INDUSTRIAL ZONING CHANGES IN NEW YORK CITY
A Case Study of "Expulsive" Zoning

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ABSTRACT

Using New York City as a case study, this paper examines how zoning and the legal mechanism of zoning changes can contribute toward environmental injustice, and offers recommendations for achieving justice through planning. Noxious uses tend to concentrate in poor and minority industrial neighborhoods due to re-zoning more affluent and less minority industrial areas to other uses, and expanding industrial zones in poorer neighborhoods and communities of color. This set of practices has been termed "expulsive" zoning, and is characterized by displacement of poor and minority people (and industry) from gentrifying industrial zones, the intrusion of additional noxious land uses into predominantly poor and minority industrial areas, and the concomitant reduction of environmental quality there. Zoning policy, it will be argued, can have adverse impacts on public health and equity, by disproportionately burdening poorer and more minority populations with noxious or environmentally risky land uses.

LAND USE REGULATIONS AND ENVIRONMENTAL JUSTICE

That land use regulations directly influence environmental justice outcomes is an idea that is not considered sufficiently in environmental justice or planning research (Arnold, 1998; Rabin, 1989). The major focus of environmental justice research to date has been the uneven spatial distribution of noxious uses, or specific LULUs (locally undesirable land uses), and their potential adverse effects on proximate populations (Been & Gupta, 1996; Boer, Pastor, Sadd, & Synder, 1997; Bowen, Salling, Haynes, & Cyran, 1995; Burke, 1993; Centner, Kriesle, & Keeler, 1996; Glickman & Hersh, 1995; Greenberg, 1993; Maantay, 2002a; Maantay, Timander, Graziosi, & Meyer, 1997; Mohai & Bryant, 1992; Neumann, Forman, & Rothlein, 1998; Perlin, Setzer, Creason, & Sexton, 1995; Pollock & Vittas, 1995; Stretesky & Lynch, 1999; Wernette & Nieves, 1992).

Environmental justice has been defined as "the provision of adequate protection from environmental toxicants for all people, regardless of age, ethnicity, gender, health status, social class, or race" (Nordenstam, 1995, p. 52), and the proximity of noxious land uses to populated areas is believed to jeopardize environmental health and justice. Although many researchers have focused on the disproportionate environmental burdens borne by the poor and communities of color, others have expanded the definition of environmental justice to include other vulnerable populations, such as the very young, the elderly, the infirm and immune-compromised, pregnant women, immigrants, and future generations (Greenberg, 1993). The definitions of environmental justice can also include the words "equity" and/or "equality" (Bryant, 1995). These words are often used interchangeably, but have generally come to denote quite different aspects of justice. Equity and equality often are equated with "process" and "outcome" types of justice, respectively. Equity is said to pertain to fairness in administrative and regulatory procedures, and equal opportunity to participate in decision-making process, while equality connotes evenness of results (or the real potential for equality of results) (Renn, Webler, & Wiedmann, 1995; Glickman & Hersh, 1995). In this paper, I use the word equity in its broadest sense, to encompass both procedural equity and outcome equality, meaning not only "fairness," but also the potential for actually achieving equality of outcomes. [1]

Much of environmental justice research deals with the presence of noxious uses within communities, and the resulting disproportionate burden on such communities, which are generally poor neighborhoods and/or communities of color (Bryant, 1995; Bullard, 1994; Camacho, 1998; Goldman, 1993; Johnston, 1994; United Church of Christ's Commission for Racial Justice, 1987). The underlying zoning designations and subsequent zoning changes are rarely factored into the analysis. While zoning tends to act as the "gatekeeper" in terms of where noxious uses can be legally sited within a municipality (Maantay, 2000), the ramifications of zoning for environmental health and equity have been somewhat hidden. Zoning is often overlooked as a root enabling cause of disproportionate environmental

burdens. Based on criteria of "appropriateness," [2] zoning seemingly reflects the natural order of things.

This study makes use of Geographic Information Systems [3] (GIS) to analyze the distribution of the areas zoned for industrial uses in New York City (the Manufacturing, or "M," zones), in relation to the demographic and socio-economic characteristics of their proximate populations. The zoning changes that altered the geographical extent or land use intensiveness of M zones throughout the City were catalogued and codified so that they could be mapped and analyzed in light of the characteristics of affected populations and how those populations changed over four decades of time. The case study will first be placed in the broader context of zoning's purposes, and of the discriminatory subtext of many zoning ordinances, as captured by both exclusionary and expulsive zoning plans. After a brief description of New York City's industrial zones and zoning, I will discuss the objectives, methodology, and findings of the New York City industrial zone case study, including a detailed examination of the changes within two industrial districts. The New York City planning response to environmental justice concerns is described and evaluated, and other possible planning mechanisms intended to correct and prevent environmental injustice are outlined.

