

COMMUNITY GARDENS AND SOCIAL SUSTAINABILITY IN NEW YORK CITY

Christopher Menone
School of Forestry & Environmental Studies
Yale University
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COMMUNITY GARDENS

Vacant land is abundant in New York City, as it is in urban areas throughout the United States. During the 1950s and 1960s, unfinished urban renewal projects, coupled with suburban growth and the decline of central business districts, created huge amounts of vacant land. During the financial crisis of the 1970s, New York City suffered a severe loss of population and housing, which further contributed to the large number of public and private lots left vacant, unattractive, and dangerous. Housing abandonment, slum clearance, arson, middle-class exodus, and declining municipal services have all contributed to the glut of vacant property in many of America's cities, and in cities around the world (Francis, Cashdan, and Paxson 1984). Today, more than 12 percent of the total land area of New York City is vacant (DCP).

At the same time, New York and other cities have inadequate amounts of open space available for the recreation and relaxation of their inhabitants. A further irony is that it is often the neighborhoods that have the greatest amount of vacant land that are most deficient in this type of useful open space (Francis, Cashdan, and Paxson 1981, 1984; Vitullo-Martin 1993; Hynes 1996). This fact, along with the growing perception of the failure of traditional city parks to serve appropriately the needs of their intended beneficiaries, has led to a broad consensus among park designers and managers and the general public that alternative approaches to the creation of urban open space are necessary (Brower and Williamson 1974; Clay 1979; Francis, Cashdan, and Paxson 1984). It is generally agreed that such alternative urban open spaces are more socially responsive and less expensive to develop and maintain than are traditional city parks (Francis, Cashdan, and Paxson 1984).

Community-developed open spaces, and, more specifically, community gardens, can often fulfill these needs. A good functional definition of a community garden is

[a]n area used for growing plants or animals, which has been collaboratively created and is maintained by members of the public. A community garden can take place on public or private land and can involve a broad cross-section of the public, as in a neighborhood community garden. Or it can involve specific sectors of the population, such as a school garden that involves students, teachers, parents, and other community members who support the garden for education.

(Abi-Nadler, Dunnigan, and Markley 2001: 24)

COMMUNITY INVOLVEMENT

Through the Neighborhood Open Space Project – and interdisciplinary research effort run by the City University of New York in the early 1980s – landscape architects, environmental psychologists, architects, and urban designers studied the history, decision-making, and neighborhood consequences of a selected sample of community open space projects in New York City. A summary of the findings of the research team states:

Community open space projects [are] successful for participants and other neighborhood residents alike. They are usually developed with little funding yet are typically well maintained and managed by the local groups. Each site seems to influence the development of other open space projects in the neighborhood as well as encourage adjacent areas to be planted and better maintained. The conversion of a vacant lot into a neighborhood amenity was also perceived by participants as potentially having important economic implications for surrounding property values. The projects we studied contributed to the attachment people felt to the neighborhood and to their confidence in the area. Many skills were acquired by residents directly involved in these projects which they considered valuable. (Francis, Cashdan, and Paxson 1981: 7)

A vital aspect of community gardening is that it is instituted and maintained at a local level (Bush-Brown 1969; Linn 1981; Francis, Cashdan, and Paxson 1984). Researchers have found that children prefer playing in places they have created themselves, such as forts and tree houses (Hart 1978). Similarly, various studies (e.g., Brower 1977) have demonstrated the merits of community involvement in neighborhood parks. Such involvement can occur during all phases of park development: design and planning, site development and construction, and management and maintenance. Local involvement is critical in cities like New York, where the Department of Parks & Recreation lacks the funds to adequately staff and maintain the hundreds of small parks under their jurisdiction, and where organizations like the Parks Council and Central Park Conservancy are calling for a decentralization of park management (Vitullo-Martin 1993).

The Neighborhood Open Space Project found that many community garden projects are initiated in low-income communities in response to neighborhood deterioration (Francis, Cashdan, and Paxson 1981). Some gardens are driven principally by the need to alleviate poverty in disadvantaged neighborhoods, and may allow the gardeners to generate income through the sale of flowers or produce to local retailers and in farmers' markets (Sturdivant 1988, Ferris and Norman 2001). Even if the produce is not sold, gardeners can consume it themselves and diminish their own food costs, the national average for savings being around \$250 per 600 square feet of garden (Wagner 1982, Yeung et al. 2002). Such productive gardens may provide job training and earning opportunities to socially excluded ethnic groups, offering alternatives to crime (Ferris and

Norman 2001). These effects fall within a broad set of circumstances that, it has been suggested, will support a socially sustainable society: “decent paying and safe jobs; quality schools and recreation; decent housing and adequate health care; democratic decision-making and personal empowerment; and communities free of violence, drugs, and poverty” (Bryant 1995: 6).

The Neighborhood Open Space Project also documented many community gardens in middle- and upper-income communities. Commonly cited reasons for starting a community garden include: people do not have private gardens and want a place to plant, people have private gardens but want a place to socialize, to beautify an ugly site in a neighborhood, or generally to improve the neighborhood (Francis, Cashdan, and Paxson 1981). Many parents and educators believe that gardening teaches urban youth “timeless truths sorely lacking among this society’s young people” (Ocone 1983: viii). Some gardens are run primarily for the health and therapeutic benefits they can afford their users, “such as the physical exercise and being outdoors in the fresh air and the opportunity for quiet relaxation” (Hayden 2001: 18). Horticultural therapy is employed in a wide range of settings and is viewed by many social and health professionals as a natural, enjoyable, and physically undemanding way to relieve stress, burn calories, stimulate creativity, overcome social isolation, and promote a sense of inner well-being (Lewis 1992, Mattson 1992, Reuter and Reuter 1992, Ulrich and Parsons 1992, Rotherth 1994, Boardman 2001, Norman 2001).

Community ownership of open space projects through neighborhood land trusts is sometimes a viable option (International Independence Institute 1972; Francis, Cashdan, and Paxson 1981; Stein 1981). The issue of ownership is, in fact, often critical to the long-term existence of a community garden. Gardens on city-owned land are constantly threatened by development (Huff 1990, Harnik 2000, Berner and Lowry 2002). Within two years of the decision by the administration of Mayor Rudolph Giuliani to make such gardens available for development, approximately 50 community gardens in New York City were reclaimed for low-income housing. The proposed acceleration of the development of such lots sparked protests and emergency fundraising campaigns by open space advocacy groups. In May 1999, the Trust for Public Land and the New York Restoration Project bought 112 community gardens from the city for \$4.2 million. However, the majority of community gardens in New York City remain threatened by development (Harnik 2000).

In New York City, several programs exist to support the efforts of community groups to manage open spaces. The GreenThumb Program of the Department of Parks & Recreation, supplies materials, grants, and technical assistance, including educational workshops, to the more than 650 community gardens that are members of the program (GreenThumb 2001). The Neighborhood Open Space Coalition works to protect gardens on city-owned lots from development (NOSC). Green Guerillas is a non-profit organization that seeks to protect and promote green space within the five boroughs (Green Guerillas 2002). A group of citizens known as Save Gardens has rallied to encourage legislation that provides recognition and support for community gardens by creating a citywide policy for the preservation of existing gardens and the creation of new gardens (Save Gardens). Bronx Green-Up is a community outreach program of The New York Botanical Garden that serves almost 325 community gardens. The services provided by this program include horticultural advice; seeds, shrubs, bulbs, and plant

materials; bulk deliveries of compost and wood chips for soil improvement; seasonal workshops for community gardeners; transportation of donated plant materials; teacher enhancement and technical assistance at Bronx schools; and summer and after-school programs for children at selected community gardens, schools, or libraries (NYBG). The Trust for Public Land is a national organization whose New York City Program has helped gain permanent protection for over 300 acres of community gardens. Currently, the Program is focusing on the creation of borough-wide garden land trusts to take ownership of 63 gardens purchased in 1999 (NOSC et al.).

New York City has also served as a global forum for discussion and collaboration for community open space advocates. The 2002 annual conference of the American Community Gardening Association (ACGA), "Gardeners Restore Our World," was held at Columbia University, and included visits to some of the city's diverse community gardens (ACGA 2002). This event brought together community gardeners, planners, educators, municipal leaders, landscape designers, environmental educators, nutritionists and researchers from around the world (Lordahl 2002).

SOCIAL SUSTAINABILITY

Community-based development projects in general have been seen as positive factors in sustainable design, planning, and community development (Francis 1994). According to some open space advocates, community gardens can be used "to build communities, foster social and environmental justice, eliminate hunger, empower communities, break down racial and ethnic barriers, provide adequate health and nutritional education, reduce crime, improve housing, promote and enhance education and ultimately, create sustainable communities" (Wilson 2001: 9). A number of studies have shown that inner city residents who live in green surroundings experience fewer quality of life crimes such as littering and graffiti, and fewer incivilities such as noisy and disruptive neighbors. People often report feeling safer in residential areas that contain greenery (Kuo and Sullivan 2001, Yeung et al. 2002). These effects, which are affected by community gardens, may support social sustainability as it "refers to those cultural norms and values, rules, regulations, behaviors, policies, and decisions to support sustainable communities, where people can interact with confidence that their environment is safe, nurturing, and productive" (Bryant 1995: 6).

The effects of community gardens on the socioeconomic and physical environment of a neighborhood are not, however, always unequivocal. This fact is especially apparent in the area of community stability and gentrification. By fostering a greater sense of community attachment and commitment, community gardens may serve to preserve the social and physical environment of a neighborhood. In this way, community gardens may promote social sustainability, particularly as it relates to community cohesiveness and quality of life, what has been called community conviviality (Hancock 1997). However, it has been suggested that they may also accelerate the process of gentrification by improving the neighborhood and attracting a more affluent population, a process that is not generally seen as being socially sustainable. The Neighborhood Open Space Project found situations where the founding of a community garden helped build a strong local land-owning organization that might

help keep speculators out of the neighborhood. However, in some neighborhoods, community greening organizations may have to join efforts with other community groups to effectively control housing costs (Francis, Cashdan, and Paxson 1981).

According to one definition, social sustainability refers to “policies and institutions that have the overall effect of integrating diverse groups and cultural practices in a just and equitable fashion” (Stren and Polèse 2000: 3). Studies have shown the positive effects of community gardens on cross-cultural communication in cities throughout the United States. A study of socioeconomic diversity in community gardens in San Jose, California, found that the gardens are forums for mutually beneficial relationships among people of diverse cultural and economic backgrounds (Dotter 1994). A study of Rutgers Urban Gardening (RUG) program showed that urban community gardening “establishe[s] a physical, psychological and emotional environment that fosters and sustains diversity” (Patel 1994: 97). This study found that 67.7 percent of the gardeners in the program developed new friendships with people from different ethnic groups through the gardens (Patel 1994).

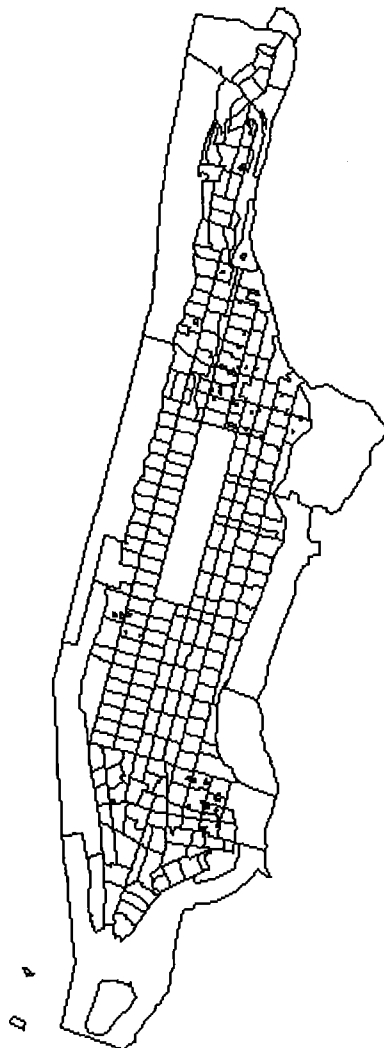
However, studies have also shown that different ethnic groups often use open space in different ways. For example, studies of the park preferences of Latinos and Anglos have suggested that Latinos prefer more developed, human-dominated park environments such as formal gardens, while Anglos prefer more quiet, natural environments such as woods. Also, Latinos seem to prefer group activities such as picnicking, while Anglos prefer individual activities such as hiking and riding motorcycles (Irwin and Gartner 1990; Baas, Ewert, and Chavez 1993; Berge and Lohr 1994).

The locally oriented nature of the development and management of community gardens may itself promote social sustainability. Governmental decentralization in general has been seen as beneficial to the achievement of urban social sustainability. It has been stated that in order to achieve such sustainability, urban policies must “seek to bring people together, to weave the various parts of the city into a cohesive whole, and to increase accessibility (spatial and otherwise) to public services and employment, within the framework, ideally, of a local governance structure which is democratic, efficient, and equitable” (Stren and Polèse 2000: 16). To this end, some researchers support a certain level of governmental decentralization, hypothesizing that national social and economic policy, while important, must work in conjunction with policy at the local level (Stren and Polèse 2000).

SPATIAL ANALYSIS

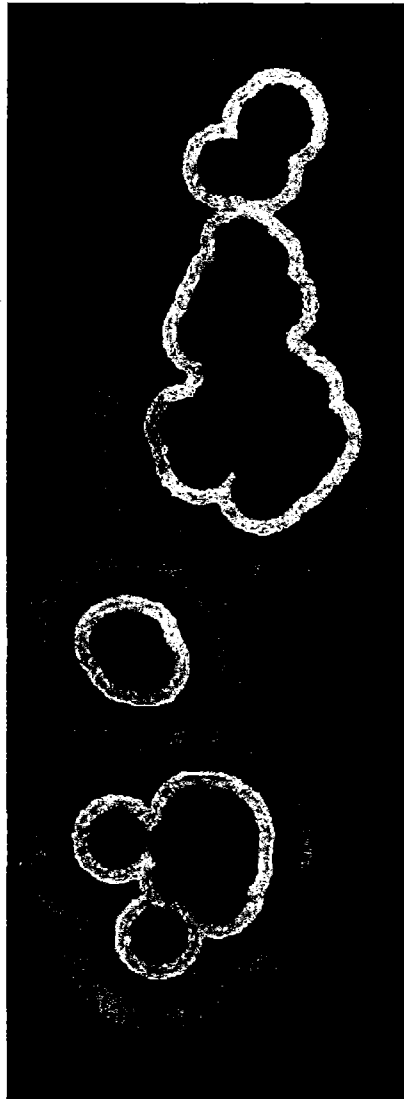
I performed an analysis of the spatial relationship between socioeconomic indicators and community gardens in three boroughs of New York City: Manhattan (New York County), Brooklyn (Kings County), and the Bronx (Bronx County). I employed a method developed in a previous project, where I produced quantitative measurements of the relationship between socioeconomic factors and the distribution of open space in the same three boroughs (Menone 2002). In following this method, land-use and demographic data are analyzed using Geographic Information System (GIS) technology, and regression analysis is used to determine whether, and to what extent, a relationship exists between these two factors. I used ArcView GIS 3.2 to create and analyze the maps and spatial databases. The maps of community gardens were produced from data provided by the Council for the Environment of New York City (CENYC). To delineate census tracts, I used Census 2000 census tract boundary maps from the Geography Network.

