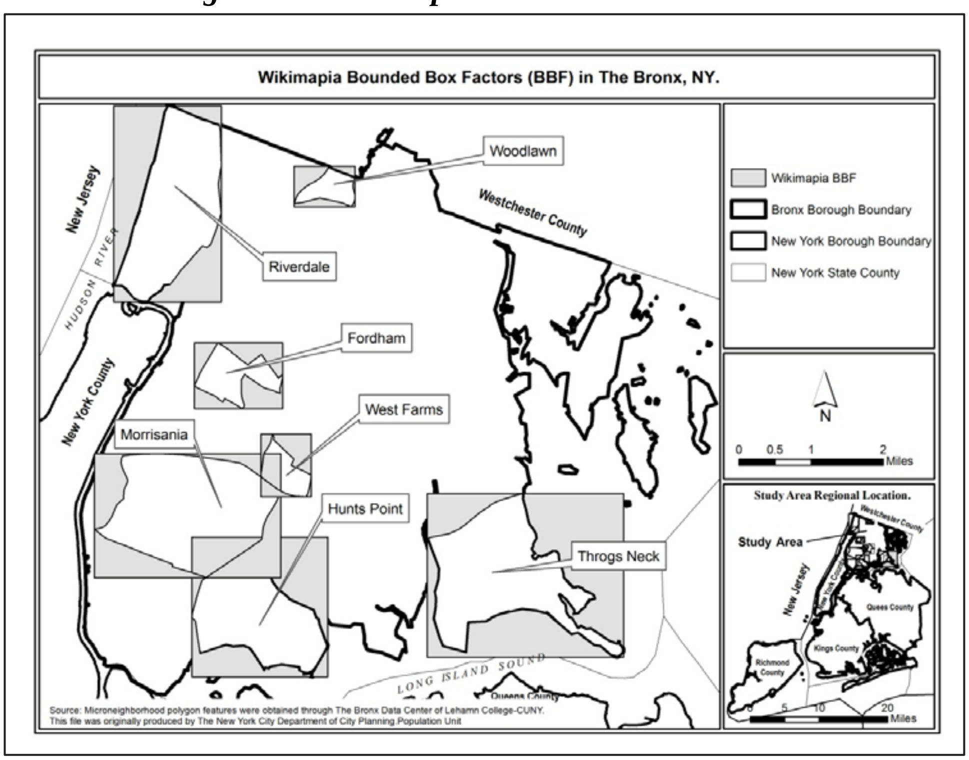
According to Wikimapia users' defined boundaries, both Morrisania and Riverdale have the highest BBF scores. They also have the most compact shapes. In addition, both Throgs Neck and Fordham have the lowest scores due to their jagged, more prorupt boundary edges.

ID	Wikimapia	BBF
1	Fordham	0.94
2	Hunts Point	1.09
3	Morrisania	1.31
4	Riverdale	1.19
5	Throgs Neck	0.89
6	West Farms	1.06
7	Woodlawn	1.13

Table 6.30 Wikimapia BBF Scores

Table 6.30 Wikimapia BBF Scores shows the factor scores for the bounding boxes and the seven selected cases using Wikimapia boundaries. *Figure 6.85 Wikimapia Bounded Box Factors* shows their respective geographic extents.

Figure 6.85Wikimapia Bounded Box Factors



6.4.6 Knowledge Interpretation Analysis

The last component of the LINK framework developed for the GeoDNA study is the Knowledge Interpretation Analysis. It combines results from the three previous analyses: 1) local socio-demographic analysis, 2) information relevance analysis, and 3) neighborhood geospatial analysis to examine the relationships between these components using a combined GeoDNA for the selected cases.

First, the geospatial aspects of each neighborhood are evaluated to assess the relations between their shapes, centroids, Minimum Bounding Box figures and Bounded Box Factors by neighborhood version. Next, the results are compared with the socio-demographic characteristics of each neighborhood. A qualitative evaluation of the records obtained during the information relevance analysis is performed by examining the metadata contents in relation to their geographic context.

In addition, the appended GeoDNA boundaries obtained during the *Centroid Distance Analysis* (section *6.4.5.2* above) are used to conduct a combined GeoDNA Information Relevance Analysis. During this final step, MBBs are produced for appended boundaries and used to calculate information relevance for the 28 NYCDCP rezoning reports described in section *6.4.4.2 Local Information Relevance* above.

Table 6.31 Geospatial Analysis Results Matrix contains the scores for each neighborhood by boundary version. The areal sizes are presented in square miles for the doughnut area between a neighborhood and its MBB, the neighborhood's area extent and its MBB and BBF. The distances between each neighborhood's centroid to the combined neighborhood area's centroid are presented in feet.

Table 6.31 Geospatial Analysis Results Matrix

	Doughnut Area Between Neighborhood and its MBB	**Neighborhood Area Extent**	**Minimum Bounding Box Area (MBB)**	**Bounded Box Factor (BBF)**	**Centroid Distance to Combined-Area Centroid**
Micro-Neighborhood					
Fordham	0.53	0.83	1.36	1.22	1,139
Hunts Point	1.17	1.30	2.47	1.05	2,307
Riverdale	1.22	1.83	3.05	1.20	1,405
Morrisania	N/A	N/A	N/A	N/A	N/A
Throgs Neck	2.37	0.95	3.32	0.57	4,508
West Farms	1.08	0.71	1.79	0.79	1,631
Woodlawn	0.33	0.37	0.71	1.06	3,453
NPA					
Fordham	1.45	0.76	2.21	0.69	909
Hunts Point	5.04	2.08	7.12	0.58	309
Morrisania	1.07	0.60	1.67	0.72	2,339
Riverdale	0.97	1.80	2.77	1.30	1,596
Throgs Neck	4.43	3.38	7.81	0.87	50
West Farms	0.44	0.54	0.98	1.10	1,953
Woodlawn	2.00	1.43	3.42	0.83	57
Wikimapia					
Fordham	0.60	0.53	1.13	0.94	952
Hunts Point	1.66	2.00	3.66	1.09	1,159
Morrisania	1.53	2.93	4.46	1.31	46
Riverdale	1.66	2.41	4.07	1.19	22
Throgs Neck	3.42	2.77	6.19	0.89	1,249
West Farms	0.29	0.32	0.61	1.06	2,324
Woodlawn	0.21	0.27	0.47	1.13	4,187

6.4.6.1 Geospatial Characteristics

Except for Morrisania, whose bottom-up version was much larger than the other two versions used in the analysis, Wikimapia neighborhood definitions were in general smaller in size for all other neighborhoods when compared to the NPA versions. In general, microneighborhoods are the smallest boundary versions found and used in the study. Therefore, they contain fewer numbers of tracts than the NPA and the Wikimapia boundary versions. However, there was no relationship observed between the shapes, sizes and number of tracts for any of the geographic boundaries used during the study. This is perhaps due to the fact that neighborhood areas are defined from the top-down based on population density rather than on geographic extent or individuals' perceptions.

1. Census Tracts

The reduction in the number of census tracts experienced within the county during the 2010 US Census was found to have affected the number of tracts that makeup the neighborhood case sample set. However, the change in the number of tracts did not affect their geographic shapes, sizes, or contents because such changes only involved the merging of several tracts within each neighborhood.

2. Centroids

As indicated above, Woodlawn, West Farms, and Throgs Neck had the highest centroid mean distance variations among all neighborhood boundaries. In addition, the centroid distance analysis did not revealed any type of relationship between the different types of neighborhood boundaries. For instance, while Wikimapia centroid distances were higher in certain neighborhoods, others were lower without any clear associative pattern by type of neighborhood, socio-demographic, or geospatial characteristics.

<u>3. Minimum Bounding Boxes (MBB)</u>

Similarly, the MBB results showed disparate results for the neighborhoods studied. Except for the neighborhood of Hunts Point, which in the NPA dataset includes a long census tract protruding westward from the main neighborhood compact area, the neighborhoods of Riverdale and Throgs Neck occupied the largest geographic extents and also had the largest MBB.

<u>4. Bounded Box Factors (BBF)</u>

Except for Hunts Point, whose shape and MBB was affected by having a protruding census tract in the NPA dataset, the neighborhood of Throgs Neck had the lowest BBF in all three neighborhood versions despite having one of the largest MBB.

6.4.6.2 Socio-Demographic Characteristics and Information Relevance Aspects

The information relevance analysis served to uncover certain relationships between the quantity and quality of records selected by neighborhood type (see results in section 6.4.4.2 above by neighborhood). First, while boundary version with larger extents, such as those found in the NPA dataset, served to find larger numbers of records, their geospatial precision was somewhat of lesser quality since they included materials pertaining to other neighborhood geographies. For example, the NPA based query for the neighborhood of Fordham also included records for Riverdale, which is located somewhat distant to the north of this neighborhood. The query also pulled records for Tremont, which is located adjacent to Fordham, and assigned higher raking scores to those records when querying with all three boundary versions. This finding suggests a low information discovery ranking associated with Fordham which according to the NYCDCP boundary version, has the largest concentration of Hispanics.

Similar results were observed for the neighborhood of Hunts Point. The query using the NPA boundary selected records for Morrisania, which abuts Hunts Point on the west side. Different results were observed for the neighborhood of Morrisania because the Wikimapia definition for this neighborhood is much larger than the NPA version (no microneighborhood version was available for this neighborhood). Therefore, the much larger MBB of Morrisania's footprint resulted in the selection of records about adjacent neighborhoods including Hunts Point and Tremont.

More consistent information discovery rankings resulted for the neighborhood of Riverdale, whose boundary definitions were the most similar in all the boundary versions used during the analysis. All footprint versions for this neighborhood resulted in an approximate equal number of the same records and with almost identical ranking values. Surprisingly, the query using the NPA footprint, which is the boundary file most widely used for planning activities by many users, resulted in fewer records selected than Wikimapia and the microneighborhood dataset versions.

Moreover, except for the Wikimapia version's footprint which gave a Riverdale report a lower raking value, all other reports selected for Riverdale received high ranking values. One report for the neighborhood of Sputyn Duvyl, which is politically located in Manhattan (New York County), was selected when querying with all three Riverdale boundary versions. The Wikimapia query produced the largest ranking scores out of the three neighborhood versions used during the study.

6.4.6.3 Combined GeoDNA Information Relevance Analysis

This section presents the results of a combined GeoDNA Information Relevance Analysis. While similar analyses have been performed, appending different boundary versions from top-down and bottom-up sources to form combined geographic extents to search for information is a new way introduced in this study. This approach is used to examine the usability of aggregate GeoDNAs and their relationships to local information discovery.

Table 6.32 Combined GeoDNA Analysis Results shows the results obtained from the aggregate GeoDNA analysis. Results obtained from the appended neighborhood boundary version are very similar to those obtained from the NPA information relevance analysis because the NPA has the largest extents of all neighborhood versions and therefore pulls the results for the analysis. In general, geospatial searches using the combined version did not alter the ranking of the reports found when compared to the NPA and to a lesser extend to the other two boundary versions used during the analysis.

However, some minor differences were observed between the NPA and the combined aggregate version, as well as the microneighborhood and the Wikimapia versions. Overall, the combined version assigned higher ranking scores to several reports identified for the neighborhood of Fordham that were more precise, and lower ranking values to those reports that were less relevant to that neighborhood.The combined GeoDNA version also assigned higher scores to reports relevant and precise for the neighborhood of Hunts Point. It also allowed for the discovery of all reports relevant to the last neighborhood mentioned including those selected with the Wikimapia and the microneighborhoods as well as those selected with the NPA version.

Table 6.32 Combined GeoDNA Analysis Results

	Planning Report	*Combined GeoDNA*	Micro	NPA	Wikimapia
Fordham	Webster Ave-Bedford Park Norwood	0.43	0.19	0.41	0.21
	3rd Avenue Tremont Rezoning	0.25	0.36	0.23	0.33
	Van Cortland Village Rezoning	0.11		0.12	
	Riverdale Special Natural Area District	0.04		0.04	
Hunts Point	The Special Hunts Point District	0.28	0.65	0.28	0.49
	Port Morris Bruckner Blvd Rezoning	0.17		0.17	
	Lower Concourse Rezoning	0.10		0.10	
	Sheridan Expressway	0.09	0.08	0.08	0.16
	Morrisania Rezoning	0.05		0.04	
	161 St. River Avenue	0.05		0.04	
Morrisania	Sheridan Expressway	0.25		0.19	0.25
	Morrisania Rezoning	0.12		0.29	0.12
	161 St. River Avenue	0.09		0.04	0.09
	The Special Hunts Point District	0.06		0.07	0.06
	3rd Avenue Tremont Rezoning	0.04			0.04
Riverdale	Riverdale Special Natural Area District	0.99	0.84	0.80	0.99
	Riverdale Rezoning	0.60	0.60	0.62	0.61
	Central Riverdale Sputyn Duyvil	0.31	0.20	0.13	0.31
	North Riverdale Rezoning	0.16	0.21	0.23	0.16
	Van Cortland Village Rezoning	0.10	0.06		0.10
Throgs Neck	Throgs Neck Rezoning	0.80	0.45	0.80	0.70
	Lower Density Growth Management Area	0.20		0.20	0.06
	Pelham Bay Rezoning	0.02		0.02	
	City Island Rezoning	0.02		0.02	0.01
	Brush Ave Rezoning	0.01		0.01	0.01
West Farms	Sheridan Expressway	0.16		0.25	0.10
	Morris Park	0.15	0.21		
	Park Stratton	0.08	0.17	0.20	
	Pelham Parkway Indian Village	0.08	0.11		
	3rd Avenue Tremont Rezoning	0.03			0.05
	Lower Density Growth Management Area	0.01	0.01		
Woodlawn	Wakefield Eastchester	0.58	0.11	0.58	
	Williamsbridge Baychester	0.25	0.01	0.25	
	Woodlawn Rezoning	0.23	0.73	0.23	0.96

Similar results were obtained for the rest of the neighborhood cases. Whereas different boundary versions allowed for the discovery of some reports and not others, the combined GeoDNA boundary version allowed for the identification of all rezoning reports whether relevant and/or precise for each particular neighborhood. Even when the reports discovered were not precisely about the neighborhood being searched, they were relevant for local planning activities within each particular neighborhood as adjacency is an important characteristic associated with a neighborhood's relative location.

6.5 Conclusions

In this chapter, qualitative and quantitative data were prepared and analyzed using a series of geoprocesses to examine the socio-demographic, geospatial, and information relevance characteristics of a group of seven neighborhoods selected during the first part of the study. Three different boundary versions were collected for the study area from top-down and bottom-up sources to conduct a GeoDNA information discovery analysis as described in *Chapter 3- The Research Design*.

Results from these analyses were integrated during the final knowledge interpretation meta-analysis to assess the impacts of each neighborhood boundary version on the discovery of local information with which to conduct community development and environmental planning activities. A final combined *GeoDNA Information Relevance Analysis* was performed to compare the results obtained from each neighborhood boundary version against those obtained from an aggregate top-down/bottom-up neighborhood boundary layer assembled for the study.

Overall, the study findings suggest that using aggregate GeoDNA that combines top-down with bottom-up geospatial definitions allows for the discovery of local information without altering the ranking of the resources found. In fact, more than half of the local neighborhoods studied have identical loadings in both, the combined GeoDNA and the NPA, which is the top-down boundary representation most widely used for local planning in New York City by a wide variety of participants. Less than half of the neighborhoods have slightly different ranking scores in their aggregate GeoDNA and NPA loadings. Specifically, the Combined GeoDNA scores for Riverdale and Morrisania are more similar to the Wikimapia results than those obtained with their NPA boundaries.

Moreover, using an aggregate GeoDNA allows for additional records to be discovered without changing the importance, relevancy, or precision of the ranking order of the reports found. This is particularly important to conduct planning activities in poor and minority neighborhoods, such as West Farms, which is located in one of the poorest US Congressional Districts overlapping the south Bronx. This neighborhood also had the most ill-defined boundaries among the cases studied during the research.

Disadvantaged neighborhoods usually change more rapidly and as a result have less conflating boundaries than older, more stable and more affluent places. As a result, geospatial searches for information about poor and disadvantaged neighborhoods may potentially yield adverse results when using top-down boundary footprints alone. An aggregate geospatial information search overcomes these limitations. Aggregate geospatial neighborhood boundaries, which are produced by appending information from top-down and bottom-up sources, affords many advantages when compared with the use of single boundary versions from top-down sources to either georeference or geosearch for local information at the neighborhood level in large, complex urban environments.

CHAPTER 7

Conclusions, Limitations and Future Work

This chapter presents the conclusions, limitations, and suggested areas of future research to study the dynamics of urban GeoDNA and their impact on local information discovery. The analysis developed for this research is based on insights gained from three interrelated strands of literature concerning the demand, supply and discovery of local information from a community perspective. In addition, the study relies on lessons learned from previous studies on urban neighborhoods planning, PPGIS, and the role geolibraries play for facilitating and disseminating information discovery. Particular attention is given to the current practices of adding neighborhood geospatial boundary value to resources to make them discoverable. Moreover, a case study permitted the development of a mixed methods research design to combine qualitative and quantitative information into a flexible framework while linking the different phases of the research.

This study moves the research forward towards a holistic interpretation of the interrelationships that occur between the primary factors that influence the discovery of local information for local community users to conduct neighborhood planning activities. Specifically, findings from a series of neighborhood centroids, MBB, and BBF analyses are integrated with results from a socio-demographic analysis to understand the links between urban GeoDNA and local information discovery. Based on current Geospatial Information and Mapping Policies (GIMPs), the study proposes the use of an intuitive methodology to develop a GeoDNA database that bridges some of the basic technical gaps for community participants to collect and assemble information from bottom-up and top-down sources to deploy a robust and functional geodatabase.

7.1 Library Data Search

The study found a relationship between the scope of library collections and the extent of their informational resources when searching text based queries. Specifically, while national and regional libraries have much larger collections of records linked to certain place names, the relevance of their collections is less precise since they cover much wider areas overlapping different states, counties, and cities where there may exist other geographic areas with the same names as local neighborhoods.

The discrepancy observed when searching for neighborhood information through different levels of libraries at the local, city, state, and federal levels, may affect users' ability to find precise information about specific neighborhoods in more complex urban environments. Moreover, the abundance of information linked to place names in larger libraries and clearinghouses presents additional constrains to users searching for local information to conduct community development and environmental planning activities because they may have to manually search through long lists of candidate materials.

Local libraries, on the other hand, have more relevant information about local neighborhoods that can be discovered using both place names as well as the geospatial searches. Nonetheless, while geospatial searches are proven to be beneficial for local and larger libraries, there are still unresolved issues related to the availability and reliability of neighborhood geographic boundary information with which to geocode materials to make them more discoverable. Findings from this study suggest that by combining top-down with bottom-up boundary definitions and creating larger and overlapping neighborhood boundary extents, metadata records can be enriched not only for library usage but for community users producing and searching for local information.

7.2 Data Production

While the fuzzy characterization of neighborhood boundaries has been widely acknowledged, information about such valuable geographies continues to be collected and disseminated by many different players in an ad hoc manner. Perhaps this is partially due to the lack of GIMPs to charge public governmental offices with the organization of neighborhood information.

One immediate outcome of such disparate approach, is that many neighborhood names are missing or misspelled in the thesauri being used by top-down and bottom-up organizations engage in GeoDNA data production. As a result, not only there is lack of conflation between boundary versions but, equally important, a loss of information that may never be recovered once neighborhood names change or become defunct and eventually disappear from search engines.

For example, the study found out that the microneighborhood file, which was produced by NYCDCP and obtained through the Lehman College Bronx Data Center, does not have an entry for the neighborhood of Morrisania, which is one of the oldest neighborhoods in the nation. Therefore, although there has been an insatiable quest to georeference resources at the finest scale, using files at the micro level, such as this particular file, may not be advisable to add geospatial value to library resources. Moreover, the study found that microneighborhood boundaries produce low levels of relevant materials and in many instances also failed to identify important resources for planning from abutting neighborhoods, many of which may have spillover effects onto adjacent neighborhoods.