The Racial Aspects of Zoning

The ostensible purpose of zoning is the protection of the public's health, safety, welfare, and morals. (Babcock, 1966; Bassett, 1936; Bressi, 1993; Freund, 1904; Haar & Wolf, 1989; Platt, 1991; Toll, 1969). One of the means of achieving this goal through zoning has been the segregation of land uses, in particular, the separation of residential from industrial. Segregating land uses that are deemed incompatible is an accepted function of zoning. Many zoning ordinances have also resulted in the segregation of "incompatible" people. Zoning's origins as a means to exclude "undesirable" racial groups are well known, and include the prohibition of laundries from residentially zoned areas in San Francisco intended to keep Chinese people out of white neighborhoods (Toll, 1969, p. 29). New York City's first zoning ordinance was designed to keep immigrant factory workers away from elite commercial and residential areas by "protecting" those areas (through zoning) from manufacturing uses (Willis, 1993; Makielski, 1966). Racial segregation through the use of zoning policy has also occurred in cities such as Richmond, Norfolk, Roanoke, and Portsmouth, Virginia; Winston-Salem, North Carolina; Birmingham, Alabama; Atlanta, Georgia; Louisville, Kentucky; St. Louis, Missouri; Oklahoma City, Oklahoma; Indianapolis, Indiana; New Orleans, Louisiana; and Dallas, Texas (Rabin, 1989, p. 106).

In many municipalities, residential racial segregation occurred as an indirect result of the segregation of land uses types, use intensities, and housing densities, and as a result of the assumptions that were made

about what were appropriate uses to commingle. For instance, using poor or minority neighborhoods as buffer zones between industrial uses and single-family home white neighborhoods was common practice in many cities' zoning plans (Rabin, 1989). This was based on the planning principle that multi-family dwellings were more appropriate to site near industry than were single-family homes. Poor and minority people often had little choice (economically and due to other forms of discrimination) but to live in multi-family dwelling units and therefore closer to industrial zones. Additionally, in some cities, industrial areas themselves were used as buffers to separate white and black neighborhoods.

In other places, zoned racial segregation occurred overtly, by design. Early zoning plans, especially in southern U.S. cities, often included zones for "White" neighborhoods and "Negro" districts (Silver, 1997, p. 28). Within these zones, property owners were often prohibited from selling their property to a person of another race, but in practice this mainly prevented blacks from owning property in a "White" neighborhood, and did not prevent whites from owning houses (as absentee landlords) in a "Negro" neighborhood (Silver, 1997).

Baltimore enacted the first comprehensive racial zoning ordinance in the U.S. in 1910, designating residential zones that were majority white, majority black, and mixed. The city's mayor at the time said that "blacks should be quarantined in isolated slums in order to reduce the incidence of civil disturbance, to prevent the spread of communicable disease into the nearby White neighborhoods, and to protect property values among the White majority" (Power, 1983, p. 301). These seemed like reasonable goals to many in local governments (and a reasonable use of zoning), and other cities followed suit.

Although racial zoning *per se* was struck down by a 1917 U.S. Supreme Court decision finding Louisville, Kentucky's racial zoning regulations invalid, this did not stop other municipalities from enacting racial zoning, including Miami, Florida, and Birmingham, Alabama, where it remained in effect until 1951. The State of Texas racial district law remained on the books until 1969, and a Dade City, Florida, ordinance that prohibited racial intermingling remained in effect until 1975 (Dubin, 1993). Additionally, other cities found ways to ensure residential segregation by race, without resorting to the blatant imposition of "White" and "Negro" designated zones. Restricting the location of black people to certain districts was surprisingly easy to accomplish, even without racial zoning. The incorporation of historic landmark districts into zoning ordinances was done in Charleston, South Carolina, and New Orleans, Louisiana, in the 1920s and 30s, and these were designed to (among other things) stop the growth of black neighborhoods from encroaching on white neighborhoods, or to expel blacks from a given neighborhood. "The testimony of local preservationists indicates that displacement of Blacks from the

Historic area was one of the implicit goals of the plan and a desired outcome of neighborhood revitalization" (Silver, 1997, p. 35). Racially restrictive covenants and deeds were widely used by white homeowners, and continued to be enforced in many areas until the 1960s (Abrams, 1971; Massey & Denton, 1993; Vose, 1959).

After World War II, planning policies in many U.S. cities were dictated by urban renewal schemes, often involving slum clearance, public housing construction, and street and highway projects. As has been amply reported elsewhere, these projects had a deleterious impact on lower-income and minority communities, forcing relocation, overcrowding, and often worse housing conditions and higher levels of segregation onto the displaced populations, in addition to (in many cases) the destruction of community life and social networks (Anderson, 1964; Caro, 1971; Jacobs, 1961; O'Connor, 1993; Schwartz, 1993). These urban renewal projects were usually preceded by zoning changes to facilitate the project, which also had the effect of increasing racial segregation and the concentration of poor and minority people in or near industrial zones (Maantay, 2000).