Map 1 shows community gardens and census tracts in Manhattan.

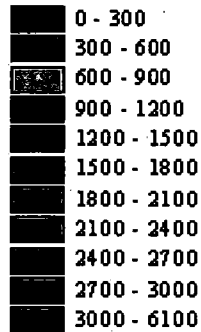


**Map 1:
Manhattan
Community Gardens and
Census Tracts**

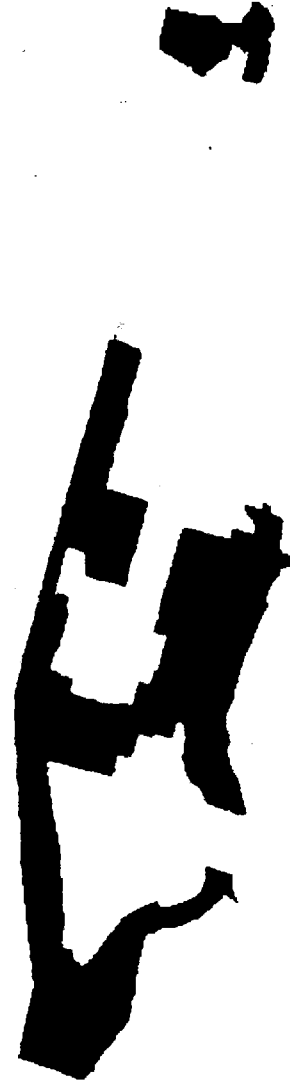
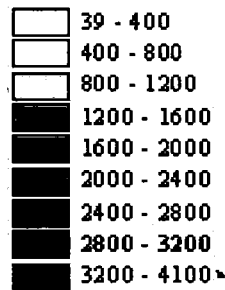
I used the community-garden maps to create maps of distance to the nearest garden (Map 2). I then calculated the mean distance to the nearest garden within each census tract (Map 3).



Map 2:
Manhattan
Distance to Nearest
Garden (m)



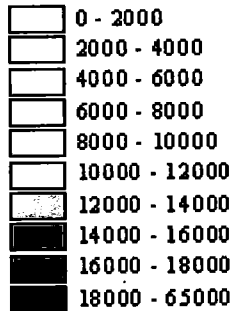
Map 3:
Manhattan
Mean Distance
to Nearest Garden (m)
by census tract



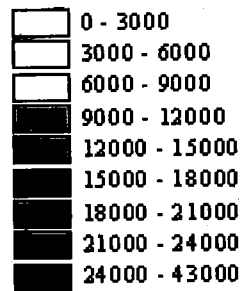
As these maps reveal, the distribution of community gardens in Manhattan is fairly patchy, with the Lower East Side, portions of western Midtown, and certain areas above Central Park being closest to gardens.

I created maps showing the amount of open land (expressed in square meters) within one-quarter mile of each pixel (Map 4). I then calculated the mean of these values within each census tract (Map 5).

Map 4:
Manhattan
Amount of Gardenland
(sq meters) within ¼ mile

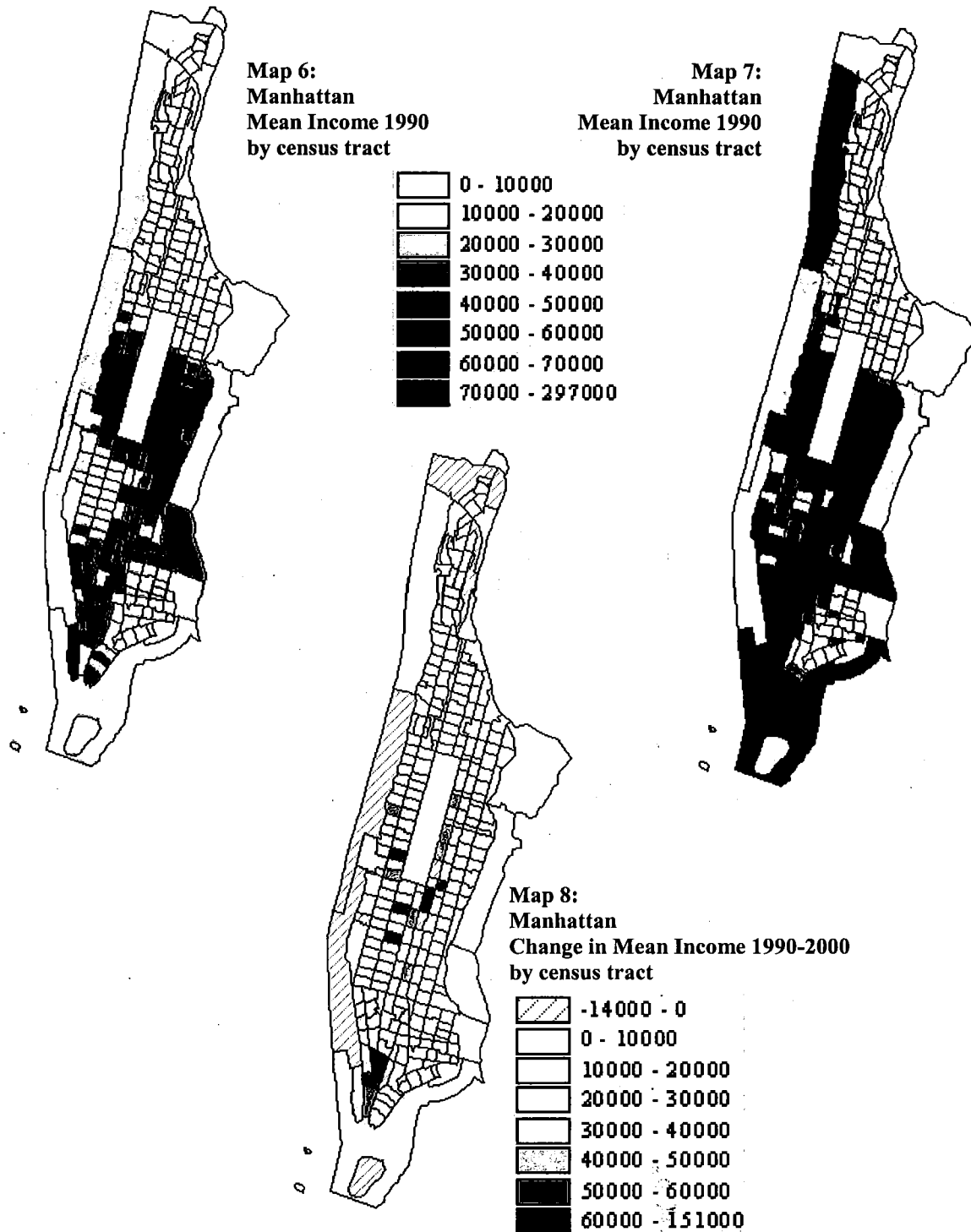


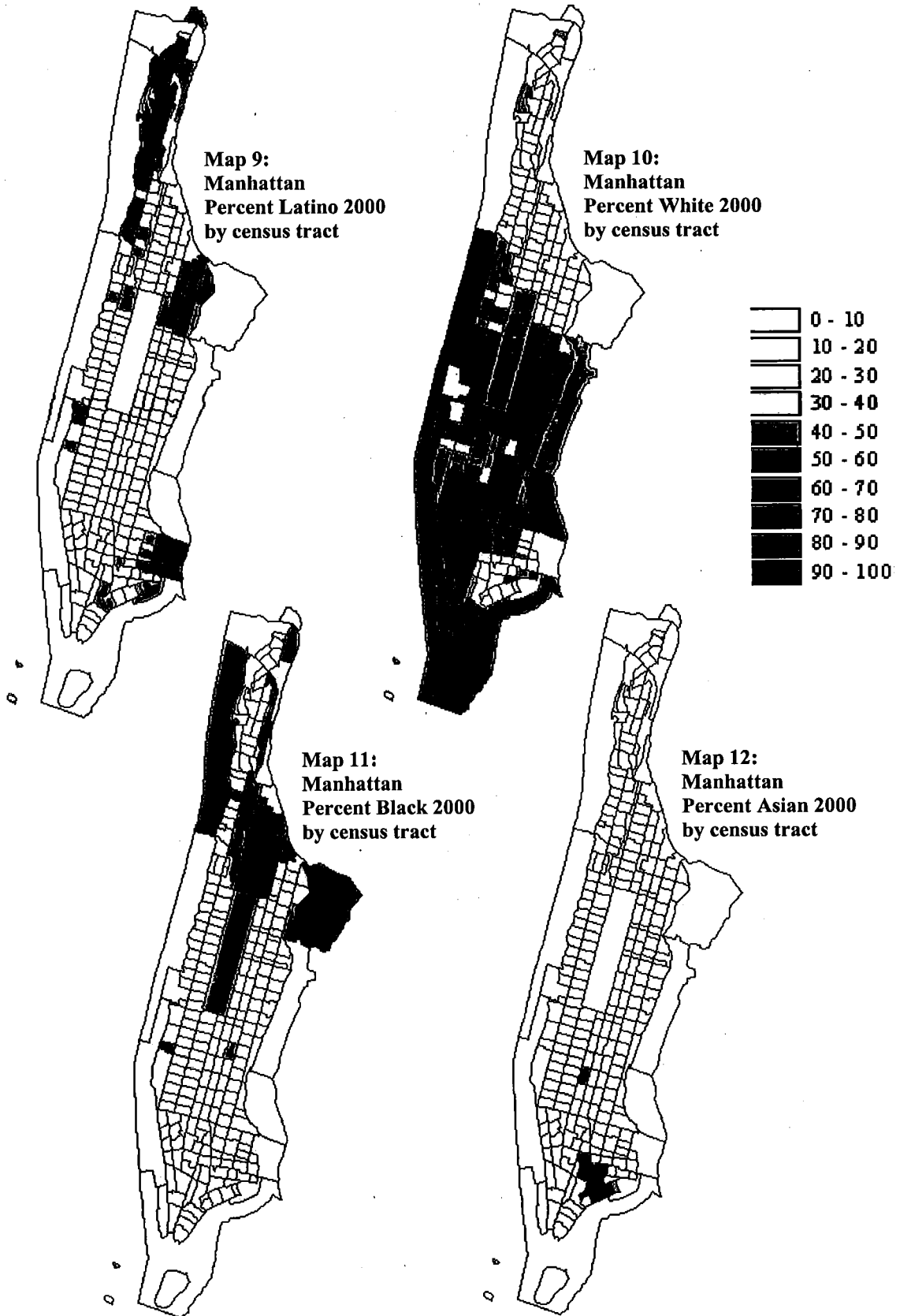
Map 5:
Manhattan
Mean Amount
of Gardenland
(sq meters)
within ¼ mile
by census tract



Again, the patchy distribution of community gardens in Manhattan is revealed, with portions of the Lower East Side, Harlem, and Washington Heights showing especially high concentrations of gardenland.

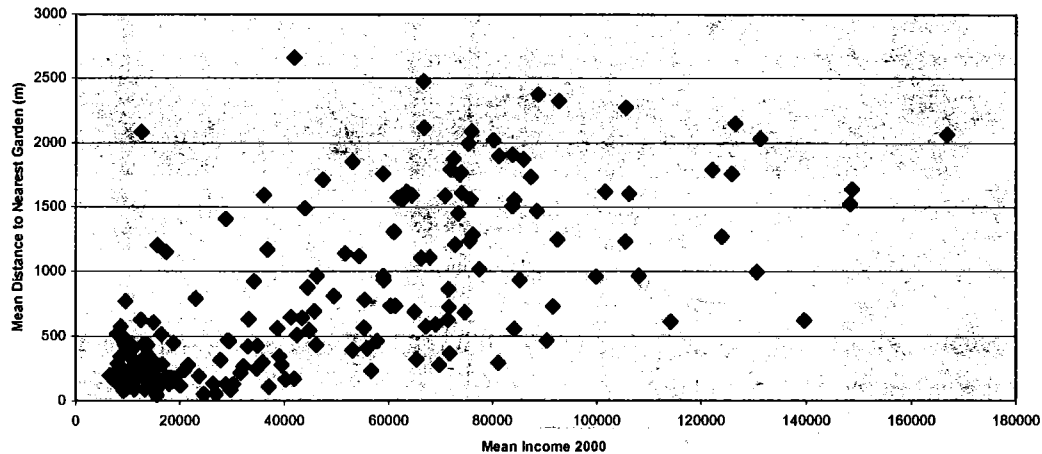
I then looked for spatial relationships between these two garden metrics and socioeconomic factors, specifically ethnicity, income, and change in income between 1990 and 2000. I obtained census-tract level income data from the 1990 and 2000 Census and ethnicity data from the 2000 Census (U.S. Census Bureau). Maps 6 through 12 present some of these data for Manhattan.



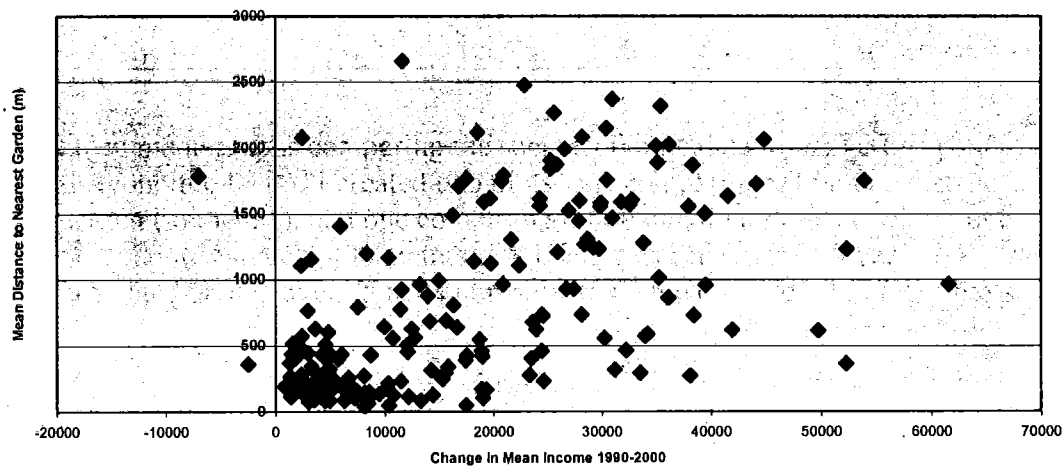


I then made graphs comparing the socioeconomic data to the garden data. For each socioeconomic factor, I created two plots: one comparing it to mean distance to the nearest garden (in meters), and one comparing it to units of gardenland within one-quarter mile (approximately 400 meters). All data was census-tract level. Only census tracts whose land area is over 75 percent residential were considered in these plots.