In addition, even within the same public agencies that are producing and disseminating local geospatial information, such activities occur in a discombobulated manner which results in disparate nomenclatures that further limit their usability to encode information geospatially. The research found that the NYCDCP uses a variety of names to encode information about the same neighborhoods and even boroughs. For example, The Bronx is encoded in one dataset file as "*BoroName = Bronx*", which alphabetically occupies the second place in a normalized data table and hence is assigned a code of # 2. Yet, another NYDCP dataset file encodes the same borough as "*BoroName = The Bronx*", which alphabetically occupies the last alphabetical place of borough names and hence is assigned the numeric code of #5. This discrepancy has negative impacts for both, developers trying to assemble useful online library systems as well as users seeking to find information to conduct planning activities.

7.3 Data Management

As uncovered by the research, increasing amounts of information are being produced by multiple players, including users and suppliers, who are actively involved in community development and environmental planning at the neighborhood level. As a result, many libraries continue to expand their collections to include coveted information about local neighborhoods. On the other hand, such increasing amounts of information are also creating spillover effects that are prompting some institutions to reduce the sizes of their collections and, in many cases, even destroy materials due to the costs associated with archiving and preserving physical records. New geospatial applications can be instrumental in the production of digital resources to document these materials before they are destroyed and lost forever. However, as indicated above there are still unresolved issues concerning the creation of a neighborhood gazetteer to centralize thesauri with names in an organized manner that captures both top-down and bottom-up definitions including vernacular neighborhoods names.

Moreover, GeoDNA also creates opportunities to streamline the production of local neighborhood data being produced by local organizations. As documented through this research and the literature, many CBOs are continuously producing large amounts of information about local neighborhoods that are useful for community development and environmental planning activities. While data developed by community development groups are subject to strict privacy regulations, data collected by groups engaged in environmental planning activities can easily be made public and accessible to online users. This finding points to an opportunity to produce data useful for neighborhood planning and to expand the study of urban GeoDNA.

7.4 Qualitative vs. Quantitative Results

The qualitative metadata analysis revealed that geospatial-based queries are more effective for discovering relevant information than traditional text-based place name searches. For example a place name base search would result in a larger numbers of records being identified, such as the ones found during the library general search described in Chapter 6, *Table 6.14 Neighborhood Information availability*. Library users would have to search through thousands of records and read their metadata to determine the relevance of each record for their neighborhoods of interests.

However, when searching for local information to find information geospatially, the results may be too large or too small for users to discover relevant information about certain neighborhoods more than others depending on the query's footprint. As demonstrated by this study and previous literature, different neighborhood boundary versions impact the quantity and quality of local information users can discover differently. For example, if the scale of the boundaries used to encode or to search for information is based on parameters that are too narrow, the query may fail to select relevant information pertaining to the neighborhood in question. On the other hand, if the footprint of the geospatial search is too broad it may return too many records.

In addition, large neighborhood extents are not necessarily related to larger amounts of information being discovered. Instead, the amount of relevant and precise information fetched through geospatial searches seems to be more related to the shape of the neighborhoods which in some cases may produce larger MBB footprints with lower BBF. For example, elongated or prorupt neighborhoods may have larger MBB and lower BBF which may render large numbers of relevant, but less precise, information. Since neighborhoods by definition have fuzzy boundaries, such levels of relevancy may be a desirable characteristic of the discovered information as neighborhood planning takes into account surrounding conditions that affect the areas under study. As pointed out by the literature, local neighborhoods do not exist in isolation but form more complex, interrelated systems that work together to sustain much larger urban environments.

Moreover, contrary to previous research indicating that census tracts were more compact than other boundaries, such as those found in nature, census tracts defined neighborhoods tent to be more prorupt than those delineated by online users thorough new web 2.0 mapping applications. Perhaps this result is related to the number and type of online users currently registered with the web portal used in this study -Wikimapia. However, this study did not seek to study issues pertaining to Digital Divide or to the lack of access to technology certain segments of the population experience. Such findings suggest the need to conduct further research about the dynamics of online users who are currently engaged in defining and disseminating information about local neighborhood boundaries.

7.5 Limitations

Due to the lack of bottom-up boundary datasets, the study incorporates geospatial data produced by online users through Wikimapia. Although such boundaries have not been vetted by local CBOs or otherwise any charged public office, they are representative of the type of information being produced by online users through new open access Web 2.0 mapping applications.

The study was also limited by the lack of available library materials that have been georeferenced at the neighborhood scale in New York City. Currently, local libraries are only engaged in digitalization projects of historic maps and lack materials about local neighborhoods, particularly within poor and minority communities which, as indicated by the literature, change more rapidly than their counterparts more affluent areas. Therefore, this study was limited to a sample set of 28 planning reports that were gathered from the New York City web portal and georeferenced during the coding phase of the research using GIS technology and digitalization methods.

In addition, the research framework originally designed for the study had intended to include a number of socioeconomic variables for the selected neighborhoods. However, many of the economic datasets envisioned to be included in the study are now being produced by the American Community Survey (ACS) under a different time schedule. At the time the study was conducted, socioeconomic data had not yet been released at the census tract level. Therefore, the study includes a number of fewer socio-demographic and housing variables about the neighborhoods studied.

7.6 Next Steps

Two strands of future research are important to be considered for the advancement of GeoDNA research. These fall within two academic disciplines; one pertains to the theoretical applications of GeoDNA and include planning and geography, the other relates to information and library systems. There is a need to develop more structured and normalized local geospatial information for libraries, such as those identified in this study, to enhance their collections of information found in special collections and other archival systems (i.e. vertical files and other historical records maintained by governmental and other local libraries).

Another important area of GeoDNA research pertains to the study of point and line features. A preliminary analysis indicated that research needs to be conducted to georeference records for point and line features found within the borough. For example, a point in polygon analysis can be tested by incorporating the coordinates for the features found in the point file from the NYCDCP. As indicated by the literature, a minimum pair of lat/long can be used to georeference metadata records in library collections. The GeoDNA LINK framework presented in this study can be enhanced with single pairs of coordinates for the features found in the facility point file.

7.7 Recommendations

As demonstrated by this analysis, users' demand for geospatial information change through time and it is necessary to maintain updated thesauri to link library materials to the local geographies of urban neighborhoods. One important step is to update the NYCDCP Neighborhood map and its associated geospatial files to reflect the current stage of users definitions to satisfy their demands for local geospatial information.

There is also an impending need to create a neighborhood gazetteer to centralize information about New York City neighborhoods, particularly in the Borough of The Bronx, where large segments of the population are minority and disempowered. As illustrated by the literature research, poor and minority neighborhoods tend to change more rapidly due to a series of internal and external factors. As the geographies of these neighborhoods change, undocumented materials about their existence may forever disappear and take away important ontological representations that would otherwise serve to document their existence and contributions to the sustainability of urban places.

New GIMPs need to be developed to charge specific agencies with local data documentation and maintenance. These data must be vetted, normalized and shared broadly among PPGIS players including members of the scientific community, governmental and administrative offices, CBOs, CDCs, CUPs, as well as the public at large. As pointed out by the literature and by this research, the lack of neighborhood standardization poses many challenges to discover information for users and local organizations to conduct sound community development and environmental planning within complex urban environments.

7.8 Future Work

As indicated by research participants, there is a need to expand the study of urban GeoDNA and its implications for information discovery not only from a methodological approach to increase the relevance and precision of the materials users can find, but also from a more pragmatic application development viewpoint. For example, while improvements need to take place to produce more organized and vetted neighborhood gazetteers that can be used and shared by multiple users and producers of local information, there is also a need to develop better online applications that include simpler search menus for library users to query and find information geospatially.

Further studies on urban GeoDNA and information discovery need to be conducted to test the generalizability of the findings produced in this study. Expanding the capacity local users have to search and discover information relevant to their neighborhoods is important as more individuals are now empowered through PPGIS and are able to become involved in planning activities to sustain their own communities. As indicated by the literature review, the body of knowledge on participatory planning continues to grow and through applied research that integrates PPGIS, neighborhood participants and local knowledge, it contributes to the expansion of its theoretical foundations.

In addition, the research demonstrated that many CBOs are producing important information about local conditions within the neighborhoods studied. This information can be used to enhance not only local planning activities from the bottom-up, but also applications within the social and environmental sciences, as well as policy development resulting from top-down planning practices. Therefore, it is important to find new ways to document, archive, and disseminate information about local neighborhoods and their unique features for users to find information relevant to such rapidly changing areas. This is particularly important for large urban environments such as The Bronx, which has been associated with a long trajectory of change, public participation, and urban resilience throughout the years.

Appendix A: Acronyms

AIAN	American Indian and Alaska Native
ACS	American Community Survey
ADL	Alexandria Digital Library
ASDD	Australian Spatial Data Directory
ANZLIC	Australian New Zealand Land Information Council
BGN	Board of Geographic Names
BID	Business Improvement District
CBO	Community Based Organization
CBSA	Core Based Statistical Area
CSA	Combined Statistical Area
CD	Community District
CDC	Community Development Corporation
CDBG	Community Development Block Grant
CLEF	Cross Language Evaluation Forum
CSDGM	Content Standard for Digital Geospatial Metadata
DOI	Digital Object Identifier
DOITT	*See NYCDOITT below*
DORIS	*See NYCDORIS below*
DPLA	Digital Public Library of America
EIS	Environmental Impact Statement
ESRI	Environmental Systems Research Institute
FOIA	Freedom of Information Act
FOIL	Freedom of Information Law
FDLP	Federal Depository Library Program
FGDC	Federal Geospatial Data Committee
GeoDNA	Geospatial Digital Neighborhood Areas (also Geospatial Digital Neighborhood Analysis)
GDT	Geographic Data Technology
Geolink	Geographic link

GIMPs	Geospatial Information and Mapping Policies
GIR	Geographic Information Retrieval
GML	Geographic Markup Language
GNBC	Geographical Names Board of Canada
GNIS	Geographic Names Information System
GNIS	USGS Geographic Names Information System
GPO	US Government Printing Office
INSPIRE	Infrastructure for Spatial Information in Europe
INCITS	International Committee for Information Technology Standards
ISO	International Standards Organization http://www.iso.org
LINK	**L**ocal Socio-demographic, **I**nformation Relevance analysis, **N**eighborhood Geospatial Analysis, and **K**nowledge Interpretation Analysis
MaNIS	Mammal Network Information Systems for the biological sciences
MARC	Machine Readable Cataloguing
MBB	Minimum Bounding Box
MBR	Minimum Bounding Rectangle
MetaCarta	private company, working on geographic text search systems
MPO	Metropolitan Planning Organization
NBII	National Biological Information Infrastructure
NCGIA	National Center for Geographic Information and Analysis
NDIIPP	National Digital Information Infrastructure and Preservation Program
NGA	GEOnet Names Server (GNS) is official BGN's site for foreign names
NGDA	National Geospatial Digital Archive
NHD	National Hydrography Dataset
NHOPI	Native Hawaiian and Other Pacific Islander
NOAA	National Oceanic and Atmospheric Administration
NPA	Neighborhood Projection Area
NSDI	National Spatial Data Infrastructure
NYC	New York City
NYCDCAS	New York City Department of Citywide Administrative Services

NYCDCP	New York City Department of City Planning
NYCDEP	New York City Department of Environmental Protection
NYCDOE	New York City Department of Education
NYCDOITT	NYC Department of Information Technology and Telecommunications
NYCDORIS	New York City Department of Records and Information Services
NYCDOT	New York City Department of Transportation
NYCDPR	New York City Department of Parks and Recreation
NYCHL	New York City Hall Library
NYCUHF	New York City United Hospital Fund
NYMTC	New York Metropolitan Transportation Council
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OCLC	Online Computer Library Center
OGC	Open Geospatial Consortium http://www.opengeospatial.org/
PAR	Participatory Action Research
PUMA	Public Use Microdata Areas
PURLS	Persistent Uniform Resource Locator
PPGIS	Public Participatory Geographic information Systems
RRA	Rapid Rural Appraisal
SPCS	State Plane Coordinate System
UCSB	University of California at Santa Barbara
URL	Universal Resource Locator
USEPA	US Housing and Urban Development
USGPO	US Government Printing Office
USHUD	US Department of Housing and Urban Development
WPA	Work Projects Administration

Appendix B: Invitation Letters

List of Community Based Organizations (CBOs) originally invited to participate in this research:

1- For a Better Bronx
2- Nos Quedamos
3-Sustainable South Bronx
4-Bronx River Alliance
5-Bronx Council for Environmental Quality
6-The Point Community Development Corporation
7-Youht Ministry for Peace and Justice
8-Phipps Community Development Corporation

1- For a Better Bronx:

From: "Giovani H. Graziosi" <gisuser@earthlink.net
To: marian.fabb@earthlink.net
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 25, 2011 1:28 PM
Attachments: GiovaniGraziosi_supportLetterForABetterBronx.pdf
GiovaniGraziosi_CV_2011.pdf

Dear Marian,

My name is Giovani Graziosi and I am a Ph.D. Candidate at Rutgers University. I am writing to request your participation in my current Ph.D. dissertation research.

Several years ago I worked with many Bronx community-based organizations. You probably remember me from the GIS Center at Hostos Community College where I worked with Juliana Maantay and other colleagues many years ago! Since then, I have become a Ph.D. Candidate at Rutgers University, NJ, where I am currently finishing my Ph.D.

My current Ph.D. dissertation research focuses on issues pertaining to the use of public information and GIS (Geographic Information Systems) by local community groups for local planning and environmental sustainability and would like to interview you or a member of your organization as part of my local research.

I am attaching some materials to this email to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or to stop by, to discuss any of these materials.

I look forward to hearing from you in the near future.

Thank you.

Best,
Giovani

2- Nos Quedamos:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: ygonzalez@nosquedamos.org
Cc: lmartinez@nosquedamos.org
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 24, 2011 11:35 AM
Attachments: GiovaniGraziosi_CV_2011.pdf GiovaniGraziosi_supportLetterNosQuedamos.pdf
Dear Ms Gonzalez,

My name is Giovani Graziosi and I am a Ph.D. Candidate at Rutgers University. I am writing to request your participation in my current Ph.D. dissertation research.

Several years ago I worked with many Bronx community-based organizations (including yours while it was under Ms Garcia's management) on issues pertaining to environmental planning and community sustainability. Since then, I have become a Ph.D. Candidate at Rutgers University, NJ.

My current Ph.D. dissertation research focuses on issues pertaining to the use of public information and GIS (Geographic Information Systems) by local community groups for local planning and environmental sustainability.

I am attaching some materials to this email to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or stop by, to discuss any of these materials.

(I would also like to mention that I worked with and knew Ms Yolanda Garcia and was sadden to learn about her passing a few years ago. She was an inspirational woman to me, particularly being also a Latino immigrant)

Please let me know if I contact you again about this request. I look forward to hearing from you in the near future.

Thank you.

Best,
Giovani

3-Sustainable South Bronx:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: mcraytor@ssbx.org
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 21, 2011 2:21 PM
Attachments: GiovaniGraziosi_CV_2011.pdf
GiovaniGraziosi_supportLetterSustainableSouthBronx.pdf
Dear Ms. Craytor,

It was a pleasure talking to you yesterday about my Ph.D. research. I am attaching the materials we discussed over the phone to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or stop by, to discuss any of these materials.

Thank you.

Best,
Giovani

4-Bronx River Alliance:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: linda.cox@parks.nyc.gov
Cc: devona.sharpe@parks.nyc.gov
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 21, 2011 2:15 PM
Attachments: GiovaniGraziosi_supportLetterBronxRiverAlliance.pdf
GiovaniGraziosi_CV_2011.pdf
Dear Ms. Cox,
It was a pleasure talking to you yesterday about my Ph.D. research. I am attaching the materials we discussed over the phone to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or stop by, to discuss any of these materials.

Thank you.

Best,
Giovani

5-Bronx Council for Environmental Quality:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: mankiewicz@Bxscience.edu
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 25, 2011 2:33 PM
Attachments: GiovaniGraziosi_CV_2011.pdf
GiovaniGraziosi_supportLetterBronxCouncilEnvironmentalQuality.pdf
Dear Dr. Julie Mankiewicz,

My name is Giovani Graziosi and I am a Ph.D. Candidate at Rutgers University. I am writing to request information about the Bronx Council for Environmental Quality (BCEQ).

Several years ago I worked with many Bronx community-based organizations including BCEQ, which was managed by Dr. Mankiewicz at the time. Since then, I have become a Ph.D. Candidate at Rutgers University, NJ, where I am currently finishing my Ph.D.

My current Ph.D. dissertation research focuses on issues pertaining to the use of public information and GIS (Geographic Information Systems) by local community groups for local planning and environmental sustainability and would like to interview a member of the BCEQ as part of my local research.

I am attaching some materials to this email to elaborate further on my request for the BCEQ to participate in my research. I am also attaching a copy of my CV for your information.

Could you please let me know if Dr. Mankiewicz is still running this organization? or, is there another person I could talk to about my research and the possibility of interviewing them for my dissertation research?

I look forward to hearing from you in the near future.

Thank you.

Best,
Giovani

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: paul@gaiainstituteny.org
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 31, 2011 11:37 AM
Attachments: GiovaniGraziosi_supportLetterBronxCouncilEnvironmentalQuality.pdf
GiovaniGraziosi_CV_2011.pdf
Dear Dr Mankiewicz,

My name is Giovani Graziosi and I am a Ph.D. Candidate at Rutgers University. I am writing to find out if you are still associated with the Bronx Council for Environmental Quality (BCEQ) because I would like to interview a member of this organization, or you, or your organization, as part of my current Ph.D. dissertation research.

Several years ago I worked with many Bronx community-based organizations. You probably remember me from the GIS Center at Hostos Community College where I worked with Juliana Maantay and other colleagues many years ago! Since then, I have become a Ph.D. Candidate at Rutgers University, NJ, where I am currently finishing my Ph.D.

My current Ph.D. dissertation research focuses on issues pertaining to the use of public information and GIS (Geographic Information Systems) by local community groups for local planning and environmental sustainability and would like to interview you or a member of your organization as part of my research.

I am attaching some materials to this email to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or to stop by, to discuss any of these materials.

I look forward to hearing from you in the near future.

Thank you.

Best,
Giovani

6-The Point Community Development Corporation:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: kelliethepoint@gmail.com
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Jan 26, 2011 2:31 PM
Attachments: GiovaniGraziosi_supportLetterThePointCommunityDevelopmentCorporation.pdf
GiovaniGraziosi_CV_2011.pdf
Dear Kellie,

It was a pleasure talking with you about my Ph.D. research and your work in the Bronx. As I mentioned during out conversation, I am a Ph.D. Candidate at Rutgers University where I am finishing my dissertation.

I am now writing to request your participation in my current Ph.D. dissertation research.

Several years ago I worked with many Bronx community-based organizations on environmental issues and Geographic Information Systems (GIS). Since then, I have become a Ph.D. Candidate at Rutgers University, NJ, where I am currently finishing my Ph.D.

My current Ph.D. dissertation research focuses on issues pertaining to the use of public information and GIS by community groups for local planning and environmental sustainability and would like to interview you, or a member of your organization, as part of my local research.

I am attaching some materials to this email to elaborate further on my request for your organization to participate in my research. I am also attaching a copy of my CV for your information.

Please let me know if you have any questions about these materials or my research in general. I will be glad to call your office, or to stop by, to discuss any of these materials.

I look forward to hearing from you in the near future.

Thank you.

Best,
Giovani

7-Youht Ministry for Peace and Justice

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: dshuffler@ympj.org
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Feb 17, 2011 3:46 PM
Attachments: GiovaniGraziosi_CV_2011.pdf
GiovaniGraziosi_supportLetter_YouthMinistriesforPeaceandJustice.doc
GiovaniGraziosi_PhDresearch_YouthMinistriesforPeaceandJustice.pdf
Dear Mr. Shuffler,

It was a pleasure talking with you about my Ph.D. research and the exciting work you do with the Bronx communities.

As I mentioned, I am a Ph.D. Candidate at Rutgers University where I am finishing my dissertation. I am now writing to request your participation in my current Ph.D. dissertation research.

My dissertation research focuses on issues pertaining to the use of public information and GIS (Geographic Information Systems) by community groups for local community and environmental planning.

Consequently, given your exemplary work in The Bronx, I would like to interview a member of your organization as part of my research.

I am attaching some materials to this email to elaborate further on my request. I am also attaching a sample letter file that you can use on your letterhead to send me back at your earliest convenience.

Please let me know if you have any questions about these materials or my research in general.