Other land use planning mechanisms, such as exclusionary zoning, reinforced the pattern of racial segregation, and the concomitant environmental burdens were disproportionately borne by minorities and poor people. The history and effects of exclusionary zoning are well documented: by requiring minimum lot sizes, housing types, house sizes, minimum square foot construction costs, or costly construction materials, many zoning ordinances have managed to keep lower-income and minority people out of certain communities, and have successfully maintained community homogeneity (Haar & Wolf, 1989; Branfman, Cohen, & Trubek, 1974; Elias, 1974; Lauber, 1974; Levy, 1974; National Committee Against Discrimination in Housing, 1974; Williams & Norman, 1974). Although exclusionary zoning ordinances have been successfully challenged in the courts as discriminatory (most notably in the Mount Laurel case), they have for many years effectively limited the choices of where poor and minority people can live, often relegating them to the least desirable locations (*Southern Burlington County NAACP v. Township of Mount Laurel* 67 N.J. 151, 336 A2d 713 (1975)).

Expulsive Zoning

In addition to zoning's historic role as an exclusionary device, zoning also can contribute directly to the undesirable nature of the very places where poor and minority people are often restricted (by zoning) to living. Zoning or re-zoning an area to permit heavier (potentially more polluting) or more concentrated industrial uses can adversely impact the people who live there, creating a different and perhaps more pernicious type of inequity than exclusionary zoning alone.

This type of zoning has been called "expulsive" zoning, because it tends to "permit - even promote - the intrusion into black neighborhoods of dis-

ruptive incompatible uses that have diminished the quality and undermined the stability of those neighborhoods" (Rabin, 1989, p. 101).

Although zoning was first advocated in this country by social reformers as a well-meaning and rational method to improve poor living conditions, it was rapidly transformed by real estate and commercial interests and individual property owners as a way of protecting property values and excluding undesirables (Makielski, 1966; Toll, 1969). Expulsive zoning is yet another example of how zoning can be appropriated to serve private interests rather than the public good, negating zoning's promise of "protecting residential communities from the negative by-products of industrialization and commercial development" (Dubin, 1993, p. 798). In other words, zoning's promise of equal protection from noxious land uses has often proven a lie for poor people and communities of color.

Yale Rabin, in his "Expulsive Zoning: The Inequitable Legacy of Euclid," examines the zoning plans of 12 U.S. cities, and finds that

> [t]he adverse impacts evident in these 12 cases of expulsive zoning vary widely. They include environmentally blighting nuisances, displacement, and life-threatening hazards… The blighting and disruptive effects of expulsive zoning grow, rather than diminish, with the passage of time… Expulsive zoning is not merely an historical remnant of a racially unenlightened past, but a current practice that continues to threaten, degrade, and destabilize black and other minority neighborhoods (Rabin, 1989, p. 118).

Rabin's study found that expulsive zoning generally takes one of two forms: by higher-grade zoning, it serves to gentrify an area so that the poorer inhabitants are priced out, or by lower-grade zoning, it imposes burdensome uses on areas where poor or minority people live, resulting in either direct displacement of residents by noxious land uses, or an undermining of environmental quality, safety, and stability of the neighborhood.

The type of expulsive zoning occurring in New York City takes both forms, and also differs in some important respects from Rabin's case study cities, as will be discussed below. One of the underlying purposes of New York City's original 1916 zoning plan was the preservation of property values in the more affluent commercial and residential parts of the city, and the protection of these lands and people from the encroachment of industry, immigrants, and blacks (Makielski, 1966; Toll, 1969). Although New York City never participated in outright racial zoning, the city's residential populations are strongly segregated by race and ethnicity – perhaps as much in 2000 as in 1960, especially considering that New York City's population is now more than 60 percent minority (see Figure 1). The city's zoning policies and practices and the related urban renewal efforts

and transportation projects, as well as the exclusionary zoning practices of many of the city's surrounding suburbs, have concentrated poor and minority people and noxious land uses together in certain areas of the city. Many view racial segregation as the root of the problem: "Segregation in both the residential and labor markets is what enables environmental burdens to be inequitably distributed in the first place" (Higgins, 1993, p. 287).

Industrial Zones in New York City

New York City has 59 major manufacturing districts, according to the New York City Department of City Planning's "Citywide Industry Study: Geographical Atlas of Industrial Areas" (1993). As befits a city greatly expanded and industrialized in the seaport-centric 19th century, most of New York's manufacturing districts are located along its many waterfronts. The rest of the major manufacturing zones are located near more recent forms of transportation infrastructure, such as railroads, airports, and highway interchanges (see Figure 2).