Graph 1
Manhattan
Income vs. Distance to Garden

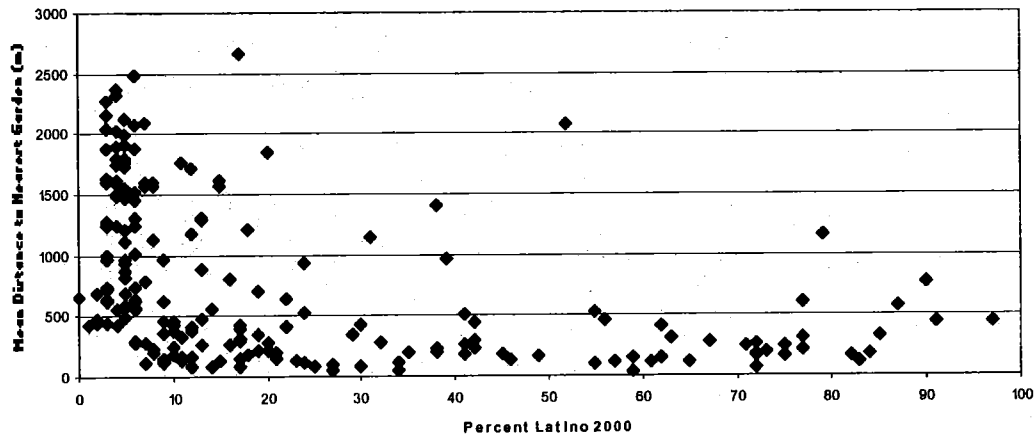


Graph 2
Manhattan
Income Change vs. Distance to Garden



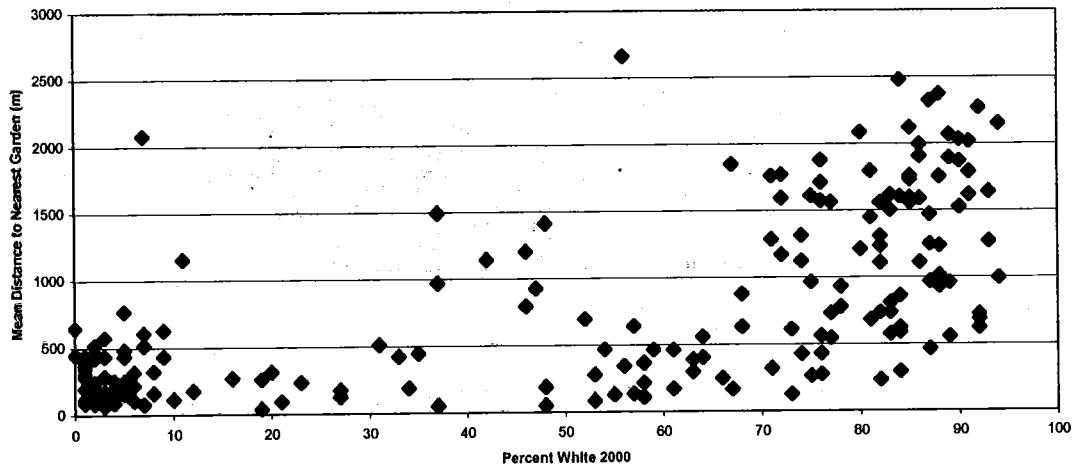
Graphs 1 and 2 both display an interesting pattern of garden distribution: most areas of lowest income or least income change are fairly close to gardens, but all spatial relationship seems to be lost completely above a certain income level.

Graph 3
Manhattan
Percent Latino vs. Distance to Garden



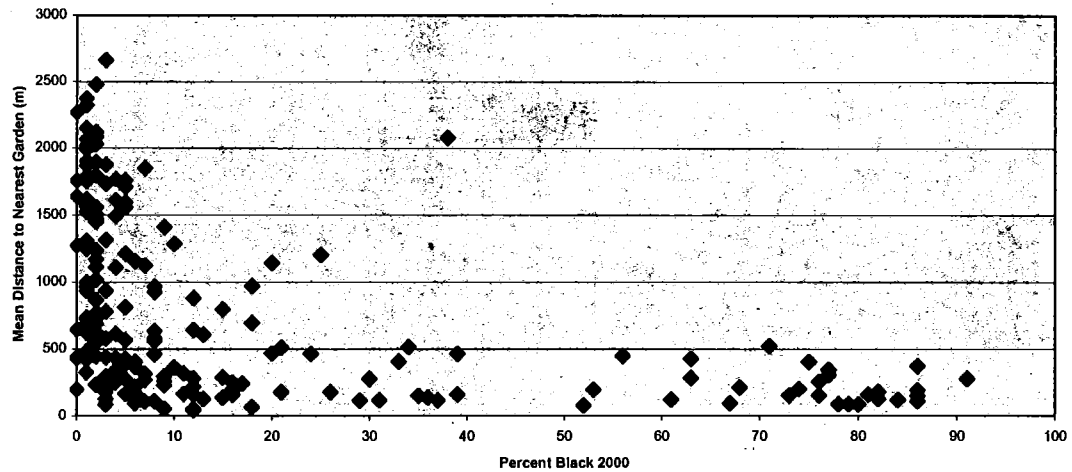
Graph 3 displays a similar trend: most areas with a high percentage of Latinos are fairly close to a garden, but any spatial relationship seems to be lost below a certain percentage (about 25 percent).

Graph 4
Manhattan
Percent White vs. Distance to Garden



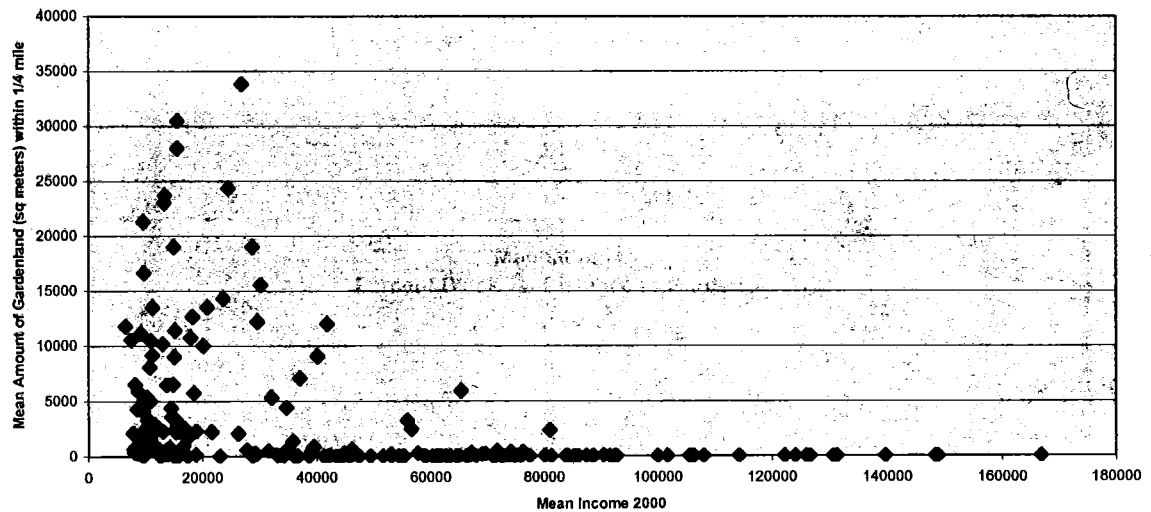
In Graph 4, the relationship between percent white and distance to the nearest garden is lost as the white proportion grows; however, the relationship is not lost as abruptly as it is in Graph 3.

Graph 5
Manhattan
Percent Black vs. Distance to Garden

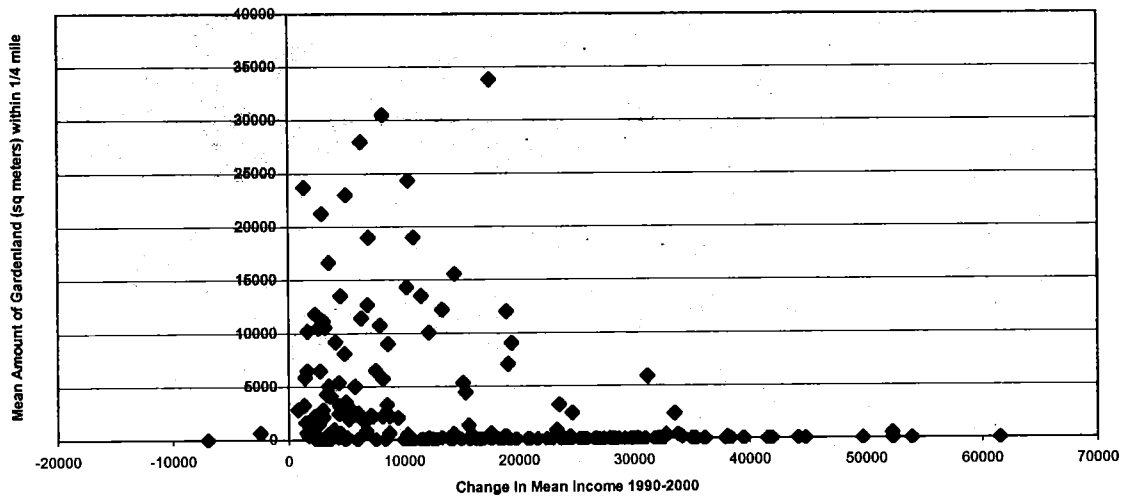


Graph 5 displays a similar trend to that of Graph 3, but the threshold seems to be lower (about 20 percent).

Graph 6
Manhattan
Income vs. Amount of Gardenland

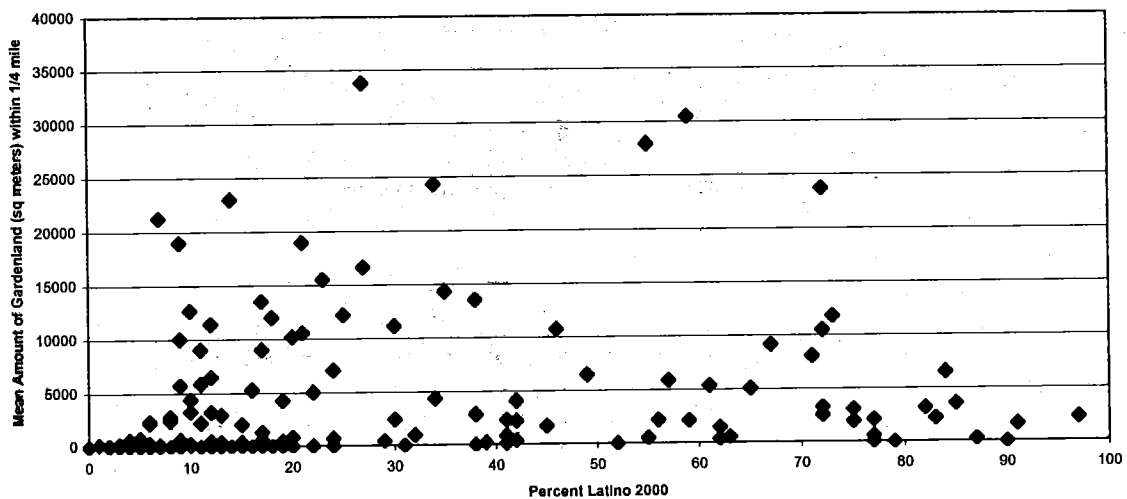


Graph 7
Manhattan
Income Change vs. Amount of Gardenland

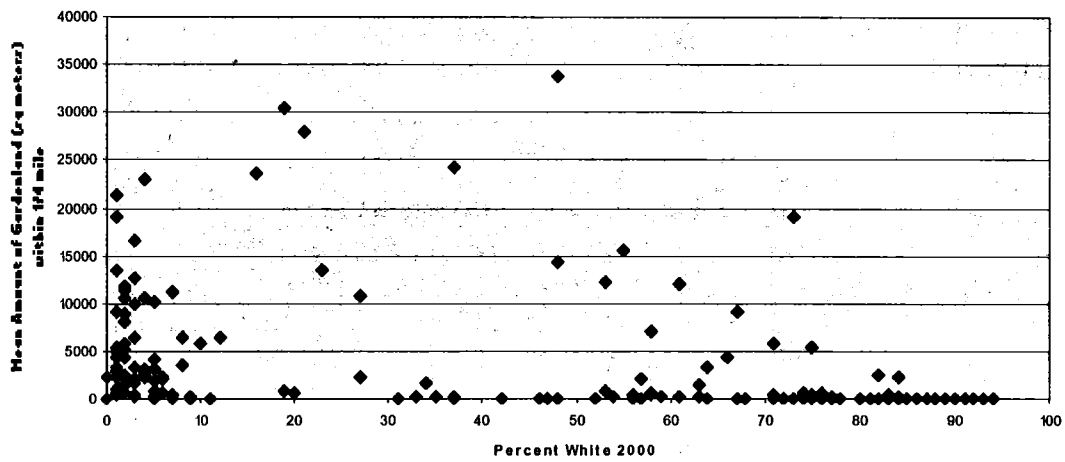


A similar threshold phenomenon is apparent in Graphs 6 and 7. In areas of low income or little income change, there is little or no correlation between these income factors and amount of gardenland nearby. However, above a certain income level, the amount of gardenland is almost always very low.

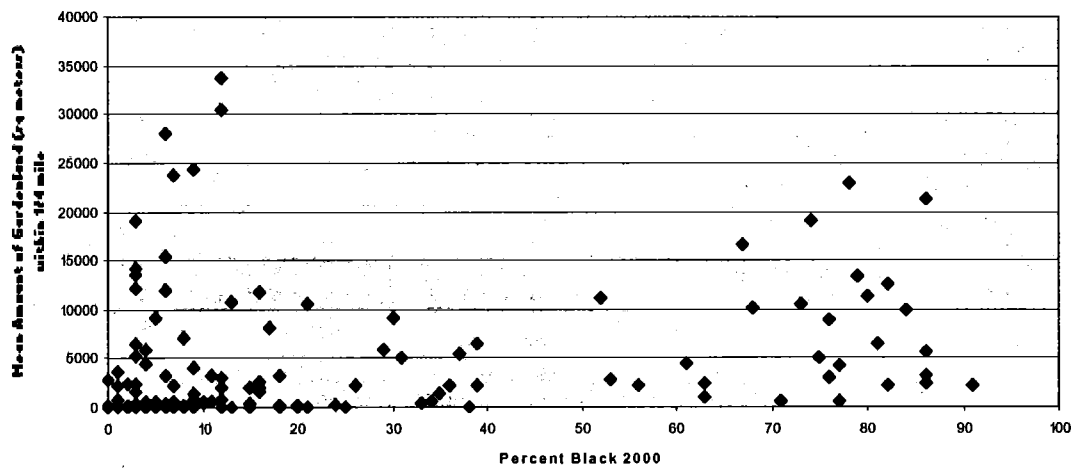
Graph 8
Manhattan
Percent Latino vs. Amount of Gardenland



Graph 9
Manhattan
Percent White vs. Amount of Gardenland



Graph 10
Manhattan
Percent Black vs. Amount of Gardenland



Graphs 8, 9, and 10 show little relationship between ethnicity and amount of gardenland. Graphs of Brooklyn and Bronx data can be found in Appendices A and B, respectively.