I look forward to receiving a letter of support from your organization (see sample) in the near future.

Thank you very much.

Best,
Giovani

8-Phipps Community Development Corporation:

From: "Giovani H. Graziosi" <gisuser@earthlink.net&gt... [Edit Address Book]
To: rabuwala@phippsny.org
Subject: Invitation to participate in my Ph.D. dissertation research
Date: Feb 25, 2011 1:59 PM
Attachments: GiovaniGraziosi_PhDresearch_PhippsCommunityDevelopmentCorporation2.pdf GiovaniGraziosi_PhDresearchSupportLetter_sample.doc
Dear Ms Abuwala,

It was a pleasure talking with you yesterday about my Ph.D. dissertation and how I intend to include your organization as part of my research.

As I mentioned during our conversation, I am a Ph.D. Candidate at Rutgers University, where I am finishing my dissertation focusing on public data usage by local community groups and how libraries collect and archive information for public dissemination.

Consequently, given your organization's exemplary work in community development, I would like to interview you as part of my research. I am attaching some materials to this email to elaborate further on my request for your participation. I am also attaching a sample letter that you can use on your letterhead to send me back a letter of support indicating your willingness to participate in my research.

I need to submit copies of letters of support from participating organizations by the end of this month to obtain the final approval from Rutgers University IRB committee to begin my research.

Please let me know if you have any questions about these materials or my research in general.

I look forward to receiving a letter of support from you (see sample) in the near future.

Thank you very much for your help.

Best,
Giovani

Appendix C: Population Change in Bronx Neighborhoods

Population Change Table extracted from the Center for Urban Research of The Graduate Center of the City University of New York (CUNY) http://www.urbanresearchmaps.org/plurality/

City Rank	DCP Code	Neighborhood	2010 Total Population	2000-2010 Change	% Change
3	BX35	Morrisania - Melrose	37,865	8,067	27.10%
6	BX34	Melrose South - Mott Haven North	39,214	6,024	18.20%
10	BX33	Longwood	26,196	3,114	13.50%
15	BX75	Crotona Park East	20,277	2,205	12.20%
19	BX26	Highbridge	37,727	3,884	11.50%
25	BX17	East Tremont	43,423	4,143	10.50%
26	BX01	Claremont - Bathgate	31,078	2,929	10.40%
34	BX27	Hunts Point	27,204	2,062	8.20%
38	BX37	VanNest-MorrisPk-WestchesterSq	29,250	2,126	7.80%
40	BX13	Co-Op City	43,752	3,074	7.60%
46	BX39	Mott Haven - Port Morris	52,413	3,387	6.90%
47	BX44	Williamsbridge - Olinville	61,321	3,901	6.80%
51	BX09	Soundview-CastleHill-ClasonPt-HardngPk	53,686	2,951	5.80%
53	BX59	Westchester - Unionport	27,248	1,480	5.70%
54	BX14	EastConcourse - ConcourseVillage	62,284	3,324	5.60%
58	BX06	Belmont	27,378	1,412	5.40%
63	BX40	Fordham South	28,262	1,382	5.10%
76	BX07	Bronxdale	35,538	1,230	3.60%
92	BX46	Parkchester	29,821	464	1.60%
97	BX31	Allerton - Pelham Gardens	28,903	396	1.40%
99	BX55	Soundview - Bruckner	35,634	497	1.40%
100	BX08	West Farms - Bronx River	35,011	474	1.40%
106	BX52	Schuylerville-ThrogsNeck-EdgwaterPk	44,167	434	1%
107	BX29	Spuyten Duyvil - Kingsbridge	30,161	287	1%
117	BX49	Pelham Parkway	30,073	62	0.20%
126	BX36	University Heights - Morris Heights	54,188	-146	-0.30%
128	BX22	NorthRiverdale-Fieldston-Riverdale	27,860	-151	-0.50%
129	BX43	Norwood	40,494	-258	-0.60%
130	BX63	West Concourse	39,282	-272	-0.70%
133	BX28	Van Cortlandt Village	50,100	-509	-1%
140	BX41	Mount Hope	51,807	-842	-1.60%
142	BX05	Bedford Pk - Fordham North	54,415	-914	-1.70%
144	BX10	PelhamBay-CountryClub-CityIsland	26,583	-557	-2.10%
149	BX30	Kingsbridge Heights	32,496	-790	-2.40%
151	BX03	Eastchester-Edenwald-Baychester	34,517	-899	-2.50%
152	BX62	Woodlawn - Wakefield	42,483	-1,100	-2.50%
189	BX98	Rikers Island	11,091	-1,684	-13.20%

Appendix D: Wikipedia's List of Bronx Neighborhoods

1. Allerton	31. Morrisania
2. Baychester	32. Mott Haven
3. Bedford Park	33. North Bronx
4. Belden Point	34. North New York
5. Belmont	35. North Riverdale
6. Bronx Lyceum	36. Norwood
7. Castle Hill	37. Olinville
8. City Island	38. Parkchester
9. Clason Point	39. Pelham Bay
10. Co-op City	40. Pelham Gardens
11. Concourse	41. Pelham Parkway
12. Country Club	42. Port Morris
13. East Bronx	43. Riverdale
14. East Morrisania	44. Silver Beach
15. East Tremont	45. Soundview
16. Eastchester	46. South Bronx
17. Edenwald	47. Spuyten Duyvil
18. Fieldston	48. The Hub
19. Fordham	49. Throggs Neck
20. Fordham-Bedford	50. Tremont
21. Harding Park	51. University Heights
22. Highbridge	52. Van Cortlandt Village
23. Hunts Point	53. Van Nest
24. Kingsbridge Heights	54. Wakefield
25. Kingsbridge	55. West Bronx
26. Locust Point	56. West Farms
27. Longwood	57. Williamsbridge
28. Melrose	58. Woodlawn
29. Morris Heights	
30. Morris Park	

From:Wikipedia's "Neighborhoods in the Bronx". Accessed July, 2009.

Appendix E: Research Design Approvals

The following documents were developed for the study and approved by the Rutgers University Institutional Review Board prior to project initiation.

1. Human Subjects Compliance Program Certification
2. Institutional Review Board Approval
3. Research Participation Consent Form
4. Audiotape Consent Form

1. Human Subjects Compliance Program Certification

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

Office of Research and Sponsored Programs
Administrative Services Building III • Cook Campus
3 Rutgers Way • New Brunswick • New Jersey 08901
732/932-0150 ext. 2104 • fax : 732/932-0163 • web: http://orsp.rutgers.edu

07/08/2010

Dear Giovani Grazrosi

I am pleased to inform you that you have successfully completed the Rutgers University Human Subjects Compliance Program. This educational program includes information on the regulations, history, policies, procedures and ethical practices pertaining to research involving human subjects, which will be helpful to you as you conduct your research.

Your approval date is 07/08/2010. Duration of approval will be based on federal requirements which are not yet determined. Well in advance of the expiration date of your approval period, you will be notified so that you may continue your education regarding the protection of human subjects.

Additional information will also be provided on the IRB list-serve and posted on the human subjects website: <http://orsp.rutgers.edu/humans/>

Please retain this letter of certification. It will be required for submitting human subjects protocols, and continuing review forms. When submitting a funding request to NIH, the certification date will be required for inclusion on a different certification letter, which may be requested by contacting the Sponsored Programs Administrator, by email at <humansubjects@orsp.rutgers.edu> or by phone at (732) 932-0150 ext. 2212. Thank you for your cooperation.

Sincerely,

Sheryl N. Goldberg
Director
Office of Research and Sponsored Programs

2. Institutional Review Board Approval

RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

April 19, 2011

P.I. Name: Graziosi
Protocol #: E11-391

Giovani H. Graziosi
0 Riverside Drive #7A
New York NY 10032

Dear Giovani Graziosi:

Notice of Exemption from IRB Review

Protocol Title: "Urban Geospatial Neighborhoods and Abstract Spaces"

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Exemption Date: 1/26/2011 **Exempt Category:** 2

This exemption is based on the following assumptions:

- **This Approval** - The research will be conducted according to the most recent version of the protocol that was submitted.
- **Reporting** – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications** – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form (s)** – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: **None**

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,
acting for
Sheryl Goldberg
Director of Office of Research and Sponsored Programs
gibel@grants.rutgers.edu

cc: Briavel Holcomb

3. Research Participation Consent Form

Rutgers the State University of New Jersey – Department of Geography
54 Joyce Kilmer Drive. Piscataway, NJ 08854

RESEARCH PARTICIPATION CONSENT FORM

You are invited to participate in a research study that is being conducted by Giovani Graziosi who is a doctoral student in the Department of Geography at Rutgers, The State University of New Jersey, under the direction of Dr. Briavel Holcomb, Dr. Lyna Wiggins, Dr. Kathe Newman, and Dr. Robert Lake.

Research Purpose Statement: The purpose of this research is to study the use and availability of geospatial information for local neighborhood planning from a community perspective. The study analyzes the *demand* and *supply* sides of public information to determine how their geospatial relationships shape the *discovery* of local neighborhood information essential for community and environmental planning as well as urban sustainability.

Participation Rights: Your participation in this study is voluntary. You may withdraw at any time during the study without any adverse effects on yourself, your organization, or the study.

Research Procedures: The study protocol is based on an interview which uses an open-ended questionnaire containing structured and semi-structured questions about your organization's use, demand, and/or supply of information used to conduct local neighborhood planning activities.

Number of Participants: Approximately 4 subjects between the ages of 18 and 99 years old will participate in the study. Each subject's individual interview will last approximately 1 hour.

Study Confidentiality: This research is confidential. The research records will include some information about you. Information collected will be stored in such a manner that some linkage between your identity and the research responses exists. Specifically, this information includes your job title, area of specialization, and type of training in community planning; Geographic Information Systems; computing; and library sciences. This information will be kept confidential by limited access to the research data, which are stored in a secure password protected file, and only made available to the Ph.D. research team and the Institutional Review Board at Rutgers University, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated.

Data Maintenance and Storage: All study data collected through the open-ended questionnaire will be kept in a secure location for at least three years and destroyed on 08/31/2014.

Study Risks and Discomforts: There are no foreseeable risks associated with your participation in this study and Rutgers University is not liable for any potential adverse effects.

Study Potential Benefits: You have been told that the benefits of taking part in this study may be an increased use and availability of information that could potentially benefit local community planning activities. However, you may receive no direct benefit from participating in this study.

Disclosure of Payments: You will receive **0** payments for participating in the study.

Cost to Participant: You will not bear any of the costs associated with the study.

Study Findings: You understand that any new findings emerging during the research, which may condition your willingness to continue with the study, will be shared with you.

APPROVED
Date: 1/26/11

Participants Accessibility: You agree to be contacted by the Principal Investigator via email or by phone upon approval by your supervisor and only for questionnaire related questions.

Study Contacts: If you have any questions about the study or study procedures, you may contact myself -the Principal Investigator- or any of my advisors as indicated below:

Principal Investigator:

Giovani H. Graziosi, M.U.P.
Department of Geography – Lucy Stone Hall. Rutgers, The State University of New Jersey
54 Joyce Kilmer Drive. Piscataway, NJ 08854.
Tel: (917) 968-1963. Email: graziosi@eden.rutgers.edu

Principal Advisors / Co-Principal Investigators:

Briavel Holcomb, Ph.D., Professor
Bloustein School of Planning and Public Policy. Rutgers, The State University of New Jersey
Civic Square Building. 33 Livingston Avenue. New Brunswick, NJ 08901.
Tel: (732) 932 4101 x 688. Email: holcomb@rci.rutgers.edu

Lyna Wiggins, Ph.D., Associate Professor
Bloustein School of Planning and Public Policy. Rutgers, The State University of New Jersey
Civic Square Building. 33 Livingston Avenue. New Brunswick, NJ 08901.
Tel: (732) 932 3133 x 568. Email: lyna@rci.rutgers.edu

For other additional questions about this study you may contact Rutgers University Department of Geography Graduate Director at the address indicated below:

Kevin St. Martin, Ph.D., Associate Professor. Director of the Graduate Program in Geography
Department of Geography – Lucy Stone Hall. Rutgers, The State University of New Jersey
54 Joyce Kilmer Drive Piscataway NJ 08854.
Tel: (732) 445-4103. Email: kstmarti@rci.rutgers.edu

If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at:

IRB Administrator at Rutgers University, the State University of New Jersey
Institutional Review Board for the Protection of Human Subjects
Office of Research and Sponsored Programs
3 Rutgers Plaza
New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

APPROVED
Date: 1/26/11

You will be given a copy of this consent form for your records.

Please sign below if you agree to participate in this research study:

Subject Name (Print) ______________________________

Subject Signature ______________________ Date ______________

Principal Investigator Signature ______________ Date ______________

4. Audiotape Consent Form

AUDIOTAPE ADDENDUM TO CONSENT FORM

You have already agreed to participate in a research study entitled: *Urban Geospatial Digital Neighborhoods and Abstract Spaces* conducted by Giovani Graziosi. You are now being asked for your permission to allow me to audiotape your interview as part of that research study. You do not have to agree to be recorded in order to participate in the main part of the study.

You understand that the recording will be used for analysis by the Principal Investigator and, if necessary, by the research team of Ph.D. advisors from Rutgers University. The audio recording will not be released, published, or otherwise disseminated in any public media outlet.

The recording will include the date of the meeting and the name of your organization.

The recording will be stored in a secure, password protected digital computer file and linked by a filename as code to your organization's name. Recorded audio files will be destroyed upon completion and publication of the study results.

Your signature on this form grants the Principal Investigator named above permission to record you as described above during your interview participation in the above referenced study. The investigator(s) will not use your audio recording for any other reason than those stated in the consent form without your written permission.

Subject Name (Print) ______________________________

Subject Signature ____________________ Date ______________

Principal Investigator Signature ______________ Date ______________

APPROVED
Date: 1/26/11

Appendix F: List of Bronx River Alliance Donors

List of The Bronx River Alliance Supporters and Donors.
From: http://bronxriver.org/?pg=content&p=aboutus&m1=6. Access 20110428

COMMUNITY BASED ORGANIZATIONS
Bissel Gardens
Bronx County Historical Society
Bronx River Parkway Reservation Conservancy
Bronx River Art Center and Gallery
Car-Free Bronx Coalition
Concerned Residents Organization
Council on the Environment of NYC
Downtown Boathouse
Drew Gardens
East Bronx History Forum
East Coast Greenway Alliance
Environmental Education Advisory Council
Forget-Me- Not Seniors
Friends of Brook Park
Friends of the Bronx Zoo
Friends of Van Cortlandt Park
Friends of Woodlawn Cemetery
Harding Park Homeowners Association & Environmental Center
Hutchison River Restoration Project
Mosholu Preservation Corporation
Muskrateers
Neighborhood Initiatives Development Corporation
Nos Quedamos
Phipps Community Development Corporation
The Point Community Development Corporation
RCNYC
Rocking the Boat
Safe Streets in Co-op City
Solar One
Southern Bronx River Watershed Alliance
Storm Water Infrasture Matters (S.W.I.M)
Sustainable South Bronx
Youth Ministries for Peace and Justice
222 Street Block Association

NON-GOVERNMENTAL ORGANIZATIONS
American Museum of Natural History
Bike NYC
5 Boro Bike Club
Bronx Council for Environmental Quality
Bronx County Historical Society

Bronx River Parkway Reservation Conservancy
Christodora, Inc.
City Parks Foundation
Council on the Environment of NYC
Downtown Boathouse
East Coast Greenway Alliance
Gaia Institute
GLOBE, Queens College
Hutchinson River restoration Project
Metropolitan Waterfront Alliance
Montefiore Medical Center
Nature Network
Neighborhood Open Space Coalition
New York Botanical Garden
New York Restoration Project
NYC Open Accessible Space Information System Cooperative (OASIS)
Romalewski New York Restoration Project
Partnerships for Parks
Pratt Center for Community Development
Regional Plan Association
Transportation Alternatives
Tri-State Transportation Campaign
Trust for Public Land
Wakefield, Williamsbridge & Woodlawn History Project
Wildcat Services Corporation
Wildlife Conservation Society - Bronx Zoo
Youth Ministries for Peace & Justice

FEDERAL GOVERNMENTAL ORGANIZATIONS
National Oceanographic & Atmospheric Administration
National Park Service
Office of Congressman Jose Serrano
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

STATE AND LOCAL GOVERNMENTAL ORGANIZATIONS
Bronx Borough President's Office
Community Boards: 2, 6, 7, 9, 11, 12
Cornell Cooperative Extension -- NYC
Council on the Environment of New York City
New York City Department of Education
New York City Department of Transportation
New York City Economic Development Corporation
New York City Department of Environmental Protection
New York City Department of Parks & Recreation
New York City Soil & Water Conservation District

New York State Attorney General's Office
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of Transportation
Westchester County Parks, Recreation, and Conservation
Westchester County Planning Department
Westchester County Soil & Water Conservation District

EDUCATIONAL INSTITUTIONS
Academy of Environmental Science
Banana Kelly High School
Baruch College Campus HIgh School
Bronx Academy for computer and Tech
Bronx Guild High School
Bronx International High School
Bronx Lab School
Bronx Light House Charter School
Bronx Satelite High School
Christopher Columbus High School
CUNY Prep
DeWitt Clinton High School
Evplorations Academy
Fannie Lou Hamer Freedom High School
Fordham University
Immaculate Conception
Jane Addams High School for Academic Careers
Lehman College/CUNY
Manhattan College
New York University Wallerstein Collaborative
Pablo Neruda Academy for Architecture and World Studies
Queens College, CUNY
St. Simon Stock Elementary School
SUNY Maritime College
The Learning Tree
Urban Assembly School for Wildlife Conservation

FINANCIAL SUPPORTERS
Foundation and Government
Achelis Foundation
Altman Foundation
Bodman Foundation
Booth Ferris Foundation
The Bronx Initiative for Energy and the Environment of the Bronx Overall Economic Development Corporation
Cleveland Dodge Foundation
Community Development Block Grant U.S. Depart. of Housing and Urban Development

The Community Preservation Corporation
Congressman Jose E. Serrano's WCS-NOAA Lower Bronx River Partnership
The Durst Organization
The Hagedorn Fund
Edward Hazen Foundation
Hearst Foundation, Inc
Hunts Point Wastewater Treatment Plant
The J.M Kaplan Fund
Lily Auchincloss Foundation
Long Island Sound Futures Fund of the National Fish and Wildlife Foundation
Merck Family Fund
Morris and Alma Schapiro Fund
National Fish and Wildlife Foundation
New York City Council
New York City Department of Environmental Protection
New York City Department of Parks & Recreation
New York City Department of Youth and Community Services
The New York City Environmental Fund
The New York City Environmental Fund of the Hudson River Foundation
The New York Community Trust
New York State Department of Environmental Conservation
New York State Department of Parks and Recreational, Recreational Trails Program
New York State Department of State/Environmental Protection Fund
New York State Department of State, Office of Coastal, Local Government & Community Sustainability, Title 11 funds of the Environmental Protection Fund
Norcross Wildlife Foundation
The Prospect Hill Foundation
Sarah K. de Coizart Article TENTH Perpetual Charitable Trust
U.S. Department of Environmental Protection
U.S. Small Business Administration

BUSINESSES
American Corporate Benefits
Bank of America
Bloomberg LP
Catskills Watershed Corporation
Con Edison
D'Arrigo Brothers Foods
Fidelis Care
Frost Lighting
Health First
Hunts Point Terminal Produce Cooperative Association
JP Morgan Chase
Krasdale Foods
Montefiore Medical Center
New York Power Authority

Patagonia
Sesame Workshop
Signature Bank
Sims Metal Management
Tryax Realty Management, Inc.
Verizon
Vista Food Exchange, Inc.