Many of New York City's existing industrial areas were in place by the late 19th century, well before New York's first zoning ordinance in 1916. To a large degree, the 1916 zoning plan reflected the locations of existing industrial areas. However, there was no separate category for "industrial" zones in the 1916 zoning plan. Industrial uses could be sited in an "unrestricted" zone, which was a zone virtually without restriction as to land use (New York City Board of Estimate and Apportionment, 1916). Residential uses could also be sited in an unrestricted zone, and, in fact, it was considered good planning practice, at that time and until relatively recently, to have working-class residences within or nearby manufacturing districts, in support of the "walk-to-work" principle. According to the "Master Plan of Adoption of City-Wide Map Showing Sections Containing Areas for Clearance, Replanning, and Low-Rent Housing," prepared by the Division of Master Plan of the City Planning Commission in 1940, one of the six siting criteria for the proposed low-rent housing was "opportunity to walk to work without detriment to housing project because of too close proximity to nuisance industries." This criterion was waived in areas that were particularly "favorable" as judged by all other listed criteria. At this time it was thought that industrial zones and working-class/poor residential communities could and should co-exist, and that housing designed as "low-rent" to replace housing defined as "substandard" should be in close proximity ("walking distance") to the industrial zones, or "areas of employment opportunity."

The Low-Rent Housing report quoted from an earlier Commission report on the Queensbridge Houses:

> In the opinion of this Commission, the building of low-rent housing in new areas in this City has gone as far as it should now be permitted

> to go. The time has now come for replacing appropriately located obsolescent areas with modern housing for low income groups, particularly where this can be accomplished within walking distance of opportunities for employment (New York City Planning Commission, Division of Master Plan, 1940, p. 3).

In other words, the "new areas" of the city that hadn't been developed yet would be reserved for middle-class housing, while any new "low-rent" housing would be located in existing older areas of the city. In discussing the selection of potential areas for the proposed low-rent housing, the report outlines three density categories, with the highest density housing to be located in Manhattan, the Bronx, and downtown Brooklyn.

> This type of housing [the highest density] is also indicated in Red Hook, Greenpoint, and Long Island City, where permanent industrial belts provide especially advantageous opportunities for walking to work. As many people should be able to live nearby such opportunities as can be housed without violating good standards of density and design (New York City Planning Commission, Division of Master Plan, 1940, p. 5).

The city's original designation in 1916 of areas as residential, commercial, or unrestricted zones was carried out by a lengthy political process, and involved public hearings. Most affluent and middle-class residential areas were zoned residential, and many of those neighborhoods that were not zoned residential in the draft plans had the opportunity to petition their elected representatives to revise the zoning before the plan was finalized (Makielski, 1965). Many working-class and lower-income residential neighborhoods were zoned unrestricted, and many of these neighborhoods were already located in or near industrial districts (Maantay, 2000). These residential areas located in or near industrial districts had decidedly less protection from noxious land uses than their more affluent neighbors who lived in areas zoned residential.

In 1961, New York undertook the first major overhaul of its zoning regulations since 1916, although thousands of individual zoning text amendments and map changes had taken place in the intervening years (Makielski, 1965; New York City Department of City Planning, 1985). The 1961 plan resulted from years of study by the city and its consultants (Harrison, Ballard, & Allen, 1950; Voorhees, Walker, Smith, & Smith, 1958) and a series of public hearings. The new zoning separated land into three major categories: Residential (R), Commercial (C), and Manufacturing (M), requiring the land in the "unrestricted" zones to be designated as one of the three categories. Since many of the old unrestricted districts had residential uses interspersed with industrial, it was not straightforward which zone to assign. The planners generally designated residential areas near industry as "R," residential, if the neighborhood seemed demographically

stable or gentrifying (Maantay, 2000). They generally designated residential areas near industry as "M," manufacturing, if the neighborhood seemed "blighted," or had experienced "white flight," high rates of vacancy, abandonment, tax delinquency, and subsequent influx of minority residents (Maantay, 2000). The residential uses within the newly designated M zones were allowed to remain as non-conforming uses, but were severely limited by law as to expansion, rebuilding, renovation, and even repair. Many were located in areas that were "redlined" by banks and insurance companies, and so residential property owners could not usually get home improvement loans, mortgages, or home insurance (Maantay, 2000).

A number of zoning experts were consulted for this study (see methodology section below). As noted by one of the zoning experts:

> There was a blanket policy [in the 1961 Zoning Resolution zone delineation] that anything low-income would become zoned for manufacturing. What they really did, I believe, in 1961, they re-zoned all areas that were manufacturing and all areas that were suitable for demolition, areas with derelict or substandard housing, areas that could be subject to urban renewal, and they re-zoned them manufacturing. So you had a lot of working class communities that were solid residential that were all zoned M from one end to the next. The idea was that the residential uses would just go away - they needed to build industrial parks requiring more and more land (Z.I. #9).