RESULTS AND DISCUSSION

A comparison of the results of the regression analyses for this study to those of my previous open-space study reveals that the R-squared values from this study are almost always higher than those from the previous study. However, the qualitative relationships (i.e., regression slopes) generally remain constant between the studies.

Table 1		
Manhattan		
Socioeconomic Factors vs. Distance to Garden		
Factor	R-squared value	Regression slope
Income 2000	0.465	Positive
Income change	0.300	Positive
Latino	0.182	Negative
White	0.421	Positive
Black	0.191	Negative
Asian	0.004	Negative

Table 1a		
Manhattan		
Socioeconomic Factors vs. Distance to Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.121	Positive
Latino	0.159	Negative
White	0.213	Positive
Black	0.068	Negative
Asian	0.000	N/A

Table 2		
Manhattan		
Socioeconomic Factors vs. Amount of Gardenland		
Factor	R-squared value	Regression slope
Income 2000	0.159	Negative
Income change	0.110	Negative
Latino	0.061	Positive
White	0.149	Negative
Black	0.116	Positive
Asian	0.005	Negative

Table 2a		
Manhattan		
Socioeconomic Factors vs. Amount of Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.046	Negative
Latino	0.164	Positive
White	0.142	Negative
Black	0.060	Positive
Asian	0.026	Negative

Table 3

Brooklyn		
Socioeconomic Factors vs. Distance to Garden		
Factor	R-squared value	Regression slope
Income 2000	0.125	Positive
Income change	0.006	Positive
Latino	0.022	Negative
White	0.215	Positive
Black	0.189	Negative
Asian	0.073	Positive

Table 3a

Brooklyn		
Socioeconomic Factors vs. Distance to Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.008	Positive
Latino	0.035	Negative
White	0.041	Positive
Black	0.021	Negative
Asian	0.039	Positive

Table 4

Brooklyn		
Socioeconomic Factors vs. Amount of Gardenland		
Factor	R-squared value	Regression slope
Income 2000	0.019	Negative
Income change	0.000	N/A
Latino	0.003	Positive
White	0.065	Negative
Black	0.067	Positive
Asian	0.037	Negative

Table 4a

Brooklyn		
Socioeconomic Factors vs. Amount of Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.012	Positive
Latino	0.001	Positive
White	0.001	Positive
Black	0.001	Negative
Asian	0.004	Negative

Table 5

The Bronx		
Socioeconomic Factors vs. Distance to Garden		
Factor	R-squared value	Regression slope
Income 2000	0.396	Positive
Income change	0.052	Positive
Latino	0.258	Negative
White	0.432	Positive
Black	0.063	Negative
Asian	0.132	Positive

Table 5a

The Bronx		
Socioeconomic Factors vs. Distance to Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.000	N/A
Latino	0.000	N/A
White	0.009	Positive
Black	0.020	Negative
Asian	0.025	Negative

Table 6

The Bronx		
Socioeconomic Factors vs. Amount of Gardenland		
Factor	R-squared value	Regression slope
Income 2000	0.095	Negative
Income change	0.002	Negative
Latino	0.081	Positive
White	0.073	Negative
Black	0.004	Positive
Asian	0.069	Negative

Table 6a

The Bronx		
Socioeconomic Factors vs. Amount of Open Land		
Factor	R-squared value	Regression slope
Income 2000	0.035	Positive
Latino	0.123	Negative
White	0.042	Positive
Black	0.324	Negative
Asian	0.131	Negative

One possible reason that the demographic factors considered in this report are more highly correlated with gardenland than they are with open space is that open space is too broad a category to have a strong relationship with local socioeconomic conditions. In the first study (Menone 2002), I mapped open space using National Land Cover Data (USGS), which did not allow me to assess the quality of the open space. As discussed earlier, open space is not all equally used by or useful to local communities.

In Manhattan, there are strong positive correlations between distance to nearest garden and income (Graph 1) and between distance to nearest garden and percent white (Graph 4). These correlations are probably due largely to the high concentrations of gardens in the Lower East Side—where the community garden movement in New York City may be said to have been born—and areas north of Central Park, which are generally areas of low income with relatively few whites.

Several Manhattan correlation analyses (distance to nearest garden vs. income, income change, percent Latino, and percent black [Graphs 1, 2, 3, and 5]; and amount of gardenland vs. income and income change [Graphs 6 and 7]) reveal an abrupt decrease in correlation above or below a certain threshold of the respective socioeconomic factor. Similar patterns were noted in the open-space study, raising the possibility that among groups of census tracts with highly variable distances both to community gardens and to open space (e.g., those with low percentages of Latinos), certain of these tracts are close to a community garden while others are close to another kind of open space. Alternatively, this pattern may be a result of spatial relationships between large public housing developments, many of which house only people below a certain income level, and community gardens. Unfortunately, there was insufficient time to perform a statistical investigation of these hypotheses.

In general, Brooklyn (Appendix A) has the lowest correlation rates of the three boroughs examined in this study, although the qualitative relationships between the socioeconomic and garden factors are basically the same as in Manhattan and the Bronx. These relatively low correlation rates are probably due largely to the fact that the community gardens in Brooklyn are more evenly distributed around the borough than are the gardens in Manhattan or the Bronx. A visual comparison between Manhattan and Brooklyn reveals a much lower degree of garden clustering in Brooklyn. The relatively weak correlations also may be a result of the fact that Brooklyn is much larger than Manhattan, and although many poor minority areas have community gardens, many do not, so the relationship is weakened.

The highest R-squared values in Table 3 (Brooklyn: Socioeconomic Factors vs. Distance to Garden) are associated with percent white and percent black. The correlation graph for percent white (Graph A4) reveals a large cluster of census tracts at zero to ten percent white that are very close to a garden, which may explain the strength of this correlation (there is a similar situation in the Bronx; see Graph B4). The graph for percent black (Graph A5) shows that most census tracts whose populations are more than ten percent black are fairly close to a community garden, which may explain the strength of this correlation.

In Brooklyn, as in Manhattan, a number of correlation analyses (e.g., distance to nearest garden vs. percent black [Graph A5] and amount of gardenland vs. percent black [Graph A11]) reveal an abrupt decrease in correlation below a certain threshold of the respective socioeconomic factor. There are, as explained above, at least two possible

explanations for this situation; however, there was insufficient time to investigate these hypotheses.

Community gardens in the Bronx (Appendix B) are less clustered than those in Manhattan, but somewhat more clustered than those in Brooklyn. The strong positive correlation between income and distance to garden is probably due largely to the fact that the areas of lowest income are in the southeast portion of the borough, where there are many community gardens. The strong negative correlation between percent Latino and distance to garden may be similarly explained, as the highest concentration of Latinos occurs in the southwest portion of the borough. The strong positive correlation between percent white and distance to garden may be explained by the fact that the highest concentrations of whites are in the northwest and eastern sections of the borough, where there are few community gardens.

The fact that areas of low income and high percentages of minority groups are generally closer to gardens than are other areas is not surprising, given the fact that community gardens are often initiated in response to neighborhood deterioration (Francis, Cashdan, and Paxson 1981). What is more surprising is that this general relationship is also true with parkland, leading one to question why poor minority areas are commonly close to large areas of both parkland and community gardens. The key to understanding this situation may lie in one of the motives for performing this project in the first place—namely, that parkland quality and usefulness varies greatly within a city. It may be that the parkland near low-income areas is not as well maintained as that near higher-income areas. This may be especially true in a time when many New York City parks are being funded and effectively run by organizations other than the Parks Department. These organizations, such as the Central Park Conservancy and the Prospect Park Alliance, often serve large parks with nearby communities of wealthy residents and businesses who can afford to help fund the upkeep of their neighborhood park. Such partnerships are not often seen in poor areas, leaving the Parks Department to maintain parks as well as it can on its very limited budget.

Another possible reason is that many high-income areas have neither nearby nor abundant parkland or community gardens is that people with more money are more likely to have yards, or are more able to leave the city for their share of open space. An interesting follow-up study to this report might be the spatial analysis of the correlation between back yards, parkland, and community gardens. The relative correlations of these different types of open space with socioeconomic factors could be particularly illuminating regarding this question.

Perhaps the most important question addressed in this study is whether community gardens promote social sustainability, particularly as it relates to community cohesiveness and quality of life, or whether they accelerate the process of gentrification by improving the neighborhood and attracting a more affluent population. In all three boroughs considered, income change was positively correlated with distance to nearest garden and negatively correlated with amount of gardenland. These correlations suggest that large areas that have experienced large increases in mean income, which are generally associated with rapid gentrification of a neighborhood, are not necessarily spatially correlated with areas with high concentrations of community gardens. Thus, this study supports the stance that community gardens promote social sustainability and do not accelerate the unsustainable process of gentrification. However, the assumption

that is in fact desirable to maintain a steady population in an urban neighborhood, while widely accepted in the fields of city planning and community development, is still subject to debate.

Throughout this report, there is an implicit assumption that relationships between gardens and the surrounding area reflect similar relationships between the gardens and the people that use and care for them. There is reason to believe that this assumption is accurate. According to Lenny Librizzi of CENYC's Open Space Greening Program, most community gardeners in New York City live on the block of the garden or within a couple of blocks. He adds that this may not be true in all cities, especially ones that have fewer gardens and where transportation is more car-dependent (Librizzi 2002). Similar studies in other cities may help clear up this uncertainty.

FURTHER CONSIDERATIONS

There are a few considerations to keep in mind when interpreting the results of this research. It is, for example, important to remember that any observed relationships between open space and socioeconomic factors do not establish causation. Also, since census tracts are the smallest spatial unit considered in this study, variation of socioeconomic factors within census tracts has been obscured. This should not be a cause for much concern here, as census tracts in New York City, which is densely populated, are generally quite small geographically. Furthermore, census tracts are widely accepted as suitable (i.e., small enough) geographic units for this sort of study (Been and Gupta 1997). Zip codes are generally considered to be too large a geographical area for this type of study, and are likely to lead to erroneous conclusions (Monmonier 1994).

It is important to remember that the data used in this project is constantly changing, and was, in fact, outdated before this report was completed. On September 18, 2002, New York City mayor Michael R. Bloomberg and New York State attorney general Eliot Spitzer, who brought a lawsuit against the city in 1999 to prevent it from auctioning garden land to the highest bidder, reached an agreement where the city agreed to preserve 391 community gardens and slate 38 others for immediate development, allowing approximately 2000 units of low-income housing to be constructed during the next year. One hundred fourteen gardens are subject to future sale or development. (Gotham Gazette 2002, Steinhauer 2002).

Finally, it must be recognized that the limited set of spatial and demographic variables considered in this report do not represent the full depth of urban complexity. Jane Jacobs, in her book *The Death and Life of Great American Cities*, describes cities as manifestations of organized complexity. She illustrates this condition in the following passage:

Consider again, as an illustration, the problem of a city neighborhood park. Any single factor about the park is slippery as an eel; it can potentially mean any number of things, depending on how it is acted upon by other factors and how it reacts to them. How much the park is used depends, in part, upon the park's own design. But even this partial influence of the park's design upon the park's use

depends, in turn, on who is around to use the park, and when, and this in turn depends on uses of the city outside the park itself ... Increase the park's size considerably, or else change its design in such a way that it severs and disperses users from the streets around it, instead of uniting and mixing them, and all bets are off. New sets of influence come into play, both in the park and in its surroundings. This is a far cry from the simple problem of ratios of open space to ratios of population ... (Jacobs 1961: 433-434)

Analyses of urban form and process, and of the relationship between the two, are subject to simplification. Due to time and budget constraints, many studies such as this (and, actually, including this), are nominally completed without a proper investigation of all relevant factors, leaving an incomplete picture of urban complexity. A full investigation of any one aspect of the city (e.g., community gardens) would necessitate an equally robust exploration of numerous other aspects of the intricate urban fabric. Jacobs expounds upon this predicament thusly:

[A]ny such simple systems of two-variable relationships cannot possibly be discerned in great cities—and never could be ... But in spite of this fact, planning theory has persistently applied this two-variable *system of thinking and analyzing* to big cities; and to this day city planners and housers believe they hold a precious nugget of truth about the *kind* of problem to be dealt with when they attempt to shape or reshape big-city neighborhoods into versions of two-variable systems, with ratios of one thing (as open space) depending directly and simply upon an immediate ratio of something else (as population). (Jacobs 1961: 436)

This acknowledgement of the limitations of this study and others like it is not meant to be discouraging to the student of urban form and process. Rather, it is meant to serve as a caveat not to oversimplify this extremely intricate subject and to strive to understand many of its aspects before making judgments or decisions about any one. Much remains to be learned not only about community gardens, but about all facets of cities.

ACKNOWLEDGEMENTS

I would like to thank my advisor Dr. Xuemei Bai. I would like to thank my co-workers Lenny Librizzi, Meredith Olson, Layman Lee, Gerard Lordahl, and everybody else at CENYC. I would like to thank the gardeners of New York City. I would like to thank my benefactors the Hixon Center for Urban Ecology, the Edna Bailey Sussman Fund, and the Teresa Heinz Scholars for Environmental Research. I would like to thank my urban collaborator Nicholas A. Molinari. I would like to thank my roommates Nabarun Dasgupta and Ruth Baker. I would like to thank my mom, dad, sisters, and the rest of my family. I would like to thank Chanticleer The Rooster. And Digital Vinyl.