IN-KIND DONORS
George Acevedo
AriZona Beverages
Artie's Steak and Seafood
Ben & Jerry's
Big Box Production
Bronx River Art Center
Bronx Tourism Council
Brooklyn Brewery
Brotherhood Winery
D'Arrigo Brothers Foods
Down East Seafood
Drew Gardens/Phipps CDC
Eastern Mountain Sports
Fairway
Gustiamo, Inc.
Alix W. Hopkins
Hunts Point Terminal Produce Cooperative Association
Katrina Jeffries
Kettle Chips
Gail Nathan
Mike's Deli
New York Botanical Garden
New York Restoration Project
NYC Department of Environmental Protection
NYC Department of Parks and Recreation
Orange V Vodka
Paddler Magazine
Patagonia
The Point CDC
Rocking the Boat
TriServe Party Rentals
Vista Food Exchange
WFUV
Whole Foods
Wildlife Conservation Society

Appendix G: Demand Questionnaire

Rutgers the State University of New Jersey – Department of Geography

Giovani H. Graziosi – Ph. D. Dissertation Research
Information Use and Needs Assessment Questionnaire

Interviewer:
Today is (enter date___________). This interview is being conducted as part of my dissertation research and according to a human subject protocol approved by the Rutgers University Institutional Review Board (IRB protocol # 11-391).

Dear Participant: Thank you for agreeing to participate in this research. This questionnaire has been designed as an open-ended, semi-structured research instrument to help me understand the most important issues your organization faces regarding the use, needs and demands for geospatial and other public information for local environmental and community planning. I am particularly interested in using the Bronx County as a case study. Therefore, this questionnaire is focused on the communities of The Bronx, NY.

Questionnaire Sections:

This questionnaire has been organized into seven interrelated sections to understand how information is collected, used, and organized by your organization for local community and neighborhood environmental planning. In addition, it also contains questions about your organization's unmet demands for public geospatial and other attribute information.

The seven sections are:

1. Organization Information
2. Participant's Information
3. Information Usage Assessment
4. Information Gathering Assessment
5. Information Demand Assessment
6. Geospatial Information Extent Assessment
7. Additional Information

General Instructions:

Please provide as much information as possible and feel free to ask questions whenever necessary. The average time needed to complete this questionnaire is about 1 hour including reading all instructions as well as answering a set of structured and semi-structured, open-ended questions.

Interviewer:
This first section contains a series of general questions pertaining to your organization's type and contact information. It also contains some basic questions pertaining to your role within the organization and your employment information.

---

1. Organization Information:

Name: ____

Address: ____

Phone Number: ______________________ Website address: __________________________

Type: Community Based Organization ____ Community Development Corporation ____

Environmental Group ____ Neighborhood / Block Association ____ Another 501c (3) type ____

If another type, please specify: ______________________________________

# of offices in the Bronx: ____ # of offices in other boroughs: ______________________

Years in operation: ____ # of employees: ___ # of employees collecting/using local data: _____

---

2. Participant's Information:

Title: ____

Area of specialization: ______________________________________

In what areas of specialization have you received training? *(Please check all that apply)*

Community Planning ____ Environmental Planning ____ GIS ____ Library ____ Computing____

Other, *please specify:* ____

____

3. Information Usage Assessment:

Interviewer: In this section you will be asked a few questions about the type of information used by your organization on a regular basis to meet its main goals and objectives.

3.1 Does your organization use geospatial, environmental, and other public information about local communities to complete tasks associated with its main goals and objectives?

Yes ☐ No ☐

3.2 If NO, for what other purposes does your organization collect and use local community data?

____

____

____

3.3 How would you describe the general data flow and the functions performed by members of your information team to collect and use geospatial and other local attribute data?

		Gets data in from	***Sends data out to***
Policy	*Decision making*		
	Resource management		
	Public presentations		
	Other: _______________		
Management	*Information analysis*		
	Data management		
	Data distribution		
	Other: ______________		
Operations	*Data archival*		
	Data maintenance		
	Data gathering		
	Other: ______________		

**Based on William Huxhold's Information Management Model in An introduction to Geographic Information Systems (1991:14).*

3.4 Please describe how geospatial and other data are gathered, processed, and distributed within your organization to complete local planning tasks.

3.5 Please check all the planning activities for which you normally need to collect and use geospatial and other public information for local planning activities.

INVENTORY	1. Identify main issues		
	2. Identify stakeholders		
	3. Identify participatory tools		
	4. Create project timeline		
	5. Assemble draft plan		
	6. Determine data sources and availability		
	7. Assess data needs		
	8. Evaluate data fitness		
	9. Develop data gathering		
NEEDS ASSESSMENT	10. Identify data limitations		
	11. Evaluate legal, institutional, technical opportunities		
	12. Evaluate existing questionnaires		
STRATEGIC MANAGEMENT	13. Environmental Impact Statement		
	14. Social Impact Statement		
	15. Cost- Benefit analysis		
	16. Create knowledge matrices		
	17. Create negotiating advocacy tools		
IMPLEMENT MONITOR	18. Stakeholder identification		
	19. Assess plan functioning		
	20. Adaptive process		
	21. Reevaluate		

**Adapted from Randolph's Process for Environmental Planning (2004:19-20) in Environmental Land Use Planning and Management.*

3.6 Are there any other activities performed at your organization for data collection and management? If so, by whom?

3.7 What types of library resources does your organization utilize to obtain information about local neighborhoods in The Bronx, NY? Please use empty cells to enter additional information.

	Y/N	***Please specify***	***Please specify***
Scholarly Articles			
Newspapers			
Whitepapers			
Microforms			
Books			
Encyclopedias			
Blogs			
Websites			
Maps			
Attribute Data			
GIS Data			
Library/Museum Collections			
Environmental Impact Statements			
Other Governmental Reports / Plans			
Community Plans / Reports			
Community Newsletter/other			
Television Programs/News			
Sound Recordings			
Video/Film			
Oral Histories			
Other			

3.8 What other types of information resources does your organization use to gather information for local planning activities?

3.9 Please describe some of the tasks performed by other units within your organization to collect and use geospatial and other public information for planning activities.

3.10 Are there any additional processes you need to conduct to use data gathered for local planning? For example, importing/exporting, cleaning/fixing, projecting/reprojecting, appending coverages, extracting data records for specific neighborhood/community areas, etc.

3.11 What are some of the questions/problems you normally encounter when gathering, processing and using geospatial and other data for local community planning?

---

4. Information Gathering Assessment:

Interviewer: This section pertains to the way in which your organization searches and gathers information to complete local community and environmental planning projects.

4.1 Where do you normally search for information? Please specify and select all that apply.

- Online libraries____
- Federal Clearinghouse ___________________ Warehouse ___________________
- State Clearinghouse ____________________ Warehouse ___________________
- City Clearinghouse _____________________ Warehouse __________________
- Private data vendor ____
- GIS / network group ____
- Other Federal (e.g. USHUD, USEPA, USGS, etc.) ___________________________________

  ____
- Other State (e.g. NYS GIS Clearinghouse, Environmental Conservation, Health, labor, etc.)_

  ____
- Other City (e.g. NYCDEP, NYCDOITT, NYCDCP, NYC Department of Health, etc) __________

  ____

4.2 In general, how would you rate the results of your information searches?

	Very Useful	**Useful**	**Somewhat Useful**	**Not Useful**	**Disappointing**
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					

Other (Google, etc,)					
Other sources					

4.3 Please indicate the types of data used by your organization and whether they are available online or through special request.

Public Access	***Type****	***Special Request***
	• Administrative Boundaries	
	• Agriculture	
	• Atmosphere	
	• Biology	
	• Business	
	• Cadastral (parcels)	
	• Demographic	
	• Elevation	
	• Environment	
	• Geology	
	• Health	
	• Imagery /Base Maps	
	• Inland Water	
	• Locations	
	• Oceans	
	• Transportation	
	• Utilities	

**These types correspond to Federal Geospatial Data Committee metadata keyword thesaurus.*

4.4 What other types of information does your organization use to conduct local community and /or environmental planning activities? Please specify. Or list any questions you may have.

____

____

____

____

5. Information Demand Assessment:

5.1 Did your organization ever need to make any special requests for datasets from a federal, state, or local agency that were unavailable online?

Yes ☐ No ☐

If Yes, please go to 52. If NO, please go to 5.4

5.2 Did you submit any of the following requests to obtain the information?

Letter / Email	
Freedom of Information Law	
Freedom of Information Act	
Phone Call	
Other (personal, etc.)	
Other	

5.3 Please describe the outcomes of your request.

____

____

____

5.4 How would you rate the usability of the data you obtain from the following resources? *[Please specify whether data were obtained through normal searches or special request]*

	Very Useful	**Useful**	**Somewhat Useful**	**Not Useful**	**Disappointing**
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					
Other (Google, etc,)					
Other					

5.5 Were these datasets provided with their accompanying metadata documentation?

Yes ☐ No ☐

If NO, please go to 5.7

5.6 If *YES*, did you find the metadata information well structured and easy to understand to use the data?

Yes ☐ No ☐

5.7 Whether you answered YES or NOT above, please indicate how you would improve the usability of the datasets you normally gather or need for local community planning?

____

____

____

____

6. Geospatial Information Extent Assessment:

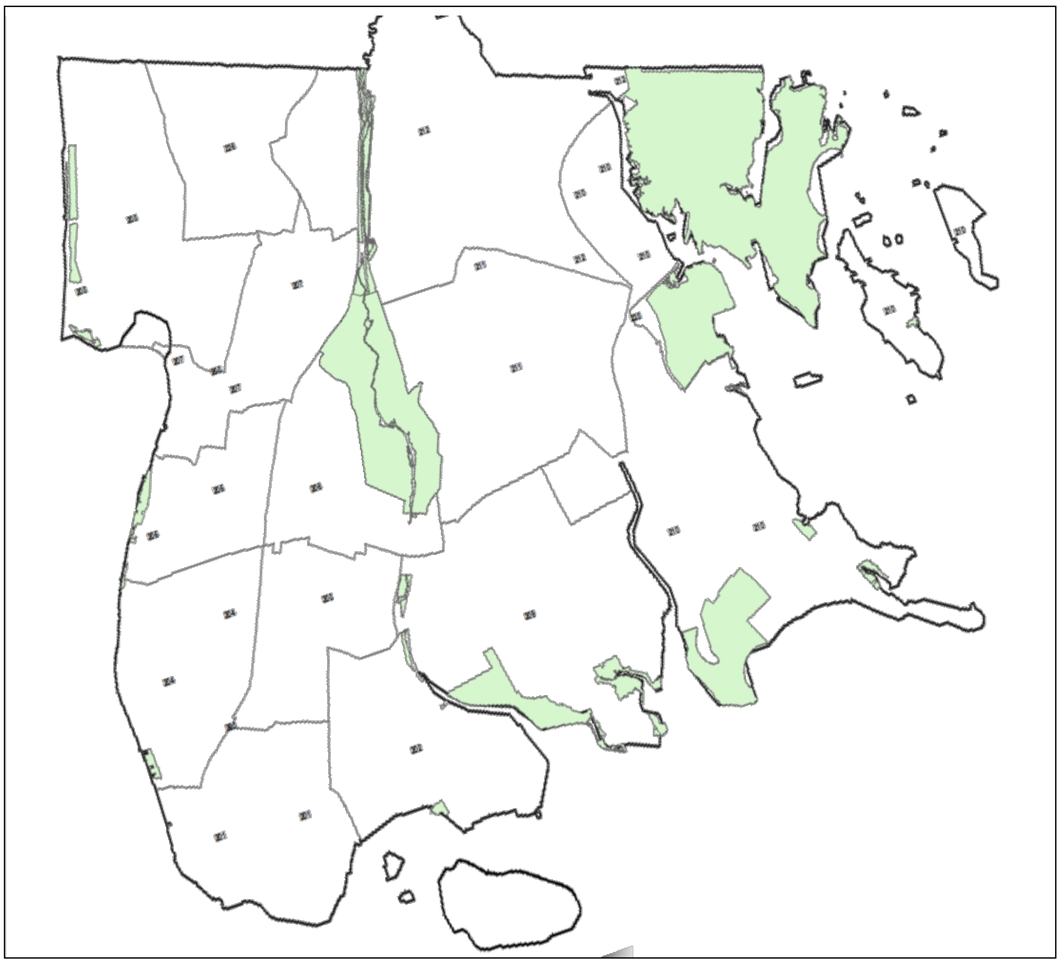
Interviewer:
Questions in this section pertain to the geographic extent of the datasets your organization normally use for environmental planning and to meet its main goals and objectives.

6.1 At what levels does your organization gather and use geospatial and other environmental information to conduct planning activities? (Please *check all that apply*)

Street, block/lot and parcel level	
Neighborhood	
Community District	
Borough or County	
Citywide	
Statewide	
National level	
Special Area	
Other (i.e. zip code)	

6.2 If NEIGHBORHOOD, for what specific neighborhood areas does your organization gather or need geospatial and other information to conduct local planning? (Please see list of neighborhood names on the following page)

6.3 In the map below, please indicate the general location and extent of the areas where your organization operates. *This map shows Community District boundaries for orientation purposes.*



6.4 Please enter any additional information or questions you consider important for local community and environmental planning within these areas.

6.5. Please check ALL the neighborhoods where your organization operates (or has operated).

West Bronx

	Bedford Park
	Belmont-Arthur Avenue
	Fieldston
	Hudson Hill
	Kingsbridge
	Kingsbridge Heights
	Marble Hill
	Morris Heights
	Mount Hope
	North New York
	North Riverdale
	Norwood
	Port Morris
	Riverdale
	Spuyten Duyvil
	University Heights
	Van Cortlandt Village
	West Farms
	Woodlawn
	Other

South Bronx

	Claremont
	Concourse
	East Morrisania
	East Tremont
	Fordham
	Fort Apache
	Highbridge
	Hunts Point
	Longwood
	Melrose
	Morris Heights
	Morrisania
	Mott Haven
	Mount Eden
	North New York
	Port Morris
	The Hub
	Tremont / East Tremont
	University Heights
	West Farms
	Other

East Bronx

	Allerton
	Baychester
	Castle Hill
	City Island
	Clason Point
	Co-op City
	Country Club
	Eastchester
	Edenwald
	Edgewater Park
	Locust Point
	Morris Park
	Olinville
	Parkchester
	Pelham Bay
	Pelham Gardens
	Pelham Parkway
	Schuylerville
	Soundview
	Throgs Neck
	Unionport
	Van Nest
	Wakefield
	Williamsbridge
	Westchester Square
	Other

**This list of neighborhoods contains information from two primary sources: Wikipedia.org and New York City Department of City Planning Neighborhood Centroids GIS point file. It may exclude the names of certain small defunct neighborhood areas.*
The above regional grouping is used here for organizational purposes only.

6.6 Please check all the different sources from which your organization normally gathers geospatial and other information for local planning?

	Public Sources		***Private Vendors***		***Online Sources***
	US Census Bureau		Maponics		Google Maps
	USEPA		Zillow		Google Earth
	USHUD		ESRI		Bing Maps
	USGS		GDT		Yahoo Maps
	NY State		NAVTEQ		Wikimapia / Wikipedia
	NYS DEC		Sanborn Mapping		
	NYC DCP		Other:		Other:
	NYC DEP				
	Other:				

7. Additional Information.

Please enter any additional information, ideas suggestions, and/or questions you consider important to improve the collection, use, and analysis of information for local community and environmental planning.

____

____

____

____

____

____

____

____

Thank you for your participation.

ACRONYMS:

US Census Bureau	
USEPA	US Environmental Protection Agency
USHUD	US Housing and Urban Development
USGS	US Geological Survey
NYS	New York State
NYS DEC	NYS Department of environmental Conservation
NYC	New York City
NYC DCP	NYC Department of City Planning
NYC DEP	NYC Department of Environmental Protection
NYCDOITT	NYC Department of Information Technology and Telecommunications
Maponics	
Zillow	
ESRI	Environmental Systems Research Institute
GDT	Geographic Data Technology
NAVTEQ	

Appendix H: Details from Supply Case Studies

List of Federal Library Depositories from the Federal Library Depository Program (FLDP).

http://catalog.gpo.gov/fdlpdir/FDLPdir.jsp Accessed 20110609.

Depository Library Number	Parent Institution of Library	Library Name	Street Address:	City	Zip Code:	State:
416	SUNY, Maritime College	Stephen B. Luce Library	6 Pennyfield Avenue, Fort Schuyler	Bronx	10465	New York
414	Fordham University	Walsh Family Library	441 East Fordham Road	Bronx	10458	New York
0390C	Herbert H. Lehman College/CUNY	Leonard Lief Library	250 Bedford Park Boulevard West	Bronx	10468	New York
398	Brooklyn Public Library	Central Library	Grand Army Plaza	Brooklyn	11238	New York
397	Brooklyn College	Brooklyn College Library	2900 Bedford Avenue	Brooklyn	11210	New York
403	Brooklyn Public Library	Business Library	280 Cadman Plaza West	Brooklyn	11201	New York
0396B	Brooklyn Law School	Library	250 Joralemon Street	Brooklyn	11201	New York
435	Queens College/CUNY	Benjamin S. Rosenthal Library	65-30 Kissena Boulevard	Flushing	11367	New York
413	CUNY School of Law at Queens College	CUNY Law School Library	65-21 Main Street	Flushing	11367	New York
0390A	Adelphi University	Swirbul Library	1 South Avenue	Garden City	11530	New York
0409A	LaGuardia Community College/CUNY	Library Media Resources Center	31-10 Thomson Avenue	Long Island City	11101	New York
0390B	New York University	Elmer Holmes Bobst Library	70 Washington Square South	New York	10012	New York
405	Cooper Union for the Advancement of	Science & Art/Library	7 East 7th Street	New York	10003	New York
0411A	Yeshiva University	Chutick Law Library	55 5th Avenue	New York	10003	New York
410	Columbia University	Lehman Library	420 West 118th Street	New York	10027	New York
390	New York University	School of Law Library	40 Washington Square South	New York	10012	New York
0410A	Yeshiva University	Pollack Library	2520 Amsterdam	New York	10033	New York

			Avenue			
408	New York Public Library	Astor Branch/Science, Industry and Business	188 Madison Avenue	New York	10016	New York
0426A	New York Law School	Mendik Library	185 West Broadway	New York	10013	New York
412	The City College of New York/CUNY	Cohen Library	160 Convent Avenue	New York	10031	New York
0428A	Fordham University School of Law	Leo T. Kissam Memorial Library	140 West 62nd Street	New York	10023	New York
402		New York Law Institute	120 Broadway	New York	10271	New York
0402A	St. John's University - Manhattan	Kathryn & Shelby Cullom Davis Library	101 Murray Stree	New York	10007	New York
0408A	New York Public Library	Lenox Branch/Science, Industry and Business	188 Madison Avenue	New York	10016	New York
401	Saint John's University	St. Augustine Hall	8000 Utopia Parkway	Queens	11439	New York

5.4.2 City University of New York Libraries

Name	College
• William and Anita M. Newman Library	Bernard M. Baruch College
• A. Philip Randolph Memorial Library	Borough of Manhattan Community College
• Bronx Community College Library	Bronx Community College
• Brooklyn College Library	Brooklyn College
• Morris R. Cohen Library	City College of New York
• College of Staten Island Library	The College of Staten Island
• Mina Rees Library	CUNY Graduate Center
• Graduate School of Journalism -	Research Center
• Hostos Community College Library	Hostos Community College
• Jacqueline Grennan Wexler Library	Hunter College
• Hunter Health Professions Library (HPL)	Brookdale Campus
• Hunter College School of Social Work Library	Hunter College
• The Judith and Stanley Zabar Art Library	Hunter College
• Lloyd George Sealy Library	John Jay College of Criminal Justice
• Robert J. Kibbee Library	Kingsborough Community College
• LaGuardia Community College Library	Fiorello H. LaGuardia Community College
• CUNY School of Law Library	CUNY School of Law at Queens College
• Lehman College - Leonard Lief Library	Lehman College
• The Charles Evans Inniss Memorial Library	Medgar Evers College
• Ursula C. Schwerin Library	New York City College of Technology
• Queens College Library	Queens College
• Kurt R. Schmeller Library	Queensborough Community College
• York College Library	York College

GLOSSARY NYC Dept of Records

FROM: http://www.nyc.gov/html/records/pdf/records_retention_manual2007.pdf

http://www.nyc.gov/html/records/pdf/records_retention_manual2007.pdf

ACCESSION

1. The removal of records from a custodial or creating office for archival purposes after the records' retention period has expired
2. A body of records moved from one agency to another.

ACTIVE RECORDS

Records that must be retained in the office because frequent reference is necessary for conducting day-to-day operations. These records are usually accessed more than once per file drawer per month.