Another zoning expert said:

> Assumptions were made that these places [the formerly unrestricted districts] would go one way or the other, manufacturing or residential. How did they decide? They might have seen a neighborhood as poor, not quite as important, and think it won't last. If the residential portion of the neighborhood was on the upswing, then zone it residential and the industrial uses will atrophy; and if the neighborhood is not on the upswing, zone it industrial and the residential uses will atrophy. Of course, this didn't often happen as planned and it was a kind of naïve assumption in retrospect - it also represents a class bias (Z.I. #8).

Another zoning expert pointed out some of the underlying assumptions of the zone designation process:

> Mapping was not only governed by existing uses in 1961, but by larger assumptions. There was a feeling that this would be a growth area for manufacturing. So huge stretches of residential communities were zoned M. Now these were nice private houses - smaller, older houses reflecting the standards of the teens and twenties. The peo-

> ple were expected to eventually move out into better housing, but there was no better housing for that income bracket. There were entire blocks of non-conforming residential uses (Z.I. #5).

As I will discuss in the sections below, the initial designation of some residential areas as industrial zones, the expansion of certain industrial areas, and the contraction of other industrial areas, all served to produce expulsive zoning outcomes.

HOW ZONING AND ZONING CHANGES CONTRIBUTE TO ENVIRONMENTAL INJUSTICE IN NEW YORK CITY

The inhabitants of industrial zones are subject to adverse impacts above and beyond the negative effects of segregation. Industrial zones generally carry a higher environmental burden than do purely residential neighborhoods in terms of pollution impacts and risks (Miller & de Roo, 1996). These impacts stem directly from industrial processes as well as from associated heavy truck traffic. For instance, just one solid waste transfer station may require 1,000 truck trips per day to access its facility through a residential neighborhood, and some neighborhoods may have 20 or more of these facilities, such as, for instance, the Hunts Point Peninsula in the Bronx, and the Greenpoint-Williamsburg section of Brooklyn (Maantay, 2001a). Adverse impacts from truck traffic include reduced pedestrian safety and increased air pollution, noise, vibration, and traffic congestion.

In addition to truck-related impacts, other impacts from industrial and waste-related processes include emissions of toxic substances to air, soil, and water, visual blight, illegal dumping of hazardous materials, and safety and health risks from the use and storage of hazardous materials. Many of these impacts have been suspected of being linked to diseases, especially respiratory ailments and various types of cancers (Haggerty, 1996; Head, 1995; National Research Council, 1997; Novotny, 1998; Wright, Bryant, & Bullard, 1996). Parts of the city closest to the heaviest industrial zones, for instance, have extremely elevated rates of asthma (Nossiter, 1995).

With the loss of many port-related activities and associated transportation, warehouse, and manufacturing uses since the 1960s, the remaining industrially zoned areas in many parts of New York City have instead become repositories of noxious waste-related facilities. As manufacturing activities diminished in industrial areas in recent decades, both private and public waste-related facilities proliferated there (New York City Planning Commission [CPC] & The Sanborn Company, 1956, 1980, 1990). These include private solid waste transfer stations, marine transfer stations, waste water treatment plants, combined sewer overflow outfalls, sludge treatment facilities, recycled materials handling facilities, junkyards, auto salvage yards, scrap metal and construction debris processing facilities, and medical

Table 1. "MINORITY" POPULATION WITHIN MAJOR M ZONES
By Borough, Per Decade, As Compared with New York City and Borough Averages

	Bronx	Brooklyn	Manhattan	Queens	Staten Island	New York City
1960						
Borough	25.4%	21.6%	39.1%	9.6%	5.8%	22.9%
M Zones	**38.4%**	**31.8%**	**33.1%**	**11.7%**	**7.6%**	**28.2%**
1970						
Borough	49.2%	38.4%	45.3%	20.2%	8.9%	36.1%
M Zones	**68.3%**	**45.9%**	**42.5%**	**21.5%**	**18.9%**	**43.6%**
1980						
Borough	63.7%	49.0%	43.6%	32.2%	13.4%	44.2%
M Zones	**75.1%**	**54.0%**	**37.9%**	**32.2%**	**33.3%**	**48.4%**
1990						
Borough	77.1%	59.7%	51.0%	51.7%	19.8%	56.6%
M Zones	**87.4%**	**63.6%**	**37.9%**	**51.2%**	**33.1%**	**60.7%**

waste disposal plants (Bronx Borough President's Solid Waste Management Task Force, 1997). The substitution of waste facilities for viable manufacturing furthers the impression that these communities are being disproportionately "dumped on" (Maantay, 2001a).