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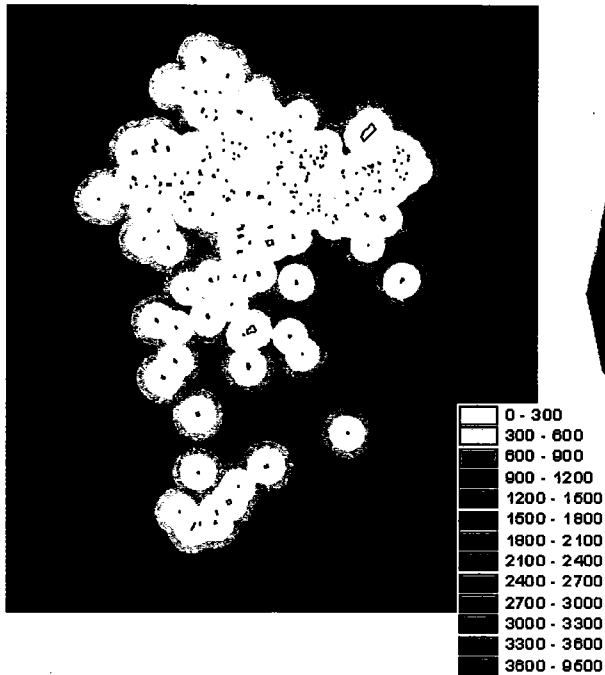
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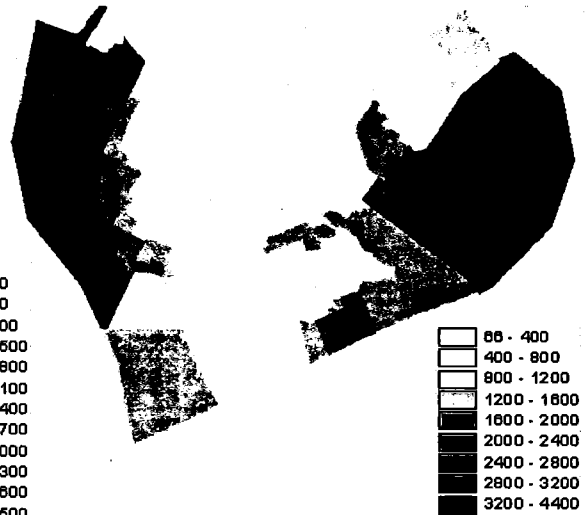
APPENDIX A

BROOKLYN

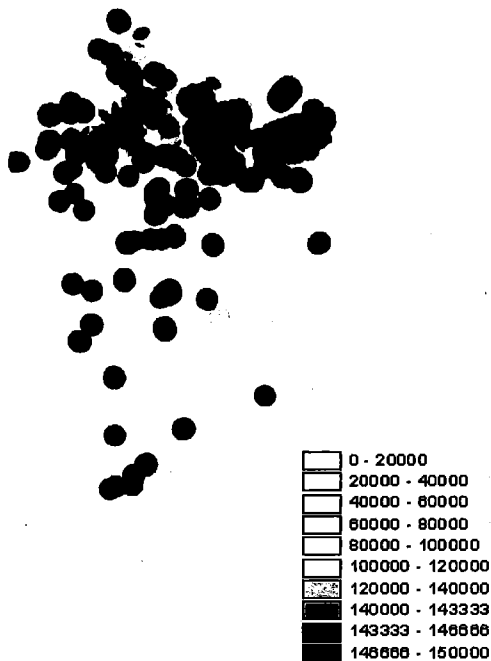
**Map A1: Brooklyn
Community Gardens (in yellow)
and Distance to Nearest Garden**



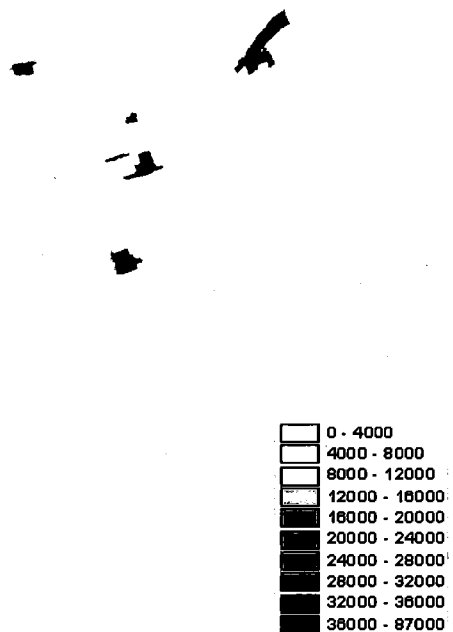
**Map A2: Brooklyn
Mean Distance
to Nearest Garden (m)
by census tract**



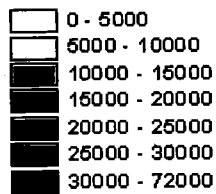
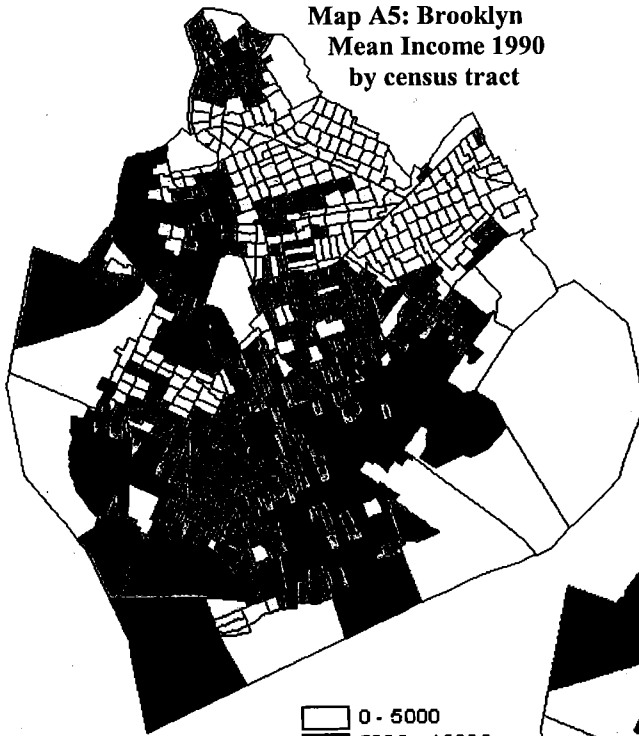
**Map A3: Brooklyn
Amount of Gardenland (sq meters)
within 1/4 mile**



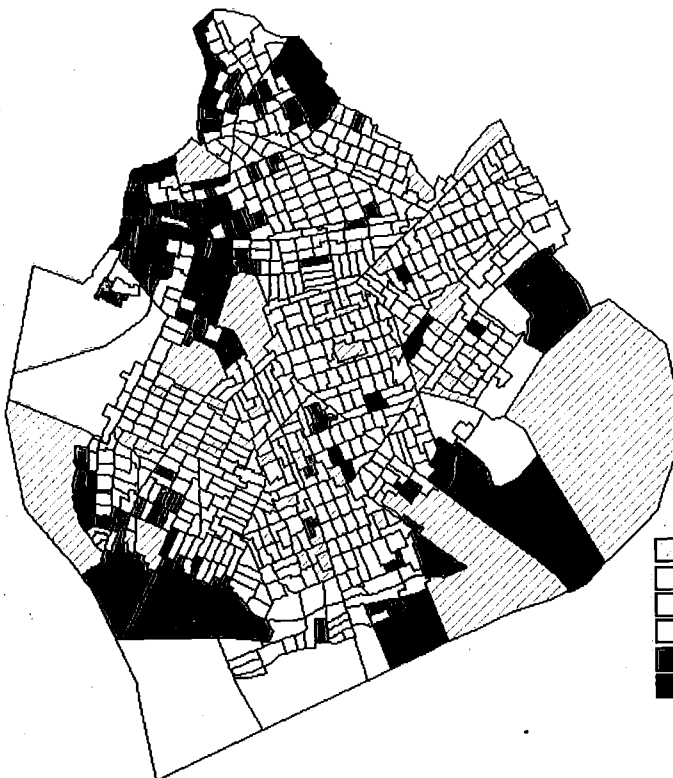
**Map A4: Brooklyn
Mean Amount
of Gardenland (sq meters)
within 1/4 mile
by census tract**



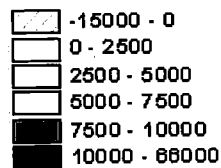
**Map A5: Brooklyn
Mean Income 1990
by census tract**



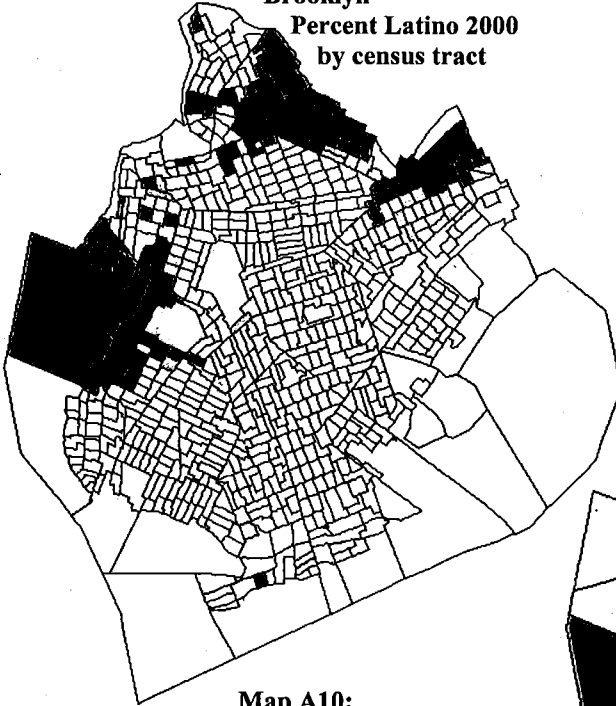
**Map A6: Brooklyn
Mean Income 2000
by census tract**



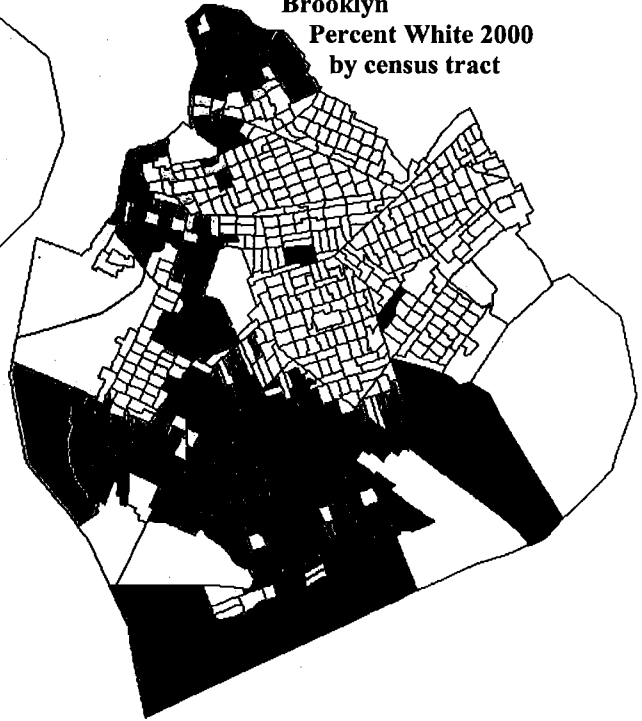
**Map A7: Brooklyn
Change in Mean Income
1990-2000
by census tract**



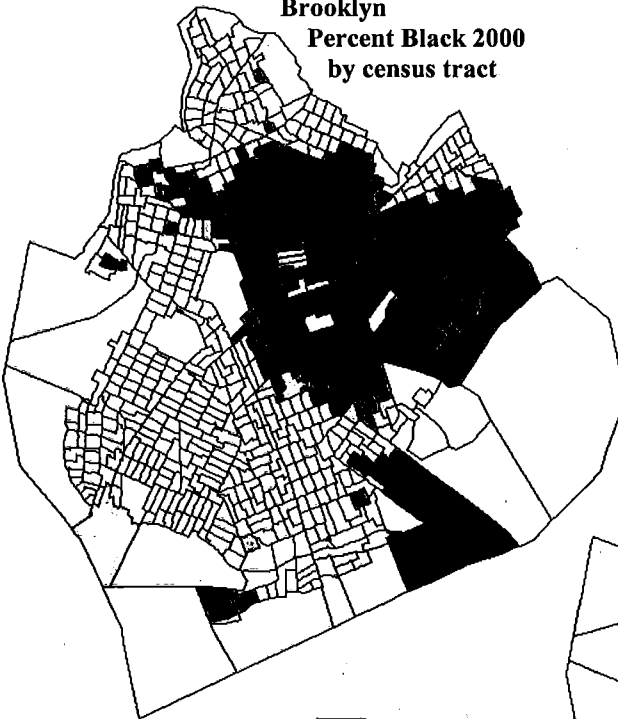
**Map A8:
Brooklyn
Percent Latino 2000
by census tract**



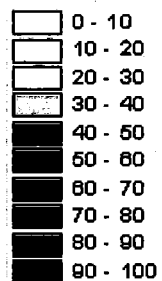
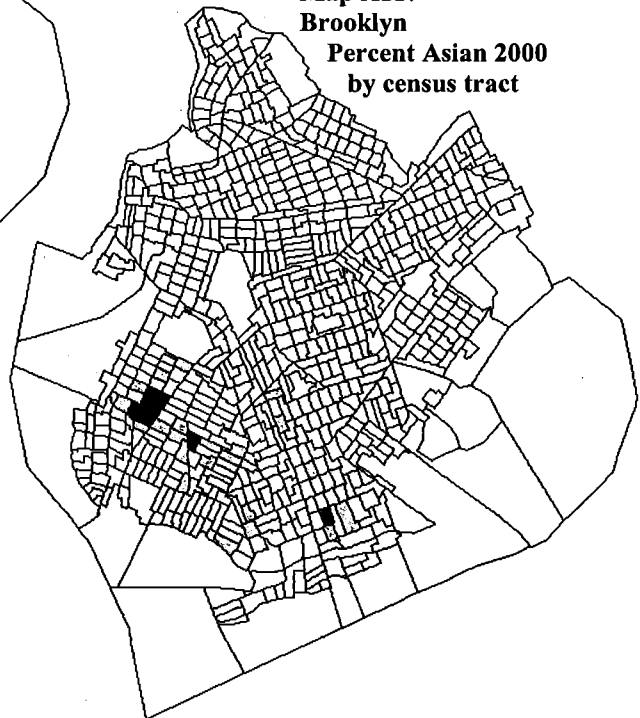
**Map A9:
Brooklyn
Percent White 2000
by census tract**



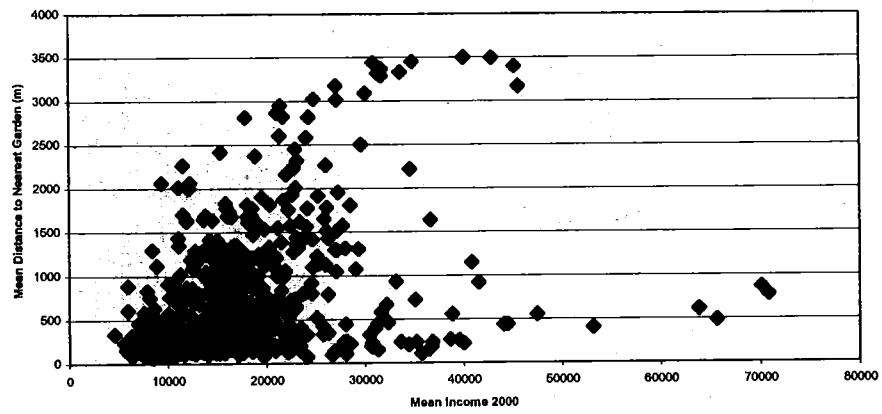
**Map A10:
Brooklyn
Percent Black 2000
by census tract**