ARCHIVES

1. Permanent records, generally of historical or research value, that have been created or received by a City office for its official purposes. These records can be in any form (i.e., microfilm, electronic record, photograph, etc.) and are part of an agency's official documentation.
2. An agency, such as the Municipal Archives, which preserves, processes, and makes available such records
3. The building where such records are kept.

ARCHIVIST

1. The Commissioner of the Department of Records and Information Services, who serves the Mayor's Office and administers and operates the Municipal Archives.
2. The Director of the Municipal Archives.
3. The Staff of the Municipal Archives.

CLOSED FILE

A file on which there is to be no more action and is considered complete, with no more records to be added; usually part of a series

CURRENT

As a records management term, used as the retention period for a series, and can mean one of two things, contingent on the type of file referenced:

1. For files with revised or reissued contents, **current** means that only the most recent version should be retained, i.e., Administrative Procedures files.
2. For files such as indices, inventories, or inspection cards, **current** indicates that file contents should be updated and/or added to continually, removing materials when they are no longer relevant, i.e., discontinued equipment removed from an equipment index.

CUSTODY

Maintenance and supervision of records by an agency, its successor agency, records center, or archive.

CUT OFF

A record series is cut off when a file is closed out and a new file of the same record series is immediately established. Cut off procedures, or file breaks, are in place to control record accumulations, prevent the growth of records into unwieldy collections, and to ease the economical transfer or disposal of records in blocks or file units. This insures the integrity of the entire record series. For example:

1. Calendar year: Records kept on a calendar year basis, such as correspondence, are cut off December 31, with a new file established January 1.
2. Fiscal year: Records kept on a fiscal year basis, such as accounting records, are cut off on June 30, with new files established July 1.

DISPOSITION

1. Destruction of records.
2. Retirement of records to an archive facility.
3. Transfer of records from one City agency to another.

FILE BREAKS

See **CUT OFF**

FILES CUSTODIAN

See **RECORDKEEPER**

NON-RECORD MATERIAL

Any materials not meeting the requirements for "record," including stocks of publications, issuances, library materials, duplicate copies of records materials, processed or published materials, catalogues, trade journals, and transitory materials such as drafts, informal notes, and routing slips. Non-record material should be disposed of when no longer needed.

PURGING

Removing pieces from a group of records, such as individual documents or folders, usually to permit disposal of parts of the file and retention of the rest; also known as **weeding**.

RECORD MATERIAL

See **OFFICIAL FILES**.

RECORD SERIES

Records accumulated over time and organized into a file or set of files which can be described, handled, and disposed of as a unit; can consist of records of a single type or format, or of records kept together because they relate to a particular subject or are connected to one activity. The physical form of records does not have to be consistent in a record series and the files can be arranged chronologically, alphabetically, numerically, coded, or any combination of filing arrangements. A series may, at any one time, consist of a single folder or any amount of files. Each record series must be specifically defined and shall include only records with the same retention period.

RECORDKEEPER

The individual in an office or agency who is responsible for establishing, maintaining, and operating files stations.

RECORDS

Any record, regardless of physical form or characteristic, that has been made, received, filed, or recorded in pursuance of law or in connection with the transaction of public business, whether or not confidential or restricted in use; includes electronic and digital records, but does not include:

1. Library and museum materials made or acquired and preserved solely for reference or exhibition purposes;
2. Extra copies of a document maintained for easy reference;
3. A stock of publications.

RECORDS RETENTION SCHEDULE

Comprehensive listing and description of records maintained by an agency which indicates all legally authorized action to be taken in relation to their retention and disposition. Provides for the periodic retirement of records to the Municipal Records Center, as well as the terms of their final disposition or retention.

RETENTION PERIOD

The length of time records must be maintained, as specified in an agency's records retention schedule. Records are retained in the agency's offices for a specified period of time and thereafter, until their retention period has expired, in the Municipal Records Center.

RETIREMENT

The transfer of inactive records to the Municipal Records Center or other authorized depositories.

SCHEDULE ITEM

A separately identifiable file or record series included in a disposition/retention schedule.

SCHEDULE NUMBER

Control number assigned to each record series in the disposition/retention schedule.

SCHEDULED RECORDS

Records for which retention periods and disposition authority have been established.

SHELF LIST

List of records, by item or series, arranged in the order they are transferred to the storage center and arranged there on shelves or stacks.

WEEDING purging

Appendix I: Supply Questionnaire

Rutgers the State University of New Jersey – Department of Geography

Giovani H. Graziosi – Ph. D. Dissertation Research

Information Supply and Assessment Questionnaire

Interviewer:
Today is (enter date___________). This interview is being conducted as part of my dissertation research and according to a human subject protocol approved by the Rutgers University Institutional Review Board (IRB protocol # 11-391).

Dear Participant: Thank you for agreeing to participate in this research. This questionnaire has been designed as an open-ended, semi-structured research instrument to help me understand the most important issues your library faces regarding the availability and dissemination of information about resources requested by users for local environmental and community planning. I am particularly interested in using the Bronx County as a case study. Therefore, this questionnaire is focused on the supply of information and other resources about the communities of The Bronx, NY.

Questionnaire Sections:

This questionnaire has been organized into seven interrelated sections to understand how information is collected, organized, and disseminated by your organization for public access. In addition, it also contains a series of general questions about your library's organizations and your role within the library.

The seven sections are:

1. Organization Information
2. Participant's Information
3. Information Production
4. Information /Resource Access
5. Information Demand Assessment
6. Geospatial Information Extent Assessment
7. Additional Information

General Instructions:

Please provide as much information as possible and feel free to ask questions whenever necessary. The average time needed to complete this questionnaire is about 1 hour including reading all instructions as well as answering a set of structured and open-ended questions.

---

1. Organization Information:

Library Name: ____

Address: ____

Phone Number: ____

Library Type: Public ____ Private ____ Educational ____ Commercial ____

Data Library ____ Digital Library____ Archive and Records ____ Other ____

If another type, please specify: ______________________________

Library Website address: ______________________________________

Number of Units: _____ Number of Employees: ____ Number of Special Collections: _____

Special Collections about The Bronx: ______________________________

____

____

____

---

2. Participant's Information:

Your Title: ____

Area of specialization: ______________________________________

In what areas of specialization have you received formal training? *(Please check all that apply)*

Environmental Planning ____ GIS/Geospatial ___ Library ____ Computing _____

Other ____ *(please specify)*

3. Information Production

Interviewer:
This section contains questions pertaining to the type of information regularly maintained and/or produced by your library.

3.1 Is your library involved in the production and/or archiving of information and /or other resources, such as special collections, useful for community planning in The Bronx, NY?

Yes ☐ No ☐ *If YES, please continue to 3.3*

3.2 If NO, how does your library handle inquiries about availability of geospatial and other public information from users about the local communities of The Bronx?

____

____

____

3.3 Please check all the resources available to users through your library:

	Y/N	***Please specify***
Scholarly Articles		
Newspapers		
Whitepapers		
Microforms		
Books		
Encyclopedias		
Blogs		
Websites		
Maps		
Attribute Data		
GIS Data		
Library/Museum Collections		
Environmental Impact Statements		
Government Documents (federal, State, local)		
Community Plans / Reports		
Community Newsletter/other		
Television Programs/News		
Sound Recordings		
Video/Film		
Oral Histories		
Other		

3.4 Please list and describe any special collections or subscriptions to outside database vendors available for users to search for local geospatial and other information about The Bronx.

3.5 What types of resources does your library hold in its Special Collections or finds for users conducting research about the local neighborhoods of The Bronx, NY?

	Y/N	***Special Collections***	***Outside Sources***
Scholarly Articles			
Newspapers			
Whitepapers			
Microforms			
Books			
Encyclopedias			
Blogs			
Websites			
Maps			
Attribute Data			
GIS Data			
Library/Museum Collections			
Environmental Impact Statements			
Other Governmental Reports / Plans			
Community Plans / Reports			
Community Newsletter/other			
Television Programs/News			
Sound Recordings			
Video/Film			
Oral Histories			
Other			

3.6 What other types of information/resources does your library have or provide access for users to answer questions about the communities of Bronx County and its environment?

3.7 Please describe any data digitalization projects conducted by your library to create metadata or other informational records for resources about The Bronx.

3.8 Does your library assign geographic boundary coordinates information (such as minimum bounding box coordinates) to these resources' metadata?

Yes ☐ No ☐

If NO, How do users search for information? (i.e. thematically, keyword search, etc.

3.9 What other units or departments are currently conducting studies whereby geospatial data or georeferenced resources are being produced within your organization?

3.10 What are some of the main geographic sources used by your library to georeference information and other resources? (i.e. maps, encyclopedias, GIS layers, GPS waypoints, etc.)

3.11 Please list all the metadata standards used by your library or institution to georeference information and other resources. (FGDC, ISO19115, Dublin Core, MARC21, etc.)

4. Information/Resource Access

4.1 Please indicate the types of data, information, and/or resources* users most frequently request to study neighborhoods or other local communities throughout The Bronx.

Type*	
• Administrative Boundaries	
• Agriculture	
• Atmosphere	
• Biology	
• Business	
• Cadastral (parcels)	
• Demographic	
• Elevation	
• Environment	
• Geology	
• Health	
• Imagery /Base Maps	
• Inland Water	
• Locations	
• Oceans	
• Transportation	
• Utilities	

**These types correspond to Federal Geospatial Data Committee metadata keyword thesaurus.*

4.2 What other information and resources does your library provide access or knowledge to users conducting research about the communities of The Bronx? *Please specify*.

4.3 How would you generally rate the usability of the following sources to find information for library users? *[Please check all that apply].*

	Very Useful	**Useful**	**Somewhat Useful**	**Not Useful**	**Disappointing**
Online Library					
Federal Clearinghouse/Warehouse					
State Clearinghouse/Warehouse					
City Clearinghouse/Warehouse					
Private Data Vendor					
GIS Network Group					
Other (Google, etc,)					
Other					
Other					

4.4 Please describe any issues or questions you may have about the resources listed above. (i.e. usage, availability, location, providers, etc.)

5. Information Demand Assesement

5.1 Please check all the resources for which your library would normally need to request information not accessible to users.

	Y/N	***Please specify***

Scholarly Articles		
Newspapers		
Whitepapers		
Microforms		
Books		
Encyclopedias		
Blogs		
Websites		
Maps		
Attribute Data		
GIS Data		
Library/Museum Collections		
Environmental Impact Statements		
Government Documents (federal, State, local)		
Community Plans / Reports		
Community Newsletter/other		
Television Programs/News		
Sound Recordings		
Video/Film		
Oral Histories		
Other		

5.2 Did your organization ever need to make any special requests for information, datasets, or any other resources from a federal, state, or local agency that were unavailable for users?

Yes ☐ No ☐

If Yes, please go to 5.3. If NO, please go to 5.4

5.3 Did you submit any of the following requests to obtain information about or copy of the requested resources?

Letter / Email	

Freedom of Information Law	
Freedom of Information Act	
Phone Call	
Other (personal, etc.)	
Other	

5.3.1 Please describe the outcomes of your request.

5.4 How would you improve the general access to library resources to satisfy users' demands for information and/or resources not generally available for local community planning?

6. Geospatial Information Extent

Interviewer:
Questions in this section pertain to the geographic extent of the datasets, information, and resources users most frequently request from your library.

6.1 At what geographic levels do users request information from your library to conduct local planning activities? (Please *check all that apply*)

Street, block/lot and parcel level	
Neighborhood	
Community District	
Borough or County	
Citywide	
Statewide	
Special Area	
Other (i.e. zip code)	

6.2 If NEIGHBORHOOD, for what specific neighborhoods does your organization have or provide access to geospatial information and other resources? (see page 10 for list of neighborhoods)

____

____

____

____

____

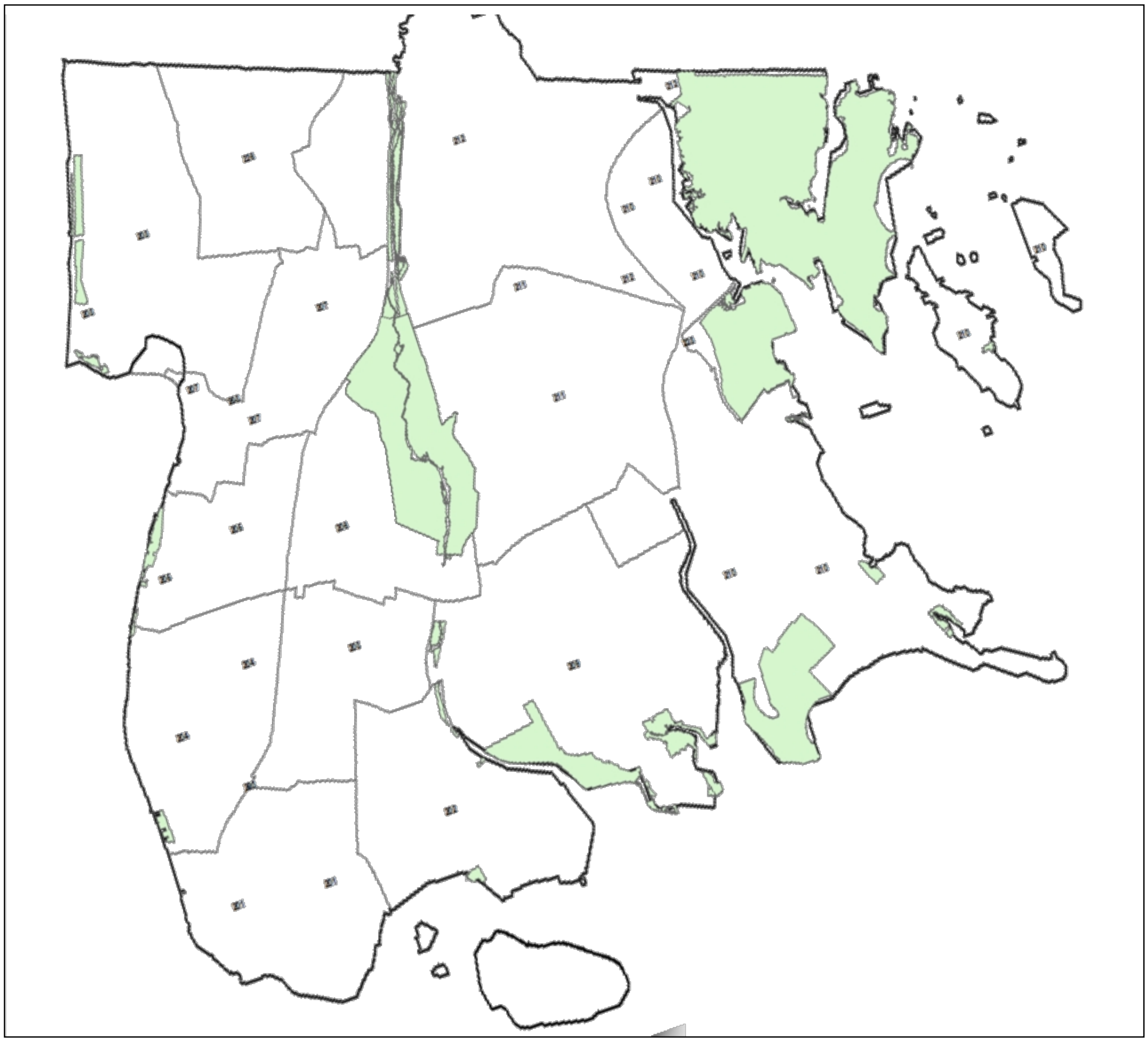
6.3 If Community District, for what specific districts does your organization have or provide access to geospatial information and other resources? (Bronx Community Districts are 1-12)

____

____

____

6.4 In the map below, please indicate the general geographic location of the areas for which your library maintains or produces information. *This map shows Community District boundary lines to help you locate your study areas.*



6.5 Please feel free to indicate specific areas or borough wide studies requested by users.

____

____

____

____

____

6.6 Please check ALL the neighborhoods or general areas for which your library has information or other informational resources.

West Bronx

	Bedford Park
	Belmont-Arthur Avenue
	Fieldston
	Hudson Hill
	Kingsbridge
	Kingsbridge Heights
	Marble Hill
	Morris Heights
	Mount Hope
	North New York
	North Riverdale
	Norwood
	Port Morris
	Riverdale
	Spuyten Duyvil
	University Heights
	Van Cortlandt Village
	West Farms
	Woodlawn
	Other

South Bronx

	Claremont
	Concourse
	East Morrisania
	East Tremont
	Fordham
	Fort Apache
	High Bridge
	Hunts Point
	Longwood
	Melrose
	Morris Heights
	Morrisania
	Mott Haven
	Mount Eden
	North New York
	Port Morris
	The Hub
	Tremont / East Tremont
	University Heights
	West Farms
	Other

East Bronx

	Allerton
	Baychester
	Castle Hill
	City Island
	Clason Point
	Co-op City
	Country Club
	Eastchester
	Edenwald
	Edgewater Park
	Locust Point
	Morris Park
	Olinville
	Parkchester
	Pelham Bay
	Pelham Gardens
	Pelham Parkway
	Schuylerville
	Soundview
	Throgs Neck
	Unionport
	Van Nest
	Wakefield
	Williamsbridge
	Westchester Square
	Other

**This list of neighborhoods contains information from two primary sources: Wikipedia.org and the New York City Department of City Planning Neighborhood Centroids GIS point file. It may exclude the names of certain small defunct neighborhood areas.*
The above regional grouping is used here for organizational purposes only.

6.7 Please check all the different sources your library normally uses or recommends for users to obtain geospatial and other information for local community planning?

Public Sources

	US Census Bureau
	USEPA
	USHUD
	USGS
	NY State
	NYS DEC
	NYC DCP
	NYC DEP
	Other:

Private Vendors

	Maponics
	Zillow
	ESRI
	GDT
	NAVTEQ
	Sanborn Mapping
	Other:

Online Sources

	Google Maps
	Google Earth
	Bing Maps
	Yahoo Maps
	Wikimapia / Wikipedia
	Other:

7. Additional Information. *Please enter any other information you consider important to improve the availability and dissemination of geospatial information and other library resources for local environmental and neighborhood planning.*

____

____

____

____

____

____

____

Thank you.

ACRONYMS:

US Census Bureau	
USEPA	US Environmental Protection Agency
USHUD	US Housing and Urban Development
USGS	US Geological Survey
NYS	New York State
NYS DEC	NYS Department of environmental Conservation
NYC	New York City
NYC DCP	NYC Department of City Planning
NYC DEP	NYC Department of Environmental Protection
NYCDOITT	NYC Department of Information Technology and Telecommunications
Maponics	
Zillow	
ESRI	Environmental Systems Research Institute
GDT	Geographic Data Technology
NAVTEQ	

Appendix J: ISO Metadata Theme Keyword Categories.