New York City Industrial Zone Case Study - Analytical Methodology and Findings

The scope of the impacts of industrial zones is not trivial: approximately 22 percent of New York City's 1990 census population lives in census tracts that are within these major M zones (Maantay, 2000; Maantay, 2001b). People living in or adjacent to the major M zones are more likely to be poorer than the average New Yorker, and more likely to be a member of a "minority" group (see Figure 2 and Tables 1 and 2). [4] This statement holds true for census data from 1960, 1970, 1980, and 1990 (Maantay, 2000). Although this study was conducted before the 2000 census data were available, subsequent analysis of Bronx 2000 census data reveals that the M zones still contain a higher percentage of minorities than borough- or city-wide averages, despite the fact that the population of the Bronx is greater than 85% minority overall (Maantay, 2002b).

Additionally, although the general locations of industrial districts have remained roughly the same over the past century, the geographic extents and boundaries of M zones have not remained static over time, with some M zones being increased and others decreased in area. Individual M zones are reduced or enlarged in extent via the legal mechanism of the zoning change. In order to examine the pattern of industrial zones and zoning changes and to characterize the proximate populations, major M zones and all re-zoning actions occurring between the years 1961-1998 were mapped using GIS. The 1961-1998 time frame was selected for the study because December 1961 marks the date of the last major overhaul

Table 2. **MEAN HOUSEHOLD INCOME WITHIN MAJOR M ZONES**
By Borough, Per Decade, As Compared with New York City and Borough Averages ($)

	Bronx	Brooklyn	Manhattan	Queens	Staten Island	New York City
1970						
Borough	$ 9,635	$ 10,181	$ 14,242	$ 13,003	$12,934	$ 11,638
M Zones	**$ 7,889**	**$ 9,113**	**$ 10,597**	**$ 11,549**	**$10,921**	**$ 9,696**
1980						
Borough	$ 16,402	$ 17,653	$ 27,163	$ 22,895	$25,795	$ 20,960
M Zones	**$ 14,797**	**$ 15,988**	**$ 19,779**	**$ 20,383**	**$20,075**	**$ 17,646**
1990						
Borough	$ 29,176	$ 33,926	$ 57,114	$ 41,180	$50,570	$ 41,700
M Zones	**$ 25,218**	**$ 31,658**	**$ 44,365**	**$ 36,778**	**$43,105**	**$ 35,453**

of the New York City Zoning Resolution. Data for actions prior to 1961 would not be directly comparable to data regarding later actions, due to significant changes in zoning categories, procedures, and record-keeping. October 1998 marks the time the archival data were researched and

Legend for Tables and Figures

Symbol	Term
BX	Bronx
BK	Brooklyn
MN	Manhattan
QN	Queens
SI	Staten Island
NYC	New York City
"M" Zone	District zoned for Manufacturing uses
"Increases"	M zone rezoned to either expand the boundaries of the M zone in areal extent, or to change the zone designation to allow "heavier" (potentially more polluting) industrial uses within the zone.
"Decreases"	M zone rezoned to either reduce the boundaries of the M zone in areal extent, or to change the zone designation to allow "lighter" industrial uses, and prohibit "heavier" industrial uses within the zone.
"Very Large" Changes	Rezoning actions affecting M zones where the change involves more than ten square blocks.
"Large" Changes	Rezoning actions affecting M zones where the change involves more than four and up to ten square blocks.
"Medium" Changes	Rezoning actions affecting M zones where the change involves more than one and up to four square blocks.
"Small" Changes	Rezoning actions affecting M zones where the change involves up to one square block.
"Minor" Changes	Rezoning action affecting M zones where the change involves a very small area, measured in feet.
One block	One square block in New York City averages between 1 and 3 acres.
N/C	No Change – no zoning changes affecting M Zones.
M Zone +	Areas where M zones were increased
M Zone –	Areas where M zones were decreased

compiled for this study, and thus represents the end point of the time frame.

The "Major M Zones" as used in this study were those defined by the New York City Department of City Planning (DCP) in their "Citywide Industry Study: Geographical Atlas of Industrial Areas," January, 1993. DCP's determination of what constitutes "major" industrial zones was based on an assessment of several factors: the amount of land zoned for industry, the number of people employed in industry for that area, and transportation access. The boundaries for these major industrial districts were based on neighborhood boundaries, major geographic or physical features, historic and present day functions, and census tract boundaries, where feasible.

The determination of where M zone changes had occurred was based on comparison of archival zoning change maps, Map Sections 1-35, New York City DCP, 1961-1998. By comparing thousands of archival zoning change maps, by extracting the changes affecting M zones, and by spatially plotting the changes in industrial zones over time, the pattern of zoning changes affecting industrial zones between 1961-1998 can be shown.

The locations of major M zones and M zone changes were overlain with a spatial database of census tracts, linked to attribute data of population characteristics. Digital data sources were used so that census data could be mapped and analyzed through Geographical Information Systems (GIS) on the computer (Adams, 1980; United States Department of Commerce, Bureau of the Census, 1990; United States Department of Commerce, Bureau of the Census, 1980).