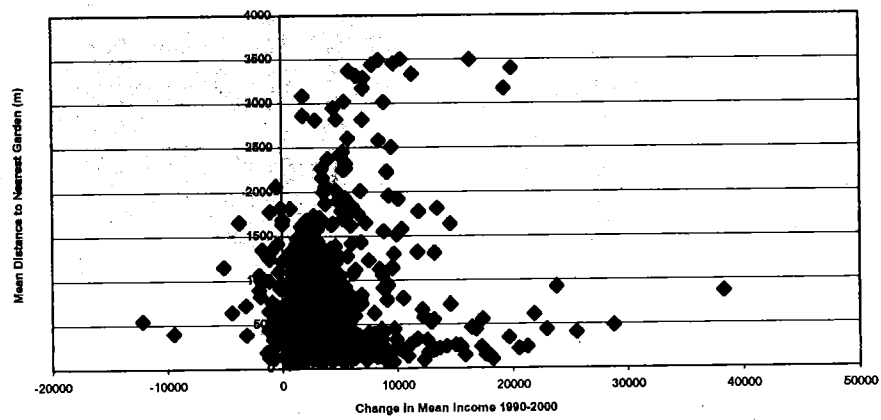
**Map A11:
Brooklyn
Percent Asian 2000
by census tract**



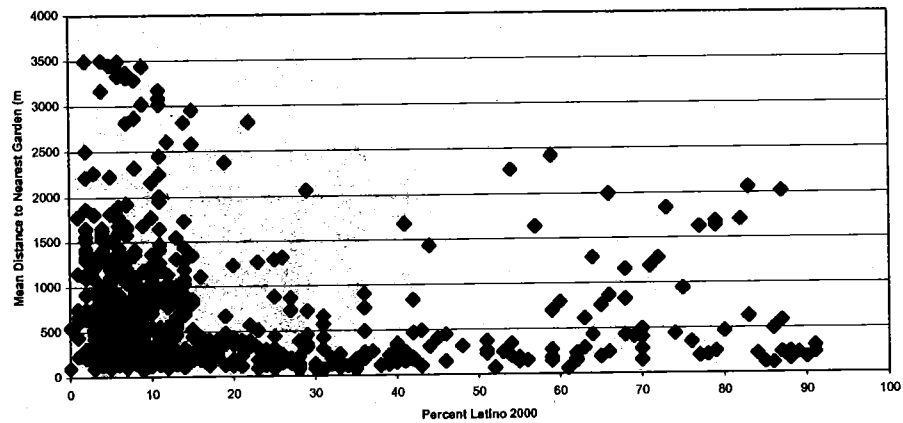
Graph A1
Brooklyn
Income vs. Distance to Garden



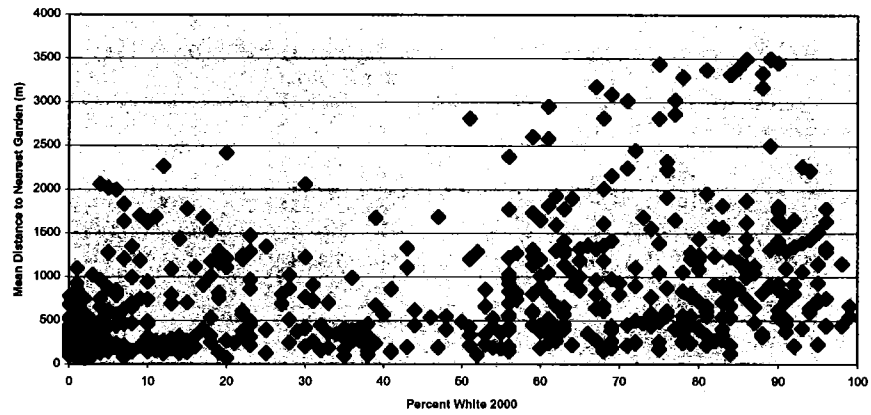
Graph A2
Brooklyn
Income Change vs. Distance to Garden



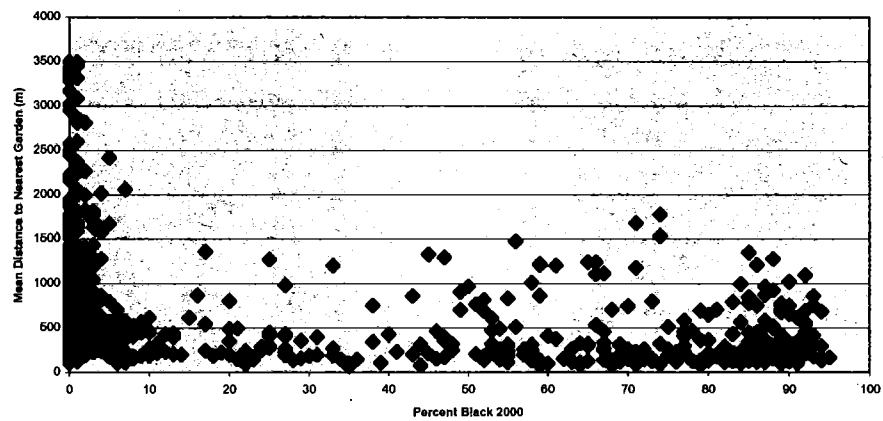
Graph A3
Brooklyn
Percent Latino vs. Distance to Garden



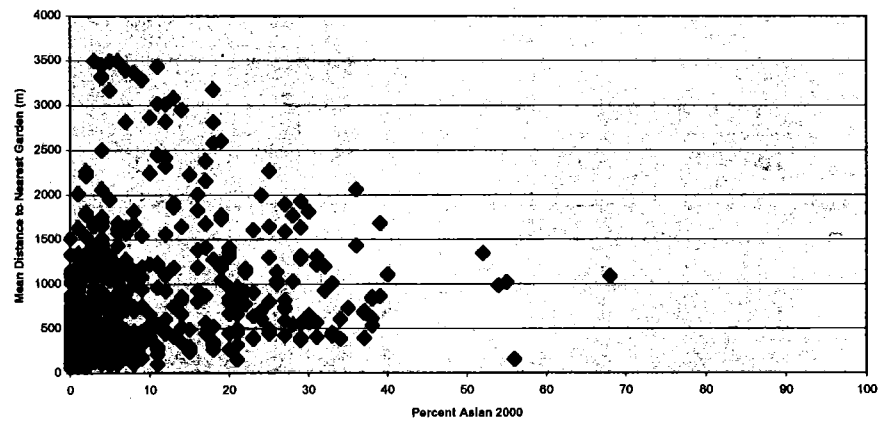
Graph A4
Brooklyn
Percent White vs. Distance to Garden



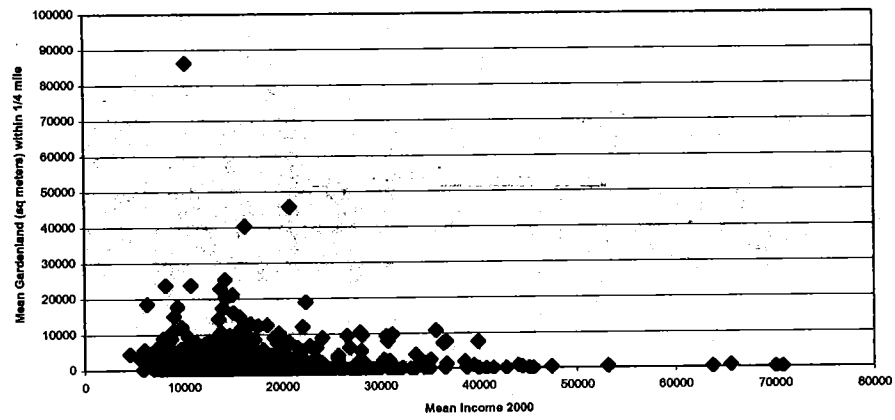
Graph A5
Brooklyn
Percent Black vs. Distance to Garden



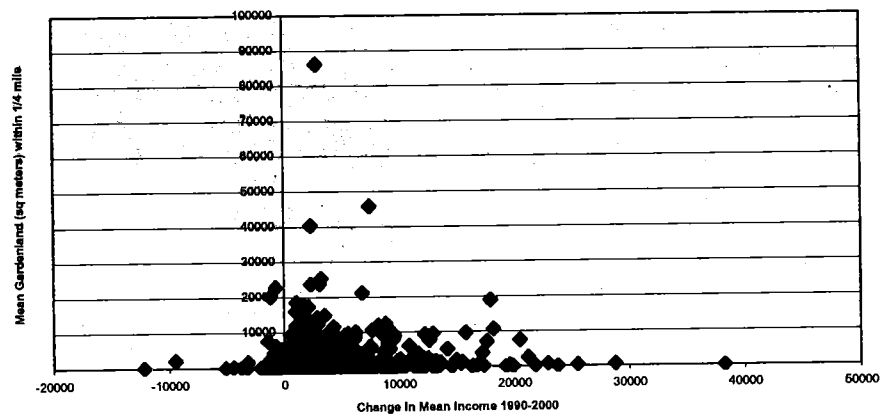
Graph A6
Brooklyn
Percent Asian vs. Distance to Garden



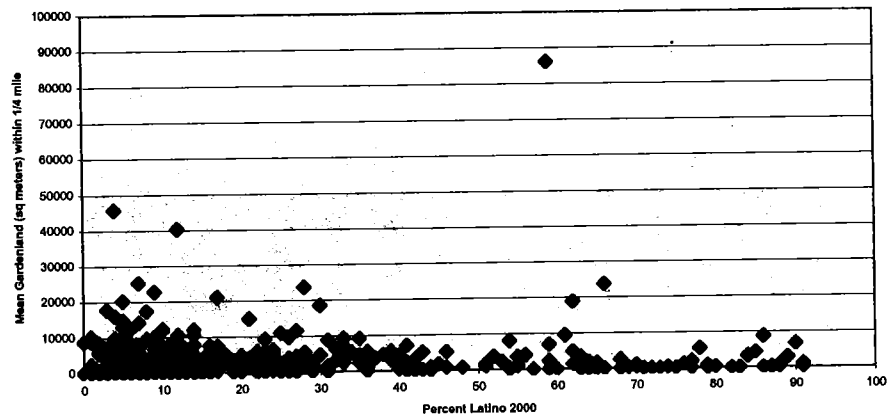
Graph A7
Brooklyn
Income vs. Amount of Gardenland



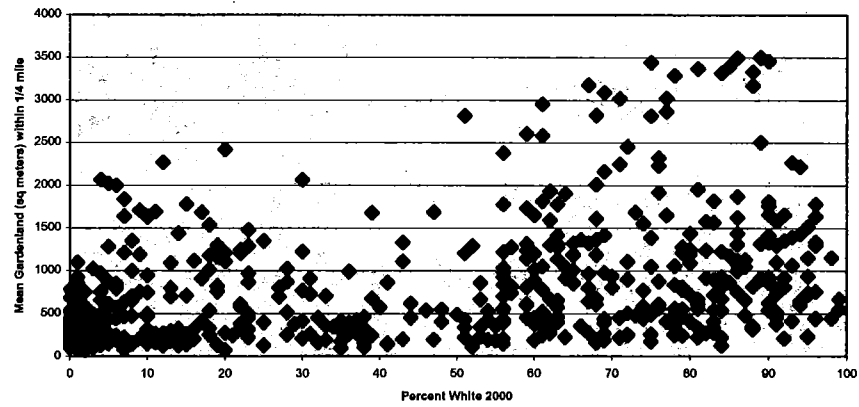
Graph A8
Brooklyn
Income Change vs. Amount of Gardenland



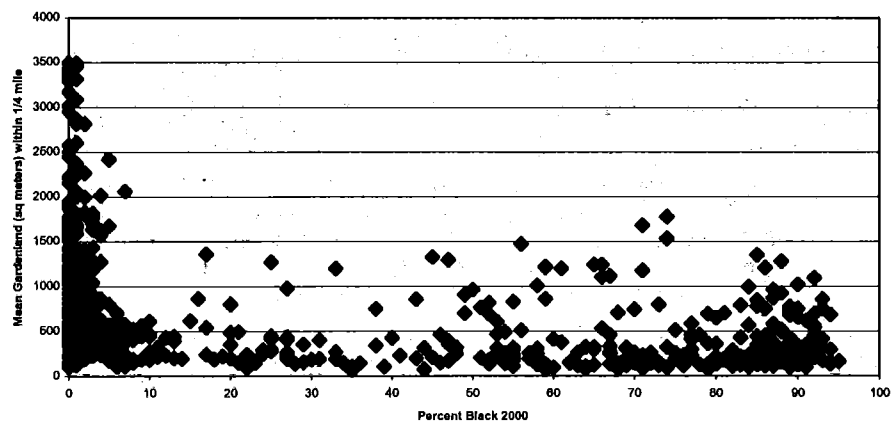
Graph A9
Brooklyn
Percent Latino vs. Amount of Gardenland



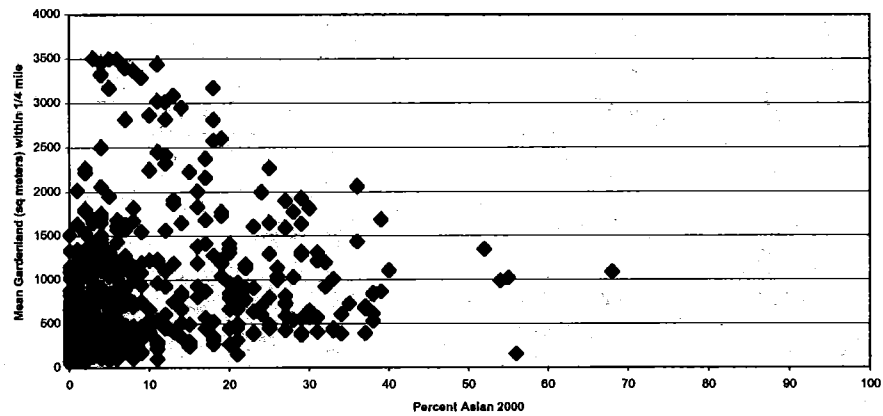
Graph A10
Brooklyn
Percent White vs. Amount of Gardenland