Code	*ISO Name*	*Definition*	*Examples*
001	***farming***	rearing of animals and/or cultivation of plants	e.g., agriculture, crops, livestock
002	***biota***	flora and/or fauna in natural environments	e.g., flora and fauna, ecology, wetlands, habitat
003	***boundaries***	legal land descriptions	e.g., political and administrative boundaries
004	***climatologyMeteorologyAtmosphere***	processes and phenomena of the atmosphere	e.g., processes and phenomena of the atmosphere
005	***economy***	economic activities, conditions, and employment	e.g., business and economics
006	***elevation***	height above or below the earth's surface	e.g., altitude, bathymetry, dem's, slope, derived products
007	***environment***	environmental resources, protection, and conservation	e.g., natural resources, pollution, impact assessment, monitoring, land analysis
008	***geoscientificInformation***	information pertaining to the earth sciences	e.g., geology, minerals, earthquakes, landslides, volcanoes, soils, gravity, permafrost, hydrogeology, erosion
009	***health***	health, health services, human ecology, and safety	e.g., disease, illness, factors affecting health, hygiene, substance abuse
010	***imageryBaseMapsEarthCover***	base maps	e.g., land cover, topographic maps, imagery, annotations
011	***intelligenceMilitary***	military bases, structures, activities	e.g., military bases, structures, activities
012	***inlandWaters***	inland water features, drainage systems and characteristics	e.g., rivers, glaciers, lakes, water use plans, dams, currents, floods, water quality, hydrographic charts

013	***location***	positional information and services	e.g., addresses, geodetic networks, control points, postal zones, place names
014	***oceans***	features and characteristics of salt water bodies	e.g., tides, tidal waves, coastal information, reefs
015	***planningCadastre***	information used for appropriate actions for future use of the land	e.g., land use maps, zoning maps, cadastral surveys, land ownership
016	***society***	characteristics of society and culture	e.g., anthropology, archaeology, religion, demographics, crime and justice
017	***structure***	man-made construction	e.g., architecture, buildings, museums, churches, factories, housing, monuments, shops, towers
018	***transportation***	means and aids for conveying persons and/or goods	e.g., roads, airports, airstrips, shipping routes, tunnels, nautical charts, vehicle and vessel, locations, aeronautical charts, railways, trails
019	***utilitiesCommunication***	energy, water and waste systems, and communications infrastructure	e.g., hydroelectricity, geothermal, solar, and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electrical and gas distribution, data communication, communication, telecommunication, radio, communication networks

FROM http://www.fgdc.gov/metadata/documents/MetadataQuickGuide.pdf

Appendix K: GeoDNA Geodatabase Specifications

GeoDNA Geodatabase Specifications are as follows[1]:

Spatial Reference Information:
- Horizontal Coordinate System Definition:
  - Planar:
    - Map Projection:
      - Map Projection Name: Lambert Conformal Conic
      - Lambert Conformal Conic:
        - Standard Parallel: 40.666667
        - Standard Parallel: 41.033333
        - Longitude of Central Meridian: -74.000000
        - Latitude of Projection Origin: 40.166667
        - False Easting: 984250.000000
        - False Northing: 0.000000
    - Planar Coordinate Information:
      - Planar Coordinate Encoding Method: coordinate pair
      - Coordinate Representation:
        - Abscissa Resolution: 0.000256
        - Ordinate Resolution: 0.000256
      - Planar Distance Units: survey feet
  - Geodetic Model:
    - Horizontal Datum Name: North American Datum of 1983
    - Ellipsoid Name: Geodetic Reference System 80
    - Semi-major Axis: 6378137.000000
    - Denominator of Flattening Ratio: 298.257222

Spatial Domain:
- Bounding Coordinates:
  - West Bounding Coordinate: -74.257465
  - East Bounding Coordinate: -73.699450
  - North Bounding Coordinate: 40.915808
  - South Bounding Coordinate: 40.495805

[1] *From: http://www.nyc.gov/html/dcp/html/bytes/meta_dis_nyborough.shtml*

Appendix L: Data Sources

Federal:

National Hydrography Dataset http://nhd.usgs.gov/data.html available through the USGS Data Viewer at http://nhd.usgs.gov/data.html

USEPA Ecoregions. http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm

Zip Code Tabulation Areas. US Census of Housing and Population. US Census Bureau, Department of Commerce

State:

LinearHydrography. New York State Office of Cyber Security (OCS). Albany, NY. Online Linkage:http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=928

DEC Transportation Files

Roads and Trails

http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=1167

Metropolitan Planning Organizations (MPO) Boundaries

Simplified NYS Streets for Labeling File

NYS Thruway Park and Ride Lots

Other -Transportation files

http://spatialityblog.com/2010/05/06/mta-data-in-gis-format/ Steve Romalewski CUNY Graduate Center,

- Long Island Bus
- LIRR
- Metro North
- NYCT Bus
- NYCT Subway
- Bus Company stops

City:

Bytes of the Big Apple. New York City Department of City Planning.
http://www.nyc.gov/html/dcp/html/bytes/applbyte.shtml

New York City, State Assembly Districts

New York City Council Districts

New York State Senate Districts

U.S. Congressional Districts

New York City Election Districts

New York City Municipal Court Districts

Borough Boundaries

Borough Boundaries Including Water Area

Community Districts

Neighborhood Projection Areas

School Districts

Fire Companies

Fire Battalions

Fire Divisions

Police Precincts

Health Center Districts

Health Areas

Census Tracts

Coastal Boundary

FRESH Zoning Boundaries

Appendix M: Administrative GeoDNA Strand

Board of Elections in the City of New York

Information | Voters | Candidates | Poll Workers

New York City Political District Maps

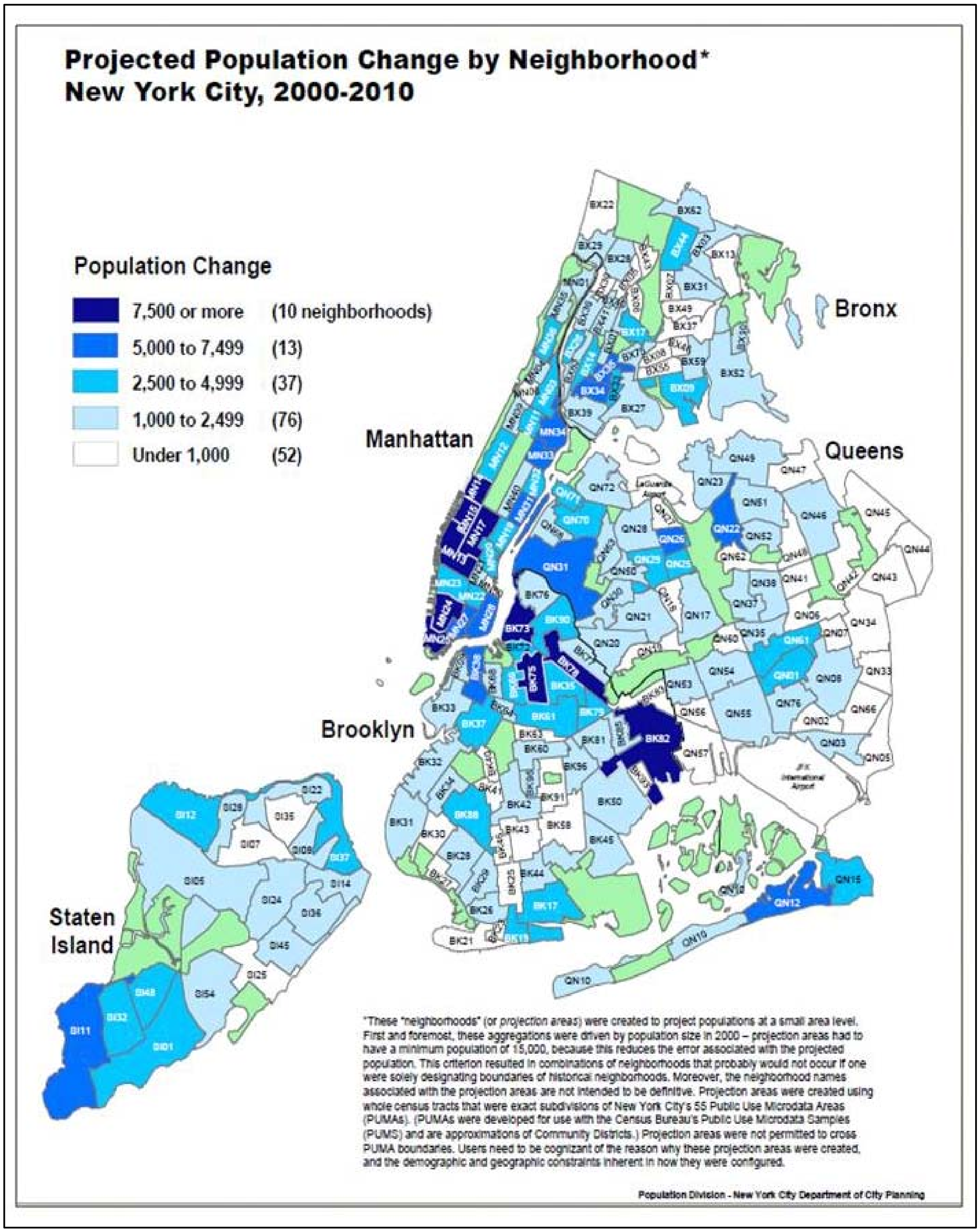
(Click on District Number to Display Map)

	New York	Bronx	Kings	Queens	Richmond
Congress	08 12 14 15	07 15 16 17	08 09 10 11 12 13	05 06 07 09 12 14 15	13
Senate	25 26 28 29 30 31	28 31 32 33 34 36	17 18 19 20 21 22 23 25 27	10 11 12 13 14 15 16	23 24
Assembly	64 65 66 67 68 69 70 71 72 73 74 75	76 77 78 79 80 81 82 83 84 85 86	40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	60 61 62 63
Council	01 02 03 04 05 06 07 08 09 10	08 11 12 13 14 15 16 17 18 22	33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 50	19 20 21 22 23 24 25 26 27 28 29 30 31 32 34	49 50 51
Municipal Court	01 02 03 04 05 06 07 08 09 10	01 02	01 02 03 04 05 06 07 08	01 02 03 04 05 06	01 02

From: http://vote.nyc.ny.us/maps.html

Appendix N: Neighborhood Geographies

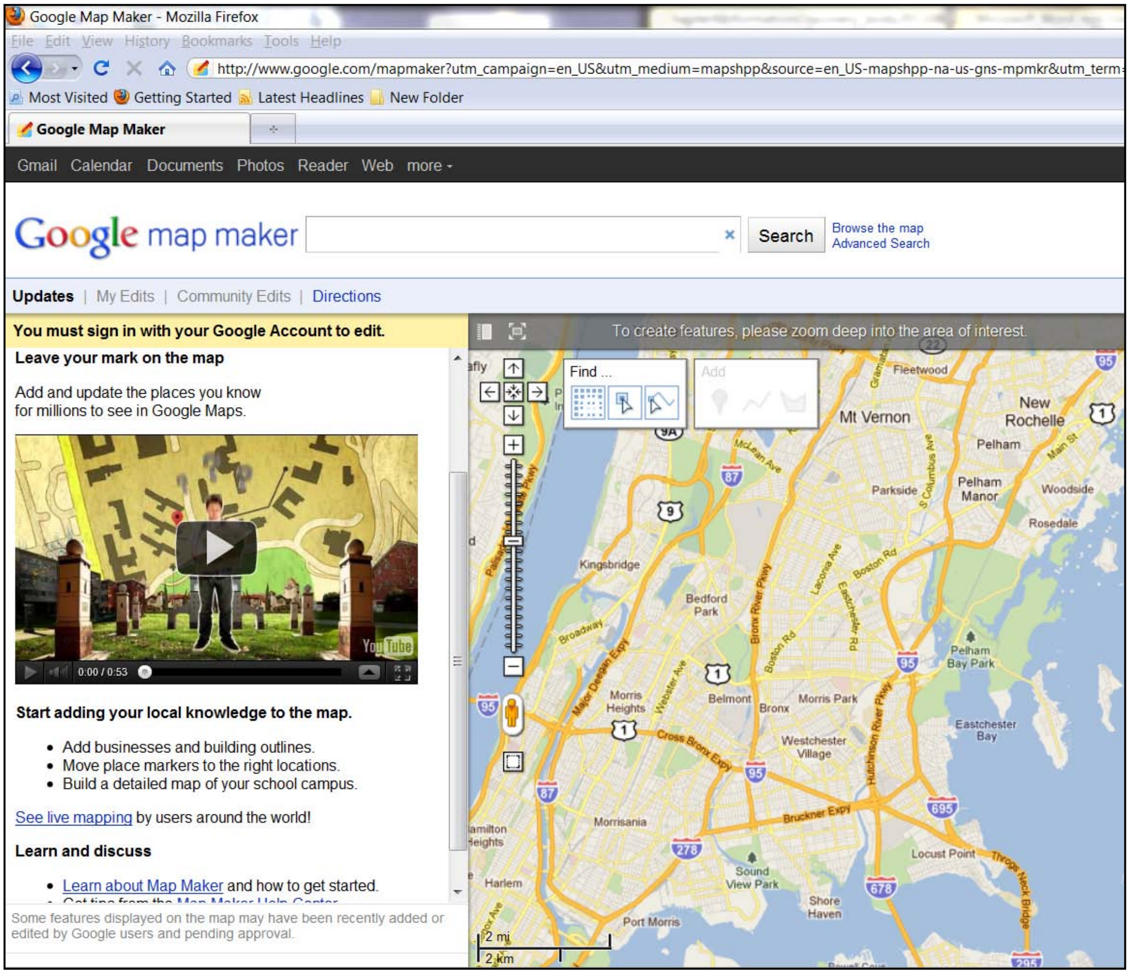
1- The New York City Department of City Planning Neighborhood Projection Areas. This boundary file was created to project population for small areas throughout the city.



2- NYCDCP Neighborhood Projection Areas and Codes

Code	Name	Latitude	Longitude
BX35	Morrisania - Melrose	40.8275471701	-73.9022327000
BX46	Parkchester	40.8377026755	-73.8580166290
BX99	park_cemetery_etc_BX	40.8707742774	-73.8517729963
BX39	Mott Haven - Port Morris	40.8088180051	-73.9174791245
BX08	West Farms - Bronx River	40.8341540372	-73.8723153928
BX40	Fordham South	40.8581551961	-73.8995359348
BX28	Van Cortlandt Village	40.8763837473	-73.8956623635
BX62	Woodlawn - Wakefield	40.8979316947	-73.8522165415
BX43	Norwood	40.8771237101	-73.8790860644
BX01	Claremont - Bathgate	40.8427419662	-73.9003074771
BX17	East Tremont	40.8449697587	-73.8855174059
BX10	PelhamBay-CountryClub-CityIsland	40.8468265920	-73.8052328034
BX36	University Heights - Morris Heights	40.8528589676	-73.9153808490
BX09	Soundview-CastleHl-ClasonPt-HardngPk	40.8175930992	-73.8577816588
BX14	EastConcourse - ConcourseVillage	40.8304590283	-73.9157467288
BX29	Spuyten Duyvil - Kingsbridge	40.8823915084	-73.9107357323
BX13	Co-Op City	40.8741417504	-73.8288503823
BX59	Westchester - Unionport	40.8320947996	-73.8486646468
BX05	Bedford Pk - Fordham North	40.8676824557	-73.8901832887
BX33	Longwood	40.8196759787	-73.8989563823
BX98	Riker's Island	40.7911474325	-73.8826604539
BX41	Mount Hope	40.8491069521	-73.9050139250
BX22	NorthRiverdale-Fieldston-Riverdale	40.8995526820	-73.9071926757
BX37	VanNest-MorrisPk-WstcstrSq	40.8467852810	-73.8506683984
BX30	Kingsbridge Heights	40.8652093201	-73.9061949593
BX06	Belmont	40.8576859873	-73.8858899799
BX26	Highbridge	40.8384255326	-73.9246890850
BX34	Melrose South - Mott Haven North	40.8182597543	-73.9128494028
BX49	Pelham Parkway	40.8544057376	-73.8543995739
BX44	Williamsbridge - Olinville	40.8821570304	-73.8589483570
BX63	West Concourse	40.8300613115	-73.9235047226
BX55	Soundview - Bruckner	40.8278546949	-73.8697430260
BX03	Eastchester-Edenwald-Baychester	40.8809155708	-73.8367156585
BX75	Crotona Park East	40.8339842324	-73.8858966243
BX52	Schuylerville-ThrogsNk-EdgwaterPk	40.8231480110	-73.8242886549
BX31	Allerton - Pelham Gardens	40.8644738228	-73.8474247806
BX07	Bronxdale	40.8640082677	-73.8648973636
BX27	Hunts Point	40.8106361735	-73.8900312265

3- Google Map Maker "Start Adding Your Local Knowledge to the Map".



Appendix O: Sociodemographic Characteristics

Total Population Figures by neighborhood boundary version

Neighborhood	# of Census Tracts	Total Housing Units	Vacant Housing Units	Occupied Housing Units	Total Population	White	Black	AIAN	Asian	NHOP	Hispanic
MicroNeighborhoods											
1 Fordham	28	48714	45844	2870	142306	9645	30634	362	4797	51	94560
2 Hunts Point	12	18393	17172	1221	52167	646	14231	121	257	6	36410
4 Riverdale	16	22900	20945	1955	47231	31526	3509	41	2603	15	8543
5 Throgs Neck	8	10386	9708	678	26057	11661	2694	61	776	13	10456
6 West Farms	22	33569	31838	1731	86348	9090	20670	233	6887	32	47010
7 Woodlawn	8	8018	7510	508	18396	6738	6276	77	745	11	3861
Neighborhood Projection Areas											
1 Fordham	32	57389	54298	3091	167961	10326	35221	418	7984	44	111011
2 Hunts Point	20	27329	25595	1734	78855	1104	22033	175	456	13	54297
3 Morrisania	24	34802	32963	1839	99726	1206	37389	268	595	24	59142
4 Riverdale	15	20016	18318	1698	42179	27995	3077	35	2346	5	7838
5 Throgs Neck	21	26018	24318	1700	64794	30028	5539	137	2150	16	25903
6 West Farms	17	27504	25732	1772	75276	1933	19018	260	4302	26	47564
7 Woodlawn	21	24693	23211	1482	64556	8545	37956	272	1832	27	13665
Wikimapia											
1 Fordham	21	32394	30589	1805	99346	5938	20918	256	3252	35	67442
2 Hunst Point	19	25773	24068	1705	73403	1053	19848	173	391	9	51230
3 Morrisania	73	101596	96247	5349	289289	4087	95590	692	3275	70	181968
4 Riverdale	18	25988	23856	2132	54911	33455	3990	51	3105	19	13178
5 Throgs Neck	17	20284	18966	1318	51070	24386	4439	101	1444	16	19982
6 West Farms	14	20184	19136	1048	54357	1672	15141	161	567	9	36135
7 Woodlawn	6	5177	4822	355	10954	6314	2120	35	326	2	1811

Percent Population Figures by neighborhood boundary version

Neighborhood	Cts	% Hsng	% Vac	% Occ	% Pop	% White	% Black	% AIAN	% Asian	% NHOP	% Hisp
MicroNeighborhoods											
1 Fordham	28	9.52	9.48	10.09	10.53	6.38	7.35	10.13	10.46	12.81	12.75
2 Hunts Point	12	3.59	3.55	4.29	3.86	0.43	3.42	0.54	3.50	1.51	4.91
4 Riverdale	16	4.47	4.33	6.87	3.50	20.85	0.84	5.50	1.18	3.77	1.15
5 Throgs Neck	8		2.01	2.38	1.93	7.71	0.65	1.64	1.76	3.27	1.41
6 West Farms	22	6.56	6.59	6.09	6.39	6.01	4.96	14.55	6.73	8.04	6.34
7 Woodlawn	8	1.57	1.55	1.79	1.36	4.46	1.51	1.57	2.23	2.76	0.52
Neighborhood Projection Areas											
1 Fordham	32	11.21	11.23	10.87	12.43	6.83	8.45	16.87	12.08	11.06	14.97
2 Hunts Point	20	5.34	5.29	6.10	5.84	0.73	5.29	0.96	5.06	3.27	7.32
3 Morrisania	24	6.80	6.82	6.46	7.38	0.80	8.97	1.26	7.75	6.03	7.98
4 Riverdale	15	3.91	3.79	5.97	3.12	18.51	0.74	4.96	1.01	1.26	1.06
5 Throgs Neck	21	5.08	5.03	5.98	4.80	19.86	1.33	4.54	3.96	4.02	3.49
6 West Farms	17	5.37	5.32	6.23	5.57	1.28	4.56	9.09	7.51	6.53	6.42
7 Woodlawn	21	4.82	4.80	5.21	4.78	5.65	9.11	3.87	7.86	6.78	1.84
Wikimapia											
1 Fordham WIKI HOOD	21	6.33	6.33	6.35	7.35	3.93	5.02	6.87	7.40	8.79	9.10
2 Hunst Point WIKI HOOD	19	5.03	4.98	5.99	5.43	0.70	4.76	0.83	5.00	2.26	6.91
3 Morrisania WIKI HOOD	73	19.85	19.91	18.80	21.41	2.70	22.94	6.92	20.00	17.59	24.54
4 Riverdale WIKI HOOD	18	5.08	4.93	7.49	4.06	22.13	0.96	6.56	1.47	4.77	1.78
5 Throgs Neck WIKI HOOD	17	3.96	3.92	4.63	3.78	16.13	1.07	3.05	2.92	4.02	2.70
6 West Farms WIKI HOOD	14	3.94	3.96	3.68	4.02	1.11	3.63	1.20	4.65	2.26	4.87
7 Woodlawn WIKI HOOD	6	1.01	1.00	1.25	0.81	4.18	0.51	0.69	1.01	0.50	0.24