New York City was divided into 2,218 census tracts for the 1990 census. Population characteristics such as race, ethnicity, and income were obtained from census attribute data from 1960, 1970, 1980, and 1990, and these were mapped and compared using a standard deviation classification method in order to allow longitudinal comparison of deviation from the average, since absolute numbers for income and percent minority changed drastically over the four decade period. Population information was aggregated from census tract data for each of the four census periods, at the following geographic levels: city-wide, borough-wide, census tracts within major M zones, census tracts within 1/2 mile of "large" and "very large" M zone increases (see zoning change definitions above), and census tracts within 1/2 mile of "large" and "very large" M zone decreases.

The re-zonings were classified by type and magnitude, and were aggregated both by decade and by borough. Size categories used were: minor boundary adjustments (very small zoning change measured in feet); small (one block or less); medium (more than one block, up to four

Table 3. "LARGE" + "VERY LARGE" M ZONE CHANGES, 1961 - 1998
By Borough, Per Decade

	Bronx	Brooklyn	Manhattan	Queens	Staten Island	New York City
1960						
Increases	2	4	0	2	1	9
Decreases	1	2	1	2	1	7
Total Changes	**3**	**6**	**1**	**4**	**2**	**16**
1970						
Increases	2	0	0	2	2	6
Decreases	1	8	7	4	7	27
Total Changes	**3**	**8**	**7**	**6**	**9**	**33**
1980						
Increases	4	0	1	1	0	6
Decreases	0	2	4	2	3	11
Total Changes	**4**	**2**	**5**	**3**	**3**	**17**
1990						
Increases	0	0	0	1	0	1
Decreases	2	3	4	5	1	15
Total Changes	**2**	**3**	**4**	**6**	**1**	**16**
1961 - 1998						
Increases	8	4	1	6	3	22
Decreases	4	15	16	13	12	60
Total Changes	**12**	**19**	**17**	**19**	**15**	**82**

blocks); large (more than four blocks, up to ten blocks); and very large (more than ten blocks). New York City's square block size is not consistent, and typically varies between 1 and 3 acres. Parts of the analysis focused on "large" and "very large" changes since, based on a review of City Planning Commission (CPC) reports and Public Hearing records available for the study time period, it was seen that many of the minor, small, and medium zoning changes appeared to be tied to the needs of specific property owners, and would seem to be an application of "spot zoning," having little to do with comprehensive planning objectives. Also, the large and very large zoning changes can be thought of as having a larger impact on the surrounding communities as well as on the city as a whole, although the incremental effect of many small changes cannot be discounted.

The re-zoning action categories created reflected combinations of the size classification and either of two types of changes: "increases" or "decreases." "Increases" are M zones that were re-zoned either to expand the boundaries of the M zone in areal extent, or to change the zone designation to allow "heavier" (potentially more polluting) industrial uses within the zone. These latter types have been termed "switches to a heavier M zone." "Decreases" are M zones that were re-zoned either to reduce the boundaries of the M zone in areal extent, or to change the zone designation to allow "lighter" industrial uses, and prohibit "heavier" industrial uses within the zone. These latter types have been termed

Table 4. **BRONX "MINORITY" POPULATION IN REZONED M ZONES, BEFORE + AFTER REZONING**
Compared with Borough + Major M Zone Averages

% Minority Population	1960 Census	1970 Census	1980 Census	1990 Census
Bronx Borough	25.4%	49.2%	63.7%	77.1%
Bronx M Zones	38.7%	68.3%	75.1%	87.4%
Increases + Decreases in M Zones				
1960 Increase	67.6%	90.1%	97.2%	98.5%
1960 Decrease	**22.3%**	**31.4%**	**43.1%**	**63.9%**
1970 Increase	6.9%	26.4%	87.2%	77.4%
1970 Decrease	**15.1%**	**31.2%**	**44.1%**	**65.9%**
1980 Increase	42.7%	84.4%	93.0%	97.5%
1980 Decrease	**N/C**	**N/C**	**N/C**	**N/C**
1990 Increase	N/C	N/C	N/C	N/C
1990 Decrease	**54.8%**	**77.2%**	**91.6%**	**97.7%**

"switches to a lighter M zone."

New York has reduced the overall amount of land zoned for industry by re-zoning a substantial amount of its Manufacturing zones to other uses. There were approximately 409 re-zoning actions (map changes) affecting M zones between 1961 and the present. The city re-zoned land from M to residential (R) or commercial (C) about 50 percent more often than it re-zoned land from other uses to M. Eighty-two of these changes were large or very large in scope, affecting from more than four blocks up to ten blocks, and more than ten blocks, respectively. Not only was there a disparity between the number of M zone decreases versus increases, but there was also a disparity in where these changes occurred. Some boroughs have had virtually no large or very large increases, and some boroughs have had virtually no large or very large decreases (see Table 3).