Graph A11
Brooklyn
Percent Black vs. Amount of Gardenland

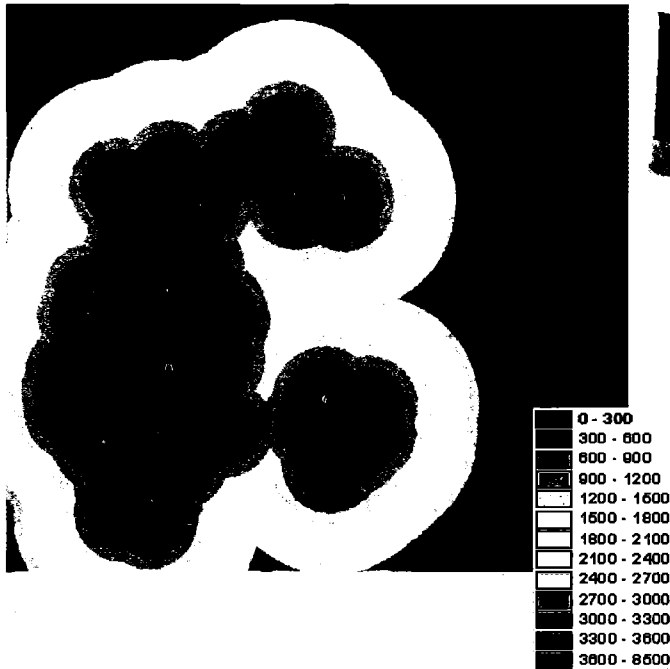


Graph A12
Brooklyn
Percent Asian vs. Amount of Gardenland

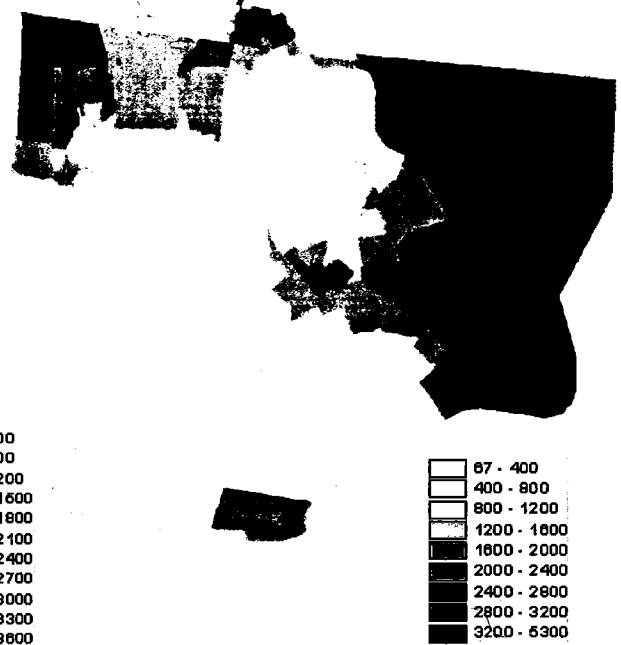


APPENDIX B THE BRONX

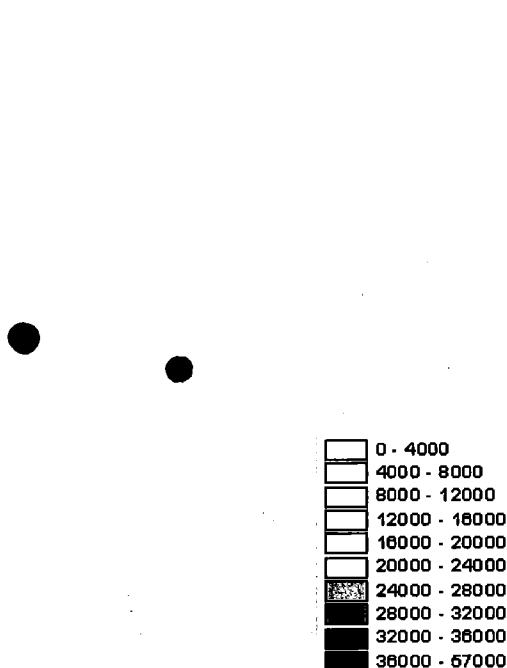
Map B1: The Bronx
Community Gardens (in orange)
and Distance to Nearest Garden (m)



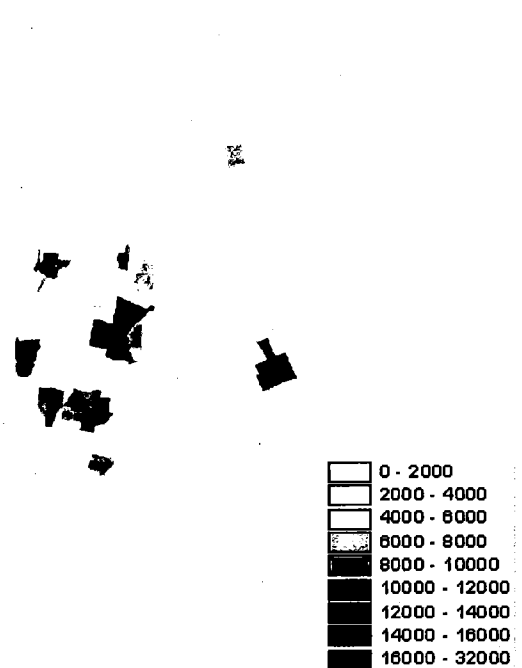
Map B2: The Bronx
Mean Distance to Nearest Garden (m)
by census tract



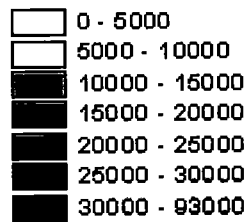
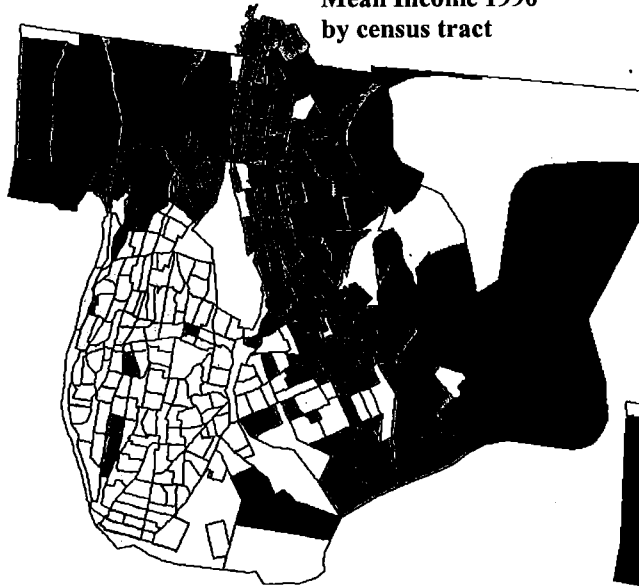
Map B3: The Bronx
Amount of Gardenland (sq meters)
within 1/4 mile



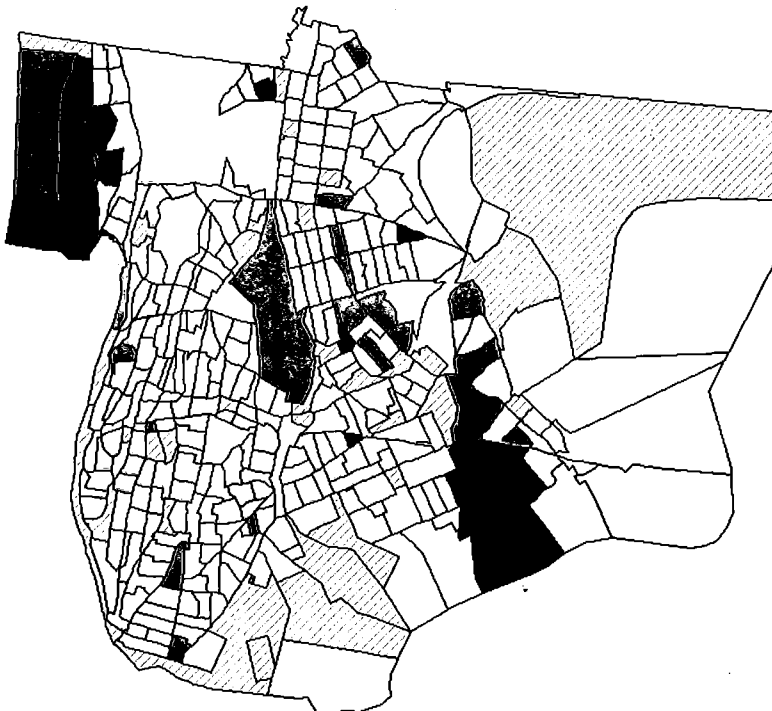
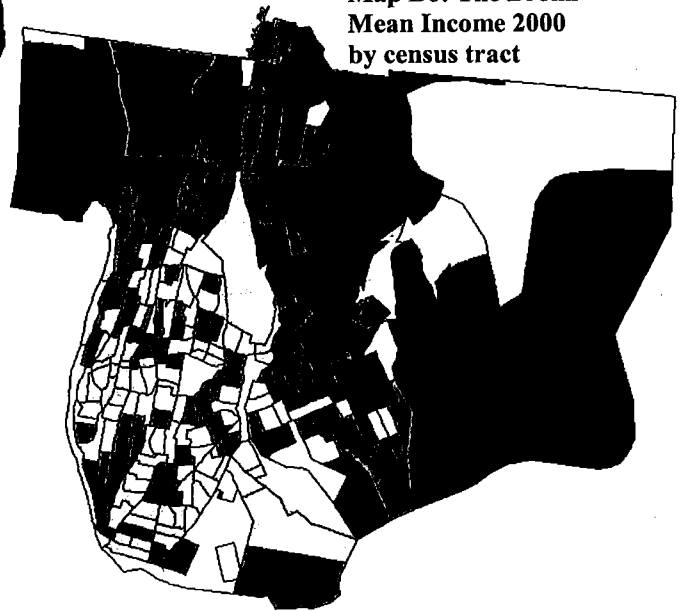
Map B4: The Bronx
Mean Amount of Gardenland (sq meters)
within 1/4 mile by census tract



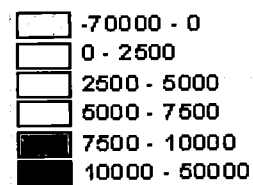
**Map B5: The Bronx
Mean Income 1990
by census tract**



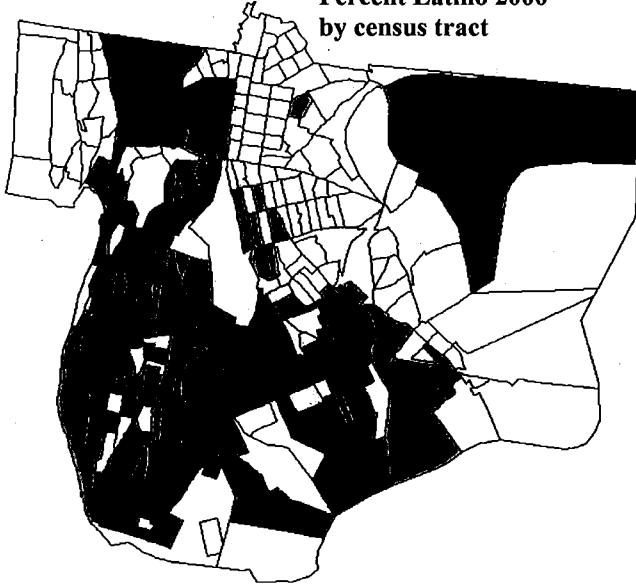
**Map B6: The Bronx
Mean Income 2000
by census tract**



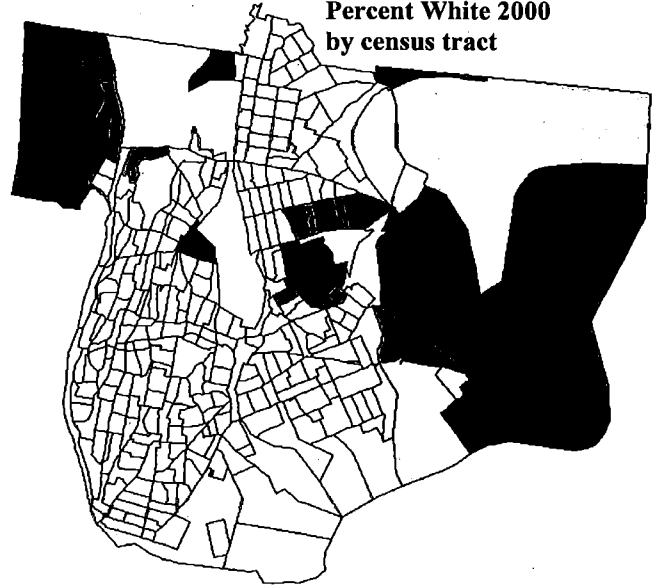
**Map B7: The Bronx
Change in Mean Income
1990-2000
by census tract**



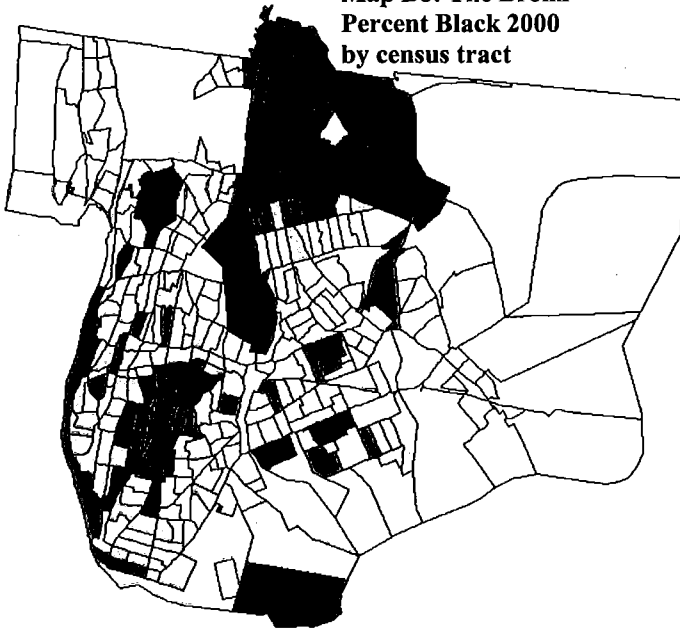
**Map B8: The Bronx
Percent Latino 2000
by census tract**



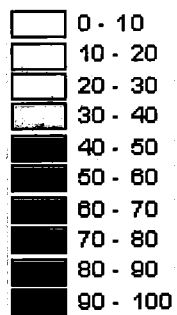
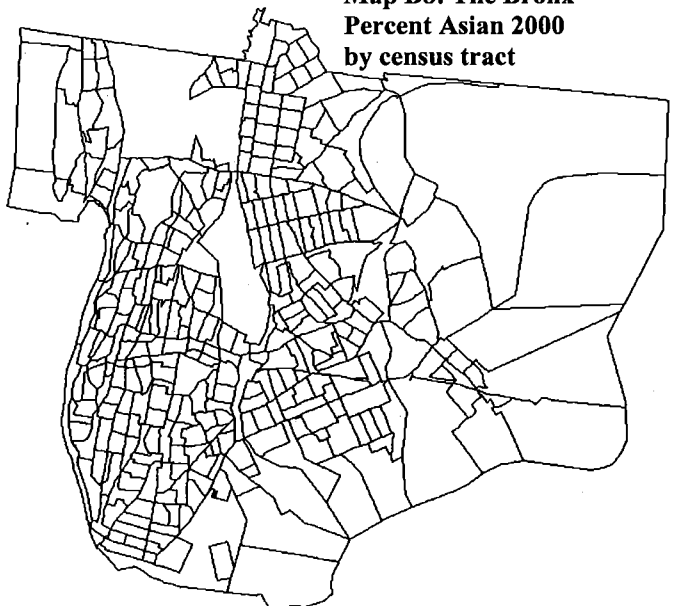
**Map B9: The Bronx
Percent White 2000
by census tract**