Population Change Table*

City Rank	DCP Code	Neighborhood	2010 Total Population	2000-2010 Change	% Change
3	BX35	Morrisania - Melrose	37,865	8,067	27.10%
6	BX34	Melrose South - Mott Haven North	39,214	6,024	18.20%
10	BX33	Longwood	26,196	3,114	13.50%
15	BX75	Crotona Park East	20,277	2,205	12.20%
19	BX26	Highbridge	37,727	3,884	11.50%
25	BX17	East Tremont	43,423	4,143	10.50%
26	BX01	Claremont - Bathgate	31,078	2,929	10.40%
34	BX27	Hunts Point	27,204	2,062	8.20%
38	BX37	VanNest-MorrisPk-WestchesterSq	29,250	2,126	7.80%
40	BX13	Co-Op City	43,752	3,074	7.60%
46	BX39	Mott Haven - Port Morris	52,413	3,387	6.90%
47	BX44	Williamsbridge - Olinville	61,321	3,901	6.80%
51	BX09	Soundview-CastleHill-ClasonPt-HardngPk	53,686	2,951	5.80%
53	BX59	Westchester - Unionport	27,248	1,480	5.70%
54	BX14	EastConcourse - ConcourseVillage	62,284	3,324	5.60%
58	BX06	Belmont	27,378	1,412	5.40%
63	BX40	Fordham South	28,262	1,382	5.10%
76	BX07	Bronxdale	35,538	1,230	3.60%
92	BX46	Parkchester	29,821	464	1.60%
97	BX31	Allerton - Pelham Gardens	28,903	396	1.40%
99	BX55	Soundview - Bruckner	35,634	497	1.40%
100	BX08	West Farms - Bronx River	35,011	474	1.40%
106	BX52	Schuylerville-ThrogsNeck-EdgwaterPk	44,167	434	1%
107	BX29	Spuyten Duyvil - Kingsbridge	30,161	287	1%
117	BX49	Pelham Parkway	30,073	62	0.20%
126	BX36	University Heights - Morris Heights	54,188	-146	-0.30%
128	BX22	NorthRiverdale-Fieldston-Riverdale	27,860	-151	-0.50%
129	BX43	Norwood	40,494	-258	-0.60%
130	BX63	West Concourse	39,282	-272	-0.70%
133	BX28	Van Cortlandt Village	50,100	-509	-1%
140	BX41	Mount Hope	51,807	-842	-1.60%
142	BX05	Bedford Pk - Fordham North	54,415	-914	-1.70%
144	BX10	PelhamBay-CountryClub-CityIsland	26,583	-557	-2.10%
149	BX30	Kingsbridge Heights	32,496	-790	-2.40%
151	BX03	Eastchester-Edenwald-Baychester	34,517	-899	-2.50%
152	BX62	Woodlawn - Wakefield	42,483	-1,100	-2.50%
189	BX98	Rikers Island	11,091	-1,684	-13.20%

* extract from the Center for Urban Research of The Graduate Center of the City University of New York (CUNY) table located at http://www.urbanresearchmaps.org/plurality/

Appendix P: Discovery Analysis Results

1. List of users' ranking of 60 Neighborhoods of interest in The Bronx, NY.

	Demand		*Supply*		
Neighborhood	**BRA**	**PCDC**	**LLCUNY**	**NYCHL**	**Total**
Allerton					0
Baychester			1		1
Bedford Park			1		1
Belmont-Arthur Avenue				1	1
Castle Hill				1	1
City Island				1	1
Claremont		1		1	2
Clason Point			1		1
Concourse			1		1
Co-op City				1	1
Country Club					0
Crotona Park		1			1
East Morrisania					0
East Tremont					0
Eastchester					0
Edenwald					0
Edgewater	1				1
Fieldston				1	1
Fordham	1		1	1	3
Fort Apache					0
High Bridge			1	1	2
Hudson Hill					0
Hunts Point	1		1	1	3
Kingsbridge			1	1	2
Kingsbridge Heights			0		0
Locust Point					0
Longwood	1		1		2
Marble Hill				1	1
Melrose		1		1	2
Morris Heights			1	1	2
Morris Park					0
Morrisania	1	1		1	3
Mott Haven	1	1	1	1	4
Mount Eden					0
Mount Hope					0
North New York					0

North Riverdale					0
Norwood					0
Olinville					0
Parkchester				1	1
Pelham Bay					0
Pelham Gardens					0
Pelham Parkway	1		1		2
Port Morris	1			1	2
Riverdale	1			1	2
Schuylerville					0
Soundview	1	1			2
Spuyten Duyvil					0
The Hub					0
Throgs Neck		1		1	2
Tremont / East Tremont	1	1	1	1	4
Unionport					0
University Heights				1	1
Van Cortlandt Village				1	1
Van Nest					0
Wakefield					0
West Farms	1	1	1	1	4
Westchester Square					0
Williamsbridge					0
Woodlawn	1		1		2

2. This table contains data for the distance calculations between the centroids of each neighborhood between their different by boundary versions.

	Wikimapia and Micro Neighborhoods	**Wikimapia to Neighborhood Projection Areas (NPA)**	**Micro Neighborhoods and Neighborhood Projection Areas (NPA)**	**Sum**	**Mean Distance**
Fordham	383.34	1453.028	1786.12	3622.486	1207.495
Hunts Point	1342.821656	1091.271	2100.338	4534.431	1511.477
Morrisania	N/A	2371.108	N/A	2371.108	1185.554
Riverdale	1426.901538	1617.434	190.6332	3234.969	1078.323
Throgs Neck	3473.512343	1248.879	4531.963	9254.355	3084.785
west farms	14733.63543	3376.115	3214.602	21324.35	7108.118
Woodlawn	753.923073	4242.451	3509.051	8505.426	2835.142

Bibliography

Adriaanse, Albert; Jeltes, Robert; and Reiling Rudo. (1989). Information requirements of integrated environmental policy experiences in Netherlands. *Environmental Management.* 13(3), 309-315. Springer-Verlag New York Inc.

Aitken, Stuart C. and Michel Suzanne M. (1995). Who contrives the "real" in GIS? geographic information, planning and critical theory. *Cartography and Geographic Information Systems*. 22(1), 17-29.

Alani, Harith; Jones, Christopher B.; Tudhope, Douglas. (2001). Voronoi-based region approximation for geographical information retrieval with gazetters. *International Journal of Geographical Information Science.* 15(4), 287-306.

Alexandria Digital Library. http://www.alexandria.ucsb.edu/public-documents/annual-report98/node32.html. Accessed November 7, 2007

ANZLIC Geographic Extent Name Register –GEN Register. http://www.anzlic.org.au/infrastructure_GEN.html. Accessed April 6, 2008

Arnstein, Sherry R. (1969). A ladder of citizen participation. *Journal of American Institute of Planners*. 35(4), 216-224.

Australian and New Zealand Land Information Council (ANZLIC) (AKA the Spatial Information Council of Australia and New Zealand. http://www.anzlic.org.au/infrastructure_metadata.html#ch3. Accessed November 10, 07

Avencia Incorporated. (2006). Gerrymandering Index; using geospatial analysis to measure relative compactness of electoral districts. *An Avencia White Paper*, October 2006. Philadelphia, Pennsylvania. www.avencia.com

Barahona, Caros and Levy, Sarah. (2002). Can participatory studies produce 'hard data' to inform policy? *Aids Workers Network.* http://www.aidwrokers.net/exchange/20021211.html. Accessed 11/02/2004.

Barndt, Michael. (1998). Public participation GIS – barriers to implementation. *Cartography and Geographic Information Systems*. 25(2), 105-112.

Barr, Robert. (2001). Spatial data and intellectual property rights. Chapter 12 in Parry, R. B. and Perkins, C. R. (Eds.) *The map library in the new millennium*, (pp 176-187). American Library Association. Chicago, Illinois. USA.

Beinum, Hans van.(1998). On the practice of Action Research. *International Journal of Action Research and Organizational Renewal*. (3).

Bellan, Gerard L. and Bellan-Santini Denise R.(2001). A Review of littoral tourism, sport and leisure activities: consequences on marine flora and fauna. *Aquatic Conservation: Marine and Freshwater Ecosystem*s. (11), 325-333.

Bery, Renuka. (1999). The discovery principle: a participatory approach to training. In White, Shirley (Ed.), *The art of facilitating participation*, (pp 228-244). Sage Publications India Pvt Ltd, New Delhi.

Birch, Eugene L.(2006). Learning from past disasters. In Eugenie L. Birch and Susan M. Watcher (Eds.), *Rebuilding urban places after disaster; lessons from hurricane Katrina*, pp 132-148. University of Pennsylvania Press.

Bradshaw, Ted K. and Muller Brian. (2004). Shaping policy decisions with spatial analysis. In Peter A. Burrough (Ed.), Michael F Goodchild and Donald G. Janelle (Eds.), *Spatially integrated social science*, pp 300-322. Oxford University Press.

Bronx Historical Society. Bronx Chronology Website. http://www.bronxhistoricalsociety.org/chrono. Accessed July, 23 2011

Brown, Foster I.; Alechandre, Andrea S.; Sassagawa Hiromi S.Y.; Aquino de, Maria. (1995). Empowering local communities in land-use management: The Chico Mendes extractive reserve, Acre, Brazil. *Cultural Survival Quarterly*. Winter 1995, 54-57.

Caldwell, Douglas R. (2005). Unlocking the mysteries of the bounding box. http://www.sunnysb.edu/coordinates/seriesa/no2/a2.htm. Persistent URL: http://purl.oclc.org/coordinates/a2.htm. Accessed on May 5, 2007.

Campari, Irene. (1996). Uncertain boundaries in urban space. Chapter 4 In Burrough, Peter A.; and Frank Andrew U. (Eds.) *Geographic objects with indeterminate boundaries*, (pp 57-69). Masser, I and Salge F. Series Editors. Taylor and Francis. London.

Campbell, Heather and Masser, Ian. (1992). GIS in local government: some findings from Great Britain. *International Journal of Geographical Information Systems*. 6(2), 529-546.

Chandler, Adam; Foley, Dan; Hafez, Alaaeldin M.(2000). Mapping and converting essential Federal Geographic Data Committee (FGDC) into MARC21 and Dublin Core. *D-Lib Magazine*. January 2000. 6(1).

Cho, CM and Choi, YS. (2005). The effect of resident-perceived neighborhood boundary on the equity of public parks distribution: using GIS. In *Web and wireless geographical information systems*, Proceedings Lecture Notes in Computer Science. No. 3833, pp 296-307.

Clapp, John and Wang Yazhen. (2005). Defining neighborhood boundaries: Are census tracts obsolete? University of Connecticut. Storrs, Connecticut. School of Business and department of Statistics.

Cleaver, Frances(2001). Institutions, agency and the limitations of participatory approaches to development. In Cooke, Bill and Kothari, Uma (Eds.), *Participation the new tyranny,* (pp 37-55). Zed Books. London, New York.

Coenen, H.(1998. On the foundations of a relationship based on equality between the researcher and the research party. In B. Boog, H. Coenen, L. Keune, & R. Lammerts (Eds.), *The complexity of relationships in action research,* (pp 17–35). Tillburg: Tillburg University Press.

Coenen, Harry and Khonraad. (2003). Inspirations and aspirations of exemplarian action research. *Journal of Community & Applied Social Psychology*. 13, 439-450

Cooper Terry L.; Musso, Juliet A.; and Kitsuse, Alicia. (2002). Faith organizations and neighborhood councils in Los Angeles. *Public Administration and Development*. 22, 83-94

Coulton, Claudia J. ; Korbin, Jill; Chan, Tsui; and Su, Marylin. (2001). Mapping residents' perceptions of neighborhood boundaries: a methodological note. *American Journal of Community Psychology.* 29(2), 371-383.

Coulton, Claudia; Cook, Thomas; Irwin, Molly. (2004). Aggregation issues in neighborhood research: a comparison of several levels of census geography and resident defined neighborhoods. Center for Urban Poverty and Social Change Mandel School of Applied Social Sciences. Case Western Reserve University. Cleveland, Ohio. 24 pgs.

Council of Libraries and Information -CLIR. http://www.clir.org/pubs/reports/pub91/1knowledge.html. Accessed on March 31, 2008

Crampton, Jeremy. (1995) The Eehics of GIS. *Cartography and Geographic Information Systems.* 22(1), pp 84-89

Creswell, John W.(2009). *Research design: qualitative, quantitative, and mixed methods approaches*. Sage Publications. California, US.

Curry, Michael. 1995). GIS and the inevitability of ethical inconsistency. In Pickles, J (Ed.), *Ground truth: the social implications of geographic information systems,* (pp 68-87) New York: Guilford Press.

David, Mathew. (2002). Problems of participation: the limits of action research. *International Social Research Methodology*. 5(1), 11-17.

Dickson, Geraldine; and Green, Kathryn. (2001). Participatory action research: lessons learned with aboriginal grandmothers. *Health Care for Women International*. 22, 471-482.

Duval, Eric; Hodgins, Wayne; Sutton, Stuart; Weibel, Stuart L. (2002). Metadata Principles and Practicalities. *D-Lib Magazine*. 8(4).

Elwood, Sarah and Ghose, Rina.(2001). PPGIS in community development planning: framing the organizational context. *Cartographica*. 38(4), 19-33. Winter 2001.

Elwood, Sarah and Leitner, Helga1. (1998). GIS and community –based planning: exploring the diversity of neighborhood perspectives and needs. *Cartography and Geographic Information Systems.* 25(2), pp77-88

Elwood, Sarah and Leitner, Helga 2. (2003). GIS and spatial knowledge production for neighborhood revitalization: negotiating state priorities and neighborhood visions. *Journal of Urban Affairs.* 25(2),139-157.

Evans S. M. and Birchenough A. C. (2001). Community-based management of the environment: lessons from the past and options for the future. *Aquatic Conservation: Marine and Freshwater Ecosystems.* 11, 137-147

Fals-Borda, Orlando. (1991). Some basic ingredients: Chapter 1. In Fals-Borda , Orlando and Rahman, Md. Anisur (Eds.), *Action and knowledge: breaking the monopoly with participatory action-research*, (pp 3-12). The Apex Press. New York, New York.

Fals-Borda, Orlando.[2] (1991). Remaking Knowledge. In Fals-Borda , Orlando and Rahman, Md. Anisur (Eds.), *Action and knowledge: breaking the monopoly with participatory action-research*. (pp146-164). The Apex Press. New York, New York.

Federal Geographic Data Committee (FGDC). Geospatial metadata standards http://www.fgdc.gov/metadata/geospatial-metadata-standards. Accessed May 7, 2007

Federal Geographic Data Committee (FGDC). Content Standard for Digital Geospatial Metadata Workbook. Version 2.0. http://www.fgdc.gov/metadata/documents/workbook_0501_bmk.pdf. Accessed May 2007.

Federal Geographic Data Committee (FGDC). February 2005. The National Geospatial Data Clearinghouse. http://www.fgdc.gov. Accessed 5/21/07

Figueira-McDonough, Josefina. (2001). Knowledge from praxis. Chapter 6 in *Community analysis and praxis: toward a grounded civil society*, (pp 115-136). Brunner-Routledge, Taylor and Francis Group. Philadelphia, PA, US.

Francis, Paul. (2001). Participatory development at the World bank: The primacy of process. In Bill Cooke and Uma Kothari (Eds.), *Participation: the new Tiranny?* Zed Books. London.

Fred, Shelley M.; Bigler, Wendy and Aspinall, Richard. (2004). Federal funding, geographic research, and geographic technologies: 1904-2004. Chapter 3 in Brunn, Stanley D.; Cutter, Susan L. and Harrington J.W. Jr. (Eds.), *Geography and Technology*, (pp 37-62). Kluwer Academic Publishers. Dordrecht, The Netherlands.

Gaber, John and Gaber, Sharon. (2007). *Qualitative analysis for planning & policy; beyond the numbers*. APA Planners Press.

Galton, Antony.(2003). On the ontological status of geographical boundaries. Chapter 8 in Matt Duckam, Michael F. Goodchild and Michael Worboys (Eds.) *Foundations of Geographic Information Science*, (pp. 151-171). Taylor and Francis. London and New York.

Gans, Herbert J. (1999). People, plans, and policies; Essays on poverty, racism, and other national urban problems. Columbia University Press, Russell sage Foundation. New York, New York.

Gaventa, John and Cornwall Andrea. (2001). Power and knowledge. *In Handbook of Action research*, (pp 71-80). Sage Publications. London.

Gaventa, John. (2004). Towards participation governance: assessing the transformative possibilities. In Hickey, Samuel and Mohan, Giles (Eds.), *Participation: from tyranny to transformation*, (pp25-41). Zed Books Ltd. London, UK and New York, NY, USA.

Geodata.gov. The US Geospatial One-Stop initiative, this GIS enabled portal provides access to interagency data. http://www.geodata.gov. Accessed May 2007.

Geometricalgorithms.com http://geometryalgorithms.com/Archive/algorithm_0107/algorithm_0107.htm. Accessed May 2007.

Getis, Arthur; Getis, Judith; and Fellman, Jerome D. (2008). *Introduction to geography*. 12th Edition. McGraw Hill Higher Education. New York, NY.

Ghose, Rina and Huxhold, William E. (2001). Role of local contextual factors in building public participation in GIS: the Milwaukee experience. *Cartography and Geographic Information Science.* 28(3), 195-208"

Gilbert, David.(1995). *Geographical computing for social scientists. information technology for the social scientist.* Raymond M. Lee Ed. UCL Press. University College London, London.

Goodchild, Michael F.(2007). Citizens as voluntary sensors: spatial data infrastructure in the world of Web 2.0. *International Journal of Spatial Data Infrastructures Research*. 2, 24–32.

Goodchild, Michael F. (2003). Geographic information science and systems for environmental management. *Annual Reviews of Environment and Resources*. 28, 493–519.

Goodchild, Michael F. (2004). The Alexandria Digital Library Project. *D-Lib Magazine*. 10(5).

Goodchild, Michael F. (2009). Epilog: Putting research into practice. In A. Stein, W. Shi, and W. Bijker (Ed.s), *Quality aspects of spatial data mining*, (pp 345-356). Boca Raton: CRC Press. http://www.geog.ucsb.edu/~good/papers/464.pdf.

Goodchild, Michael F. and J. Zhou (2003). Finding geographic information: collection-level metadata. *GeoInformatica.* 7(2), 95-112.

Greater New Orleans Community Data Center (GNCDC). Neighborhoods: Choosing Boundaries. http://www.gnocdc.org/def/neighborhood.html. Accessed: March 13, 2006.

Greene, Richard P. and Pick, James B. (2006). Defining the metropolis. Chapter 3 in *Exploring the urban community: A GIS approach*, (pp 116-151). Pearson Prentice Hall, Upper Saddle River, NJ.

Greg Janée, James Frew, Linda L. Hil. (2004). Issues in georeferenced libraries. *D-Lib Magazine.* 10(5). http://www.alexandria.ucsb.edu/~gjanee/archive/2004/issues.pdf

GSDI Gateway. Global Spatial Data Infrastructure promotes international, national, and local cooperation. http://gsdi.org/Default.asp. Accessed May 2007.

Guest, Avery M. and Lee, Barrett A. (1984). How urbanites define their neighborhoods. *Population & Environment.* 7(1), 32-56.

Hailey, John. (2001). Beyond the formulaic: process and practice in Suth Asian NGOs. In Bill Cooke and Uma Kothari (Eds.), *Participation: the new tyranny*, pp 88-01. Zeds Books. London.

Hall, Stephen S. (1993). *Mapping the next millennium: how computer-driven cartography is revolutionizing the face of science*. New York: Vintage Books.

Hallman, Howard W. (1977). Organizing: local government perspective. Chapter 5 in *The organization and operation of neighborhood councils: a practical guide*, (pp. 52-62). Praeger Publishers. New York and London.

Hallman, Howard W. (1984). *Neighborhoods; their place in urban life*. Sage Library of Social Research. No. 154. Sage Publications, Inc. Beverly Hills, California.

Hammersley, Martyn; and Gomm, Roger;(2000). Introduction. In Gomm, Roger; Hammersley, Martyn; and Foster, Peter (Eds), *Case Study Method*, (pp 1-16). SAGE Publications. London.

Hammersley, Martyn; Gomm, Roger; and Foster, Peter. (2000). Case study and theory. Chapter 12 in Gomm, Roger; Hammersley, Martyn; and Foster, Peter (Eds.), *Case study method*, (pp 234-258). SAGE Publications. London. "

Harris, Trevor and Weiner, Daniel. (1998). Empowerment, marginalization, and "Community Integrated" GIS. *Cartography and Geographic Information Systems*. 25(2), pp 67-76.

Harris, Trevor M.; Weiner, Daniel; Warner, Timothy A.; and Levin, Richard. (1995). Pursuing social goals through participatory Geographic Information Systems. Chapter 9 in John Pickels (Ed.) *Ground truth: the social implications of geographic information systems*, (pp. 196-222). The Gilfford Press. New York, New York.

Hickey, Samuel and Mohan, Giles. (2004). Towards participation as transformation: critical themes and challenges. In Hickey, Samuel and Mohan, Giles (Eds.), *Participation: from Tyranny to transformation*. Pp 3-24 Zed Books Ltd. London.

Hill, Linda L. (2006). *Georeferencing; the geographic association of information.* MIT Press. Cambridge, Massachusetts.

Hirtle, Stephen C.(2003). Neighborhoods and landmarks. Chapter 10 in Matt Duckam, Michael F. Goodchild and Michael Worboys (Eds.), *Foundations of geographic information science*, (pp. 191-203). Taylor and Francis. London and New York.

Holcomb, Briavel H. and Beauregard, Robert A.(1981). Geographical aspects of urban revitalization. In Holcomb, Briavel H. and Beauregard, Robert A. (Eds.) *Revitalizing Cities*, (pp 1-16). *Resource publication in geography*. Association of American Geographers. Washington, DC.

Hunter, Albert. (1983). The urban neighborhood: its analytical and social context. Chapter 11 in Phillip L. Clay and Robert M. Hollister (Eds.), *Neighborhood policy and planning*, (pp 3-20). Lexington Books. D.C. Heath and Company. Lexington, Massachusetts, US.

Huxhold, William E. (1991). Information in the organization. In *An introduction to urban geographic information systems*, (pp3-24). Oxford Press. New York and Oxford.

IDEC Catalog. Infrastructure de Datos Espaciales de Catalunya, is the Catalan data coordinating infrastructure. http://geoportal-idec.net

Innes, Judith E. and Simpson, David M.(1993). Implementing GIS for planning, lessons learned from the history of technological innovation. *Journal of the American Planning Association*. 59(2), 230-236.

INSPIRE. Infrastructure for spatial information in Europe. http://inspire-geoportal.ec.europa.eu/. Accessed December, 2011.

Jankowski, Piotr and Nyerges, Timothy. (2001). Introduction to geographic information systems and participatory geographic information science. Chapter 1 In *Geographic information systems for group decision making – towards a participatory information science*, (pp. 1-9).Traylor and Francis, London.

Jankowski, Piotr; Jankowska, Maria; Stsik, Milosz.(2001). A map browser for an Internet-based GIS data repository. Research Article. *Transactions in GIS*. 5(1), 5-18.

Joch, Alan. (2003). Data on demand. Learn how EPA's new response center tackles environmental emergencies. *FedeTech Magazine*. http://www.fedtechmagazine.com/article.asp?item_id=86. Last accessed July 01, 2011

Keating, W. Dennis and Krumholz, Norman.(2000). Neighborhood planning. *Journal of Planning Education and Research*. Association of Collegiate Schools of Planning. 20(1), 111-114

Kienberger, Stefan; Steinbruch, Franziska; Blaschke, Thomas; Da Costa Luis; Gomes, Aurelio.(2005). The potential of community mapping and community integrated GIS: a study in the Sofala Province, Mozambique. *Proceedings / Tagunsband; Ed. Hg Manfred Schrenk*. Corp 2005 & Geomultimedia05, pp 697-703

Kothari, Uma. (2001). Power Knowledge and social control in participatory development. In By Bill Cooke and Uma Kothari (Eds.), *Participation: the new tyranny?*, (pp 138-152). Zeds Books. London.

Kotler, Milton. (1969). *Neighborhood government: the local foundations of political life*. The Bobbs-Merrill Company, Indianapolis and new York.

Kwan, Mei-Po. (2002). Feminist visualization: re-envisioning GIS as a method in feminist geographic research. *Annals of the Association of American Geographers*. 92(2), 645-661.

Lanfear, Kenneth J. (2009) (DRAFT). A Ranking Method for a Geospatial Search of Reports, or What is the scale of a book? Reston, Va. : U.S. Geological Survey.

Larson, Jennifer; Olmos Siliceo, Maria A.; dos Santos Silva, Marcelino; klien, Eva; Schade, Sven. (2006). Are geospatial catalogues reaching their goals? *9th AGILE* Conference on Geographic Information Science, April 2006 Visegrád, Hungary.

Larson, Ray and Frontiera, Patricia. (2004). Spatial ranking methods for geographic information retrieval in digital libraries. (preprint). In Rachel Heery and Liz Lyon (Eds.) *Research and Advanced Technology for Digital Libraries: 8th European Conference*, (pp. 45-57). ECDL 2004, Bath, UK, September 2004 Proceedings. Lecture Notes in Computer Science Series. Springer-Verlag.

Lee Shong, Sung Sil (1995). Participatory research and community organizing. New Social Movement and Community Organizing Conference (working paper). University of Washington. Seattle, WA. November 1-3.

Leitner, Helga; McMaster, Robert; Elwood, Sarah; McMaster, Susana; Sheppard, Eric.(1998). Models for making GIS available to community organizations: Dimensions of differences and appropriateness. Paper presented at the NCGIA meeting on Empowerment, Marginalization and GIS, Santa Barbara CA, 1998.

Lundqvist, Magnus; Mazalov, Vladimir; Sandkuhl, Kurt; Vdovitsyn, Vladimir; Ivashko, Evgeny. (2009). Do digital libraries satisfy users' information demand? Findings from an empirical study. Proceedings of the 11th All-Russian Research Conference Digital Libraries: Advanced Methods and Technologies, Digital Collections. Petrozavodsk, Russia.

Lutz, M. and Klien, E. (2006). Ontology based retrieval of geographic information. *International Journal of Geographical Information Science*. 20(3), 233-260

M S Swaminathan Research Foundation.(2003) Village information centres: harnessing local knowledge via interactive media. Harnessing Local Knowledge Via Interactive Media –Policy makers Workshop. Chennai, India October 8-9, 2003.

Mark, David M. (2003). Geographic information science: defining the field. Chapter 1 in Matt Duckam, Michael F. Goodchild and Michael Worboys (Eds.), *Foundations of geographic information science,* (pp. 3-17). Taylor and Francis. London and New York.

McIntyre, Alice. (2003). Through the eyes of women: photovoice and participatory research as tools for reimagining place. *Gender, Place and Culture.* 10(1), pp47-66.

McNicoll, Paule. (1999). Issues in teaching participatory action research. *Journal of Social Work Education*, Winter 99. 35(1)

Medeiros Costa-Neto, Eraldo. (2000). Sustainable development and traditional knowledge: a case study in a Brazilian artisanal fishermen's community. *Sustainable Development,* 8, Pp 89-95

Miller, Roger P.(1995). Beyond method, beyond ethics: integrating social theory into GIS and GIS into social theory. *Cartography and Geographic Information Systems*. 22(1),. pp 98-103.

Monmonier, Mark. (2001). *Gauging compactness. bushmanders & bullwinkles: how politicians manipulate electronic maps and census data to win elections*, pp. 64-76. The University of Chicago Press. Chicago, Illinois.

Montello, Daniel R. (2003). Regions in geography: process and content. Chapter 9 in *Foundations of geographic information science.* Matt Duckam, Michael F. Goodchild and Michael Worboys (Eds.), pp. 173-189. Taylor and Francis. London and New York. .

Mosse, David. (2001). People's knowledge, participation and patronage: operations and representations in rural development. In Cooke, Bill and Kothari, Uma (Eds.), *Participation the new tyranny?*, pp 17-35. Zed Books. London, New York.

Mugerauer, Robert" (2000). Qualitative GIS: to mediate, not dominate. Chapter 19 in *Information, place, and cyberspace issues in accessibility*, pp. 317-338. Donald G. Janelle and David C. Hodge (Eds.). Springer. Berlin.

National Institute of Standards and Technology –NIST. Minimum Bounding Box. http://www.nist.gov/dads/HTML/minimumBoundingBoxe.html. Accessed May 2007.

New York Chamber of Commerce and Industry. *New York: A City of Neighborhoods*. Edward I. Koch, Mayor The City of New York.

Newman, Kathe.(2004). Race, politics, and community development in U.S. cities: Newark, decline and avoidance, renaissance and desire: from disinvestments to reinvestment. *Annals of the American Academy of Political and Social Justice.* 594 Annals 34.

NJDCAS. (2004). Neighborhood Plan Application Submission Guidelines. http://www.state.nj.us/dca/dcr/nrtc/index.shrml. Accessed July 2004.

Nogueras-Iso, J.; Zarazara-Soria, F.J.; Lacasta J.; Bejar R.; Muro_Medrano P.R. yerges, Timothy; Jankowski, Piotr; and Drew, Christina"(2002). Data-gathering strategies for social-behavioral research about participatory geographical information system use. *International Journal of Geographical Information Science.* 16(1), pp. 1-22.

Obermeyer, Nancy J.(1995). The hidden GIS technocracy. *Cartography and Geographic Information Systems.* 22(1), pp 78-83.

Obermeyer, Nancy J.2.(1998). The evolution of public participation GIS. *Cartography and Geographic Information Systems.* 25(2), pp 65-66.

Obermeyer, Nancy J.3 (2002). PPGIS: The evolution of Public Participation GIS. http://www.ncgia.ucsb.edu/varenius/ppgis/papers/obermeyer/obermeyer.html. Accessed April 27, 2002.

Onsrud, Harlan. (1998). Legal access as a necessary prerequisite to participatory process. Paper presented at the Varenius Project "Empowerment, Marginalization and Public Participation GIS" http://www.ncgia.ucsb.edu/varenius/ppgis/papers/onsrud.html. Accessed November 30, 2001.

Openshaw, Stan. (1995). A View of the GIS Crisis in Geography. In John A. Agnew, David J. Livingstone, and Alisdair Rogers (Eds.), *Human Geography: An essential Anthology*, (pp 657-685). Blackwell Publishers Ltd. Oxford, UK & Cambridge USA.

Papadias, Dimitris; Theodoridis, Yannis. 1997). Spatial relations, minimum bounding rectangles, and spatial data structures. *International Journal of Information Science.* 11(2), 111-138.

Peluso, Nancy Lee. (1995). Whose woods are these? Counter mapping forest territories in Kalimantan, Indonesia. *Antipode*. 27(4), 383-406.

Peterman, William. (2000). *Neighborhood planning and community-based development: the potential and limits of grassroots action*. Sage Publications, Thousand Oaks, California, US.

Petras, Vivien. (2004). Statistical analysis of geographic and language clues in the MARC record. Technical Report for *Going places in the catalog: improved geographical access project.* Supported by the IMLS National Leadership Grant for Libraries, award LG-02-02-0035-02. School of Information Management & Systems, University of California Berkeley.

Pickles, John.(1995). Representations in an electronic age. In Pickels J. (Ed.), *Ground truth: the social implications of geographic information systems*, (pp1-30). The Gilfford Press. New York, New York.

Pinto, Jeffrey K. and Onsrud Harlan J. (1995). Sharing geographic information across organizational boundaries: A research framework. In Onsrud, Harlan J and Rushton Gerard (Eds.), *Sharing geographic information*, (pp 44-64). Center for Urban Policy Research, Rutgers the State University of New Jersey, New Brunswick, New Jersey.

Poole, Peter. (1995). Guide to the technology. Geomatics: Who needs it? *Cultural Survival Quarterly*. Winter 1995, 16-18.

Rahman, Muhammad Anisur. (1991). The theoretical standpoint to PAR. Chapter 2. In Orlando Fals-Borda and Muhammad Anisur Rahman (Eds), *Action and knowledge: breaking the monopoly with participatory action research*, (pp13-23). The Apex Press, New York.

Randolph, John. (2004). Environmental planning. Chapter 2 in *Environmental land use planning and management*. Island Press.

Rasmussen, Anja Moller. (2001). Information and development: the information effect. *Information Development*. 17(1), 12-17.

Reardon, Kenneth M. (2005). Communities and Banking. Straight A's? Evaluating the success of community/university development partnerships. http://www.community-wealth.org/_pdfs/news/recent-articles/12-05/article-reardon.pdf.

Reardon, Kenneth M. (1998). Participatory action research as service learning. *New Directions for Teaching and Learning*. (73), 57-64.

Reason, Peter and Bradbury, Hillary. (2001). Introduction: Inquiry and participation in search of a world worthy of human aspiration. In *Handbook of action research,* (pp1-15) Sage Publications.

Reese, Terry. (2005). Bibliographic freedom and the future direction of Map cataloguing. *Journal of Maps & Geography Libraries*. 2(1), 67-97

Reidy, Chris. (1992). Where to draw the line. Boston Globe. Boston, MA, US. Oct 23, 1992.

Rohe, William and Gates, Lauren. (1985). *Planning with neighborhoods*. University of North Carolina Press.

Sadahiro, Yukio. (2001). Number of polygons generated by map overlay: the case of convex polygons. *Transactions in GIS*. 5(4), 345-353.

Salas, Maruja and Tillmann, Timmi. (1998). About people's dreams and visions and how to retune our perceptions: convergence of PAR and PRA in Latin-America. *Studies in Cultures, Organizations, and Societie*s. 4, 169-186.

Sanderson, Robert and Larson, Ray R. (2006). Indexing and searching tera-scale grid-based digital libraries. Preprint of a paper appearing in the *INFOSCALE* 2006 Proceedings.

Sawicki, David S. and Peterman, D. Randy.(1998). Understanding the breadth and depth of PPGIS supply –Final Draft. PPPGIS Specialist Meeting, Santa Barbara, California –October 14-17, 1998.

Schubert, Marsha.(1996). Using participatory action research. *Roeper Review*. Feb/Mar 1996, 18(3).

Schwirian, Kent P (1983). Models of neighborhood change. *Annual Review of Sociology*. 9, 83-102

Sclove, Richard E.; Scammell, Madeleine L.; and Holland Breena. (1998). Community based research in the United States: an introductory reconnaissance, including twelve organizational studies and the comparison eiht the Dutch Science Shops and the main stream American research system. The Loka Institute. Amherst Massachusetts, USA.

Sheppard, Eric. (1995). GIS and society: toward a research agenda. *Cartography and Geographic Information Systems*. 22(1), pp 5-16.

Smith, Robin S.(2006). Theories of digital participation. Chapter 3 in *GIS for sustainable development.* Michele Campagna (Ed.). CRC Press, Taylor and Francis Group. Boca Raton, FL, US. pp 37-53

Smits, Jan. (2001). Metadata standards: confusion or convergence? Chapter 9 in Parry, R. B. and Perkins, C. R. (Eds.), *The map library in the new millennium*, (pp 117-136). American Library Association, Chicago. Chicago, Illinois. USA.

Stein, Chris. (2004). Poorest U.S. cities. *Community and economic development.* http://www.planetizen.com/node/14142. Accessed November 21, 2005.

Stonich, Susan C. (1998). Information technologies, advocacy, and development: resistance and backlash to industrial shrimp farming. *Cartography and Geographic Information Systems.* 25(2), Pp 113-122

Sui, Daniel and Morrill, Richard. (2004). Computers and geography: from automated geography to digital earth. Chapter 5 In Brunn, Stanley D.; Cutter, Susan L. and Harrington J.W. Jr. (Eds.) *Geography and technology*, Pp 81-108. Kluwer Academic Publishers. Dordrecht, The Netherlands.

Sui, Daniel.(1999). GIS, environmental equity analysis, and the modifiable areal unit problem (MAUP). Chapter 5 in Massimo Craglia and Harlam Onsrud (Eds.), *Geographic information research;Trans-Atlantic perspectives*, pp 41-54. Taylor and Francis.

Sunday, Dan. Bounding containers for polygons, polyhedral, and point sets (2D & 3D). Algorithm 8, http://geometryalorithms.com. Accessed May 05, 2005.

Suttles, Gerald. (1972). The social construction of communities. University of Chicago

Taggart, Robert. (1998). Is validity really an issue for participatory action research? *Studies in Cultures, Organizations, and Societies.* 4: 211-236

Talen, Emily. (2001). The codes project. Arizona State University. http://codesproject.asu.edu/codes/14. Accessed November 17, 2011.

Taylor, Peter J. and Johnston, Ronald J.(1995). Geographic Information Systems and Geography. Chapter 3. In John Pickels (Ed.) *Ground truth: the social implications of geographic information systems*, (pp. 51-67). The Gilfford Press. New York, New York.

Teddlie, Charles and Tashakkori, Abbas. (2009). *Foundations of mixed methods research. Integrating quantitative and qualitative approaches in the social and behavioral sciences*. mSAGE Inc. Thousands Oaks, California. USA.

The World Bank. The World Bank participation source book. http://www.worldbank.org/wbi/sourcebook/sba104.htm. Accessed November 02, 2004.

Treasure Coast Regional Planning Council. (2004). Sustainable neighborhood planning for the region. www.tcrpc.org/orientation/02_neighborhood_scale/2_neighborhood_scale_print.pdf. Accessed April 15, 2006.

Trodd, Nigel and Geary, Wayne M Jr. (2006). A participatory GIS-based method to construct output areas for neighborhood analysis and social planning. From: http://www.urisa.org/geary. Accessed December, 2006.

U.S. Library of Congress. (2005). Library, National Endowment for the Humanities launch first step in digitizing early newspapers. *News fromthe Library of Congress*. April 4, 2005.

US Department of Commerce. Bureau of the Census. (2011). Census of Population and Housing. American Fact Finder. Source: U.S. Census Bureau.

US White House. The National Spatial Data Infrastructure. http://www.whitehouse.gov/omb/circulars/a016/a016_rev.html. Accessed March 2008.

Vogt, Paul W. (1993) *Dictionary of statistics and methodology: a nontechnical guide for the social sciences.* SAGE Publications. Newbury Park, California. USA.

Von Hoffman, Alexander. (2003). *House by house, block by block; the rebirth of America's urban neighborhoods*. Oxford University Press, Inc. New York, New York

Warren, Rachelle B. and Warren, Donald I. (1977). What's in a neighborhood? Chapter 1 in *The neighborhood organizer's handbook.* University of Notre Dame Press. Notre Dame, Indiana, US

White Center & Boulevard Park. Healthy people healthy communities. Data source and neighborhood boundaries http://www.metrokc.gov/health/datamaps/datasource.htm, Accessed July 2009.

Whyte, William F (1995). Encounters with participatory action research. *Qualitative Sociolog*y. 18(3), 289-299.

Whyte, William F. (1989). Advancing scientific knowledge through participatory Action Research. *Sociological Forum*. 4(3), 367-385.

Wiggins, Lyna L. (1993). Diffusion and use of Geographic Information Systems in public sector Agencies in the United States. In Ian Masser and Harlan J. Onsrud (Eds) *Diffusion and use of geographic information technologies*, (pp 147-164). Dordrecht: Kluwer Academic.

Wikipedia. Minimum Bounding Rectangle. http://en.wikipedia.org/wiki/Minimum_bounding_rectangle. Accessed March 2006.

Wilson, John P.; Lam, Christine S.; and Holmes-Wong Deborah A. (2004). A new method for the specification of geographic footprints in digital gazetteers. *Cartographic and Geographic Information Science.* 31(4), 195-207.

Wismer, Susan. (1999). From the ground up: quality of life indicators and sustainable community development. *Feminist Economics*. 5(2), 109-114

Yapa, L.S. (1991). Is GIS appropriate technology? *International Journal of Geographic Information Systems*. (5),41-58.

Yin, R. K. (1989). *Case study research: design and methods*. California, US. Sage Publications. California, US.

Yin, Robert.(2008) *Case study research: design and methods* (Applied Social Research Methods) 4th Edition. SAGE Inc. Thousands Oaks, California. USA.