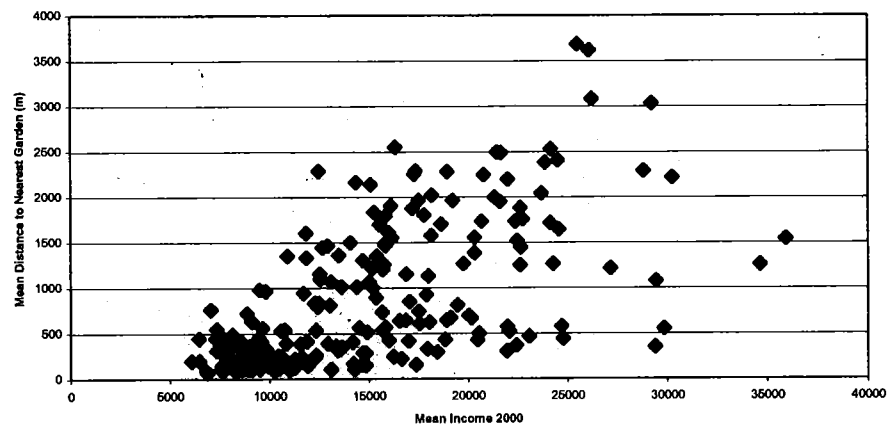
**Map B8: The Bronx
Percent Black 2000
by census tract**



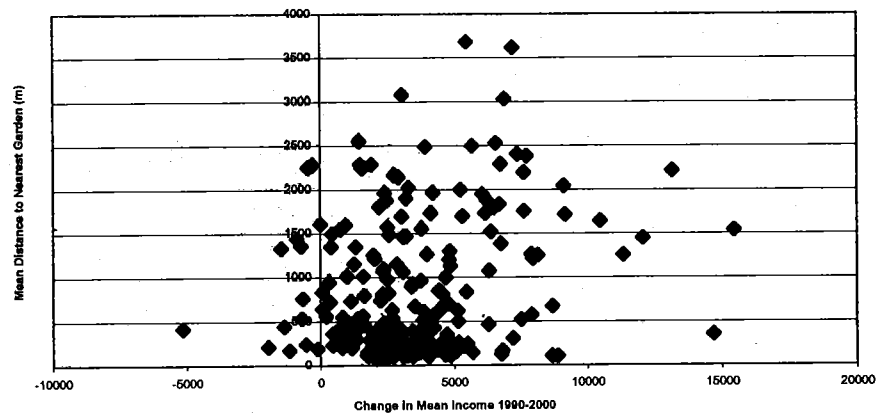
**Map B8: The Bronx
Percent Asian 2000
by census tract**



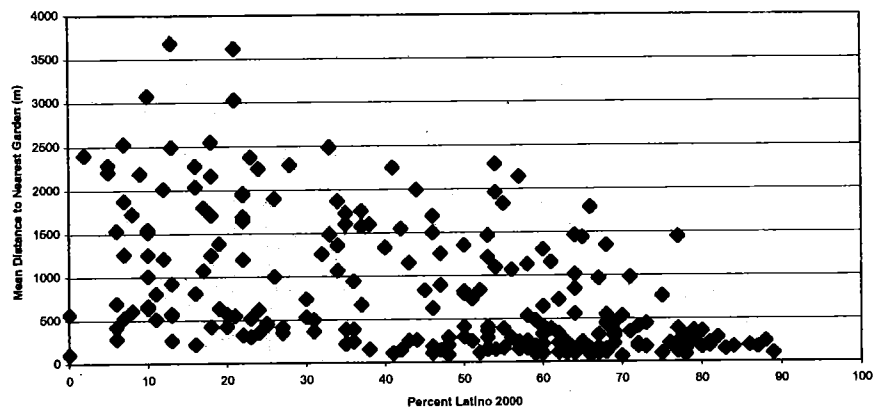
Graph B1
The Bronx
Income vs. Distance to Garden



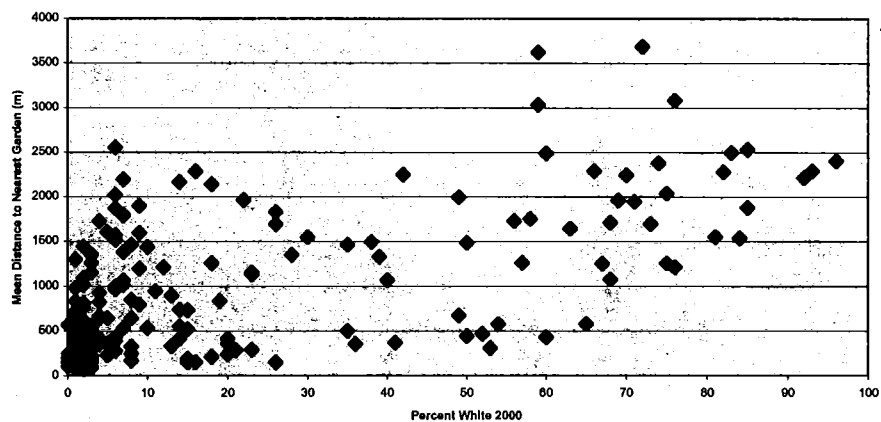
Graph B2
The Bronx
Income Change vs. Distance to Garden



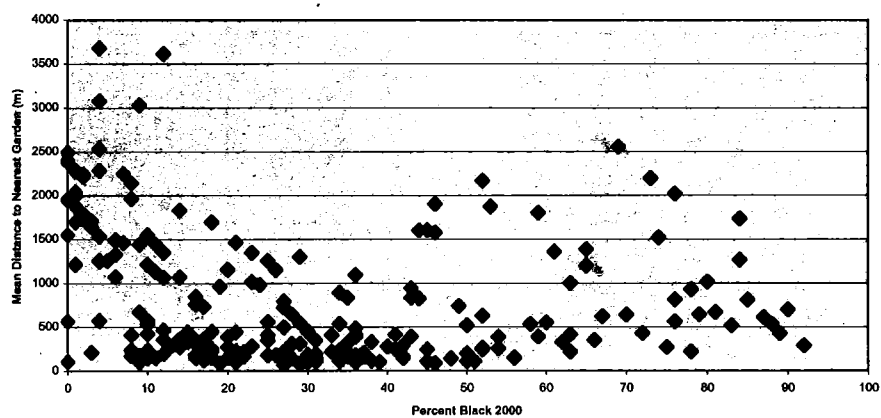
Graph B3
The Bronx
Percent Latino vs. Distance to Garden



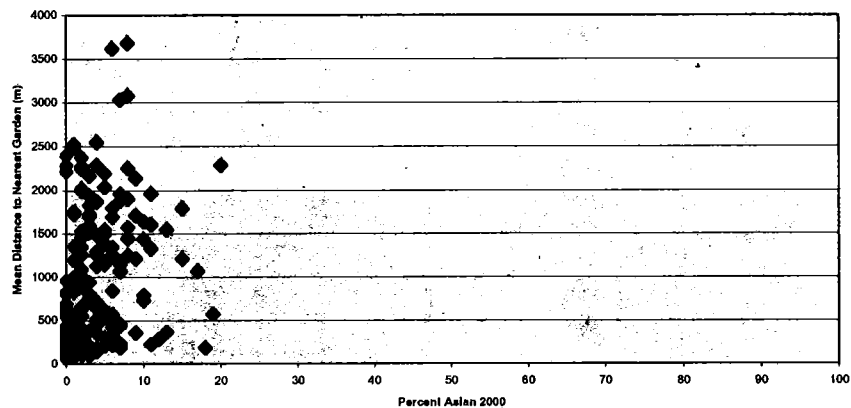
Graph B4
The Bronx
Percent White vs. Distance to Garden



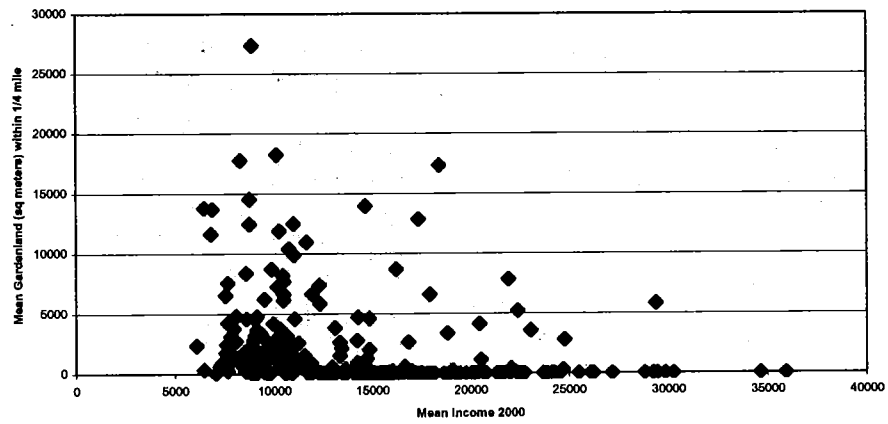
Graph B5
The Bronx
Percent Black vs. Distance to Garden



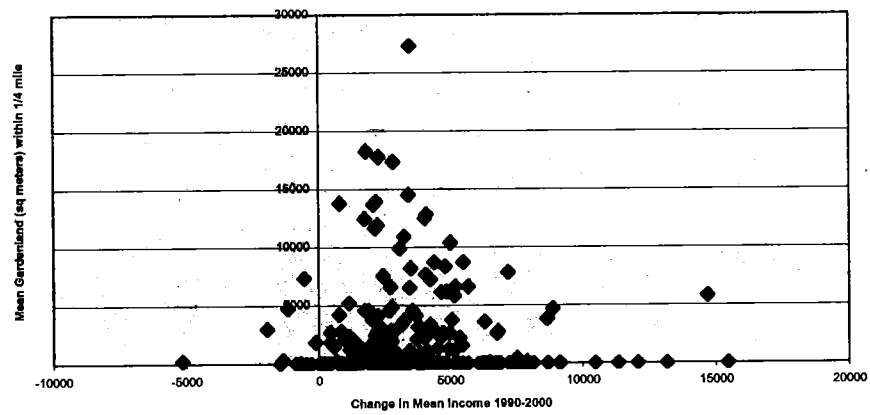
Graph B6
The Bronx
Percent Asian vs. Distance to Garden



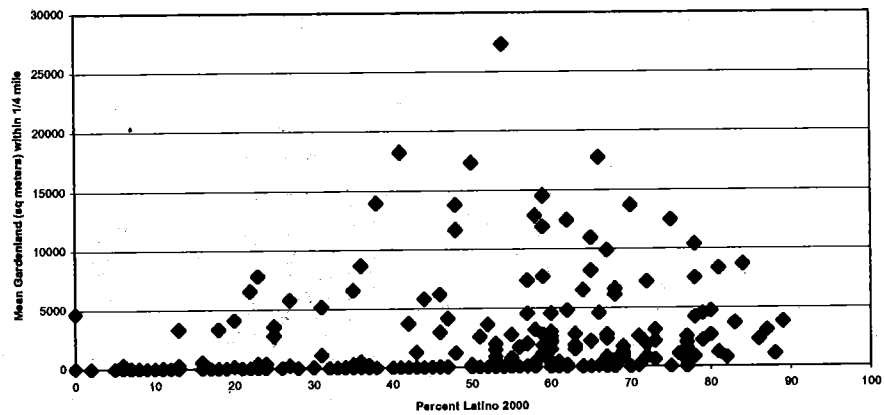
Graph B7
The Bronx
Income vs. Amount of Gardenland



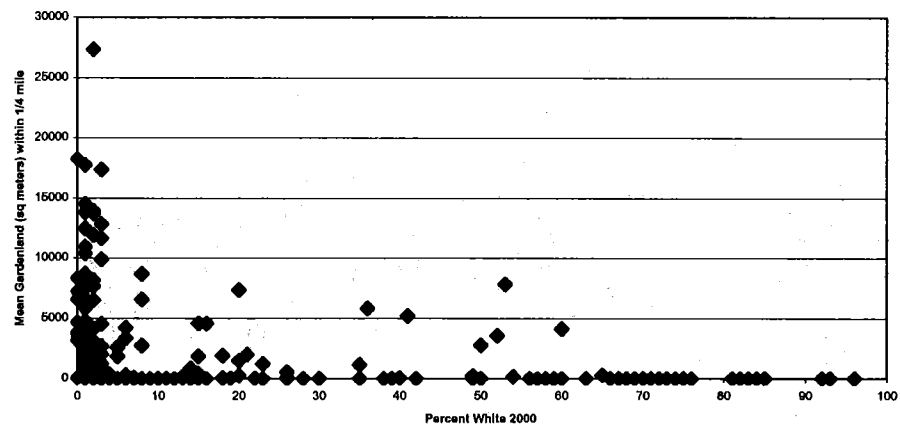
Graph B8
The Bronx
Income Change vs. Amount of Gardenland



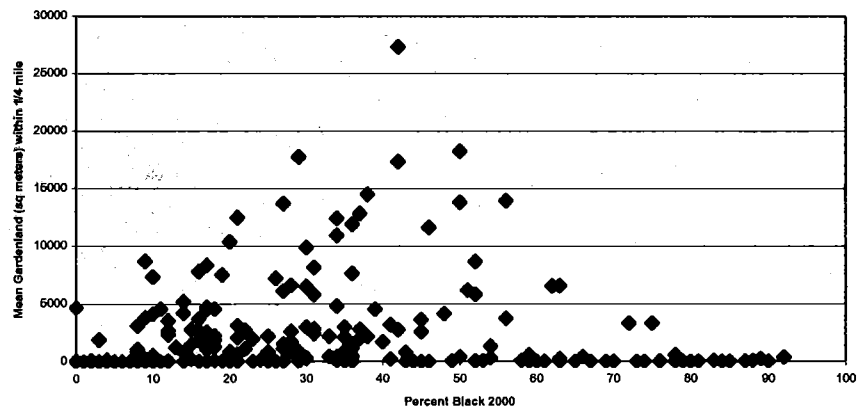
Graph B9
The Bronx
Percent Latino vs. Amount of Gardenland



Graph B10
The Bronx
Percent White vs. Amount of Gardenland



Graph B11
The Bronx
Percent Black vs. Amount of Gardenland



Graph B12
The Bronx
Percent Asian vs. Amount of Gardenland