Industrial areas re-zoned to increase the size or intensity of M zones tended to have populations at the time of the re-zoning that were more heavily minority and poorer than borough and/or city averages, and often more so than the borough M zone average. Areas re-zoned to decrease the size or intensity of M zones tended to have populations at the time of the re-zoning that were not as poor or as heavily minority as the M zone average and/or borough and city averages (see Figure 3).

The analysis also indicates that the areas that are re-zoned to increase M zones are not only more likely to have a higher than average percentage of minority people with lower than average incomes, but that after re-zoning to increase M districts these areas increasingly diverge from the borough and city averages – they become poorer and more heavily minor-

Table 5. BRONX AVERAGE HOUSEHOLD INCOME IN REZONED M ZONES, BEFORE + AFTER REZONING
Compared with Borough + Major M Zone Averages

Mean Income	1970 Census	1980 Census	1990 Census
Bronx Borough	9,635	16,402	29,176
Bronx M Zones	7,889	14,797	25,218
Increases + Decreases in M Zones			
1960 Increase	6,190	9,850	16,808
1960 Decrease	**12,247**	**22,872**	**35,550**
1970 Increase	11,378	19,107	32,844
1970 Decrease	**12,148**	**22,805**	**36,709**
1980 Increase	6,869	11,186	20,869
1980 Decrease	**N/C**	**N/C**	**N/C**
1990 Increase	N/C	N/C	N/C
1990 Decrease	**8,033**	**11,800**	**19,309**

ity relative to the rest of the borough and city. Conversely, areas re-zoned to decrease M districts tend to become more similar to (or even surpass) the borough or city averages with regard to mean income, and more similar to (or lower than) borough and city averages with regard to percent minority population, after re-zoning (see Tables 4 and 5).

Official documents outline the planning rationales behind the re-zoning actions. For instance, "marginal" or "deteriorated" residential neighborhoods are considered more appropriate for re-zoning to industrial than "stable" communities that have been "maintained." Sometimes "market forces" or "market pressures" are cited as reasons for re-zoning districts from M to other uses. The rationales for zoning changes were obtained from archival documentation such as Zoning Amendment Applications, City Planning Commission Calendars, Uniform Land Use Review Procedure (ULURP) applications, Urban Renewal Plans, Environmental Impact Assessments, Planning Studies, and letters and other documents obtained through the New York State Freedom of Information Law (FOIL) for the years 1961-1999. Documents from 1916-1961 were also consulted, as available, for context and background of later policy developments. A complete list of archival documents used is given in Maantay (2000), Appendix C.

Several previous studies have focused on whether the noxious land use or the minority population came first (Been, 1994; Been & Gupta, 1996). In other words, was the noxious facility sited before the nearby population

became predominantly minority and/or poor, or was the neighborhood predominantly minority and/or poor when the facility was sited? I was able to consider this issue, not in terms of particular noxious uses, but in terms of the zoning changes that *facilitate* the siting of noxious uses. Thus, my research poses a different question: Which came first, the zoning changes or the people? I found that, in many instances, neighborhoods were zoned to increase industrial uses after they had *already* become poorer and more minority than the city and borough average, and they diverged further from city and borough averages *after* re-zoning. The issue of "which came first" may be important in establishing intent or racial *animus* in a legal context, but whether active discrimination or a series of thoughtless decisions and assumptions were behind the zoning changes, the end result remains the same: poor and minority people are disproportionately burdened by industrial zoning changes.

Five Industrially-Zoned Communities

In addition to the city- and borough-wide analyses of demographic and zoning changes, I also looked in detail at five smaller case study industrial areas. The intent of the case studies was to furnish more information about the complexity of the issues involved in the zoning change process than can be obtained by simply looking at the city- or borough-wide patterns and trends of industrial zoning changes. The case study areas were selected to represent a range of industrial areas, and each needed to contain substantial industrial zones as well as contain a residential population. In order to be illustrative of the different types of industrial zoning changes that had taken place, it was desirable to have at least one of each of the following areas represented in the analysis: an area where M zones had been increased; an area where M zones had been decreased; an area where M zones had remained basically the same; and an area where the M zones had been changed to a different kind of M zone. The zoning changes could then be correlated with policy trends, changing demographics, and land use conditions over the four decade study period.

The five case study areas selected were Red Hook, Brooklyn (M zones virtually unchanged); Gowanus Canal, Brooklyn (M zones decreased); Hunts Point, Bronx (M zones "switched" to a heavier M zone); Bathgate, Bronx (large increases in M zones); and the Lower West Side of Manhattan (large decreases in M zones). The last two case study areas will be the focus of this section, and they offer the starkest contrast: the Bathgate area received several large M zone increases, and the Lower West Side received several large and very large M zone decreases.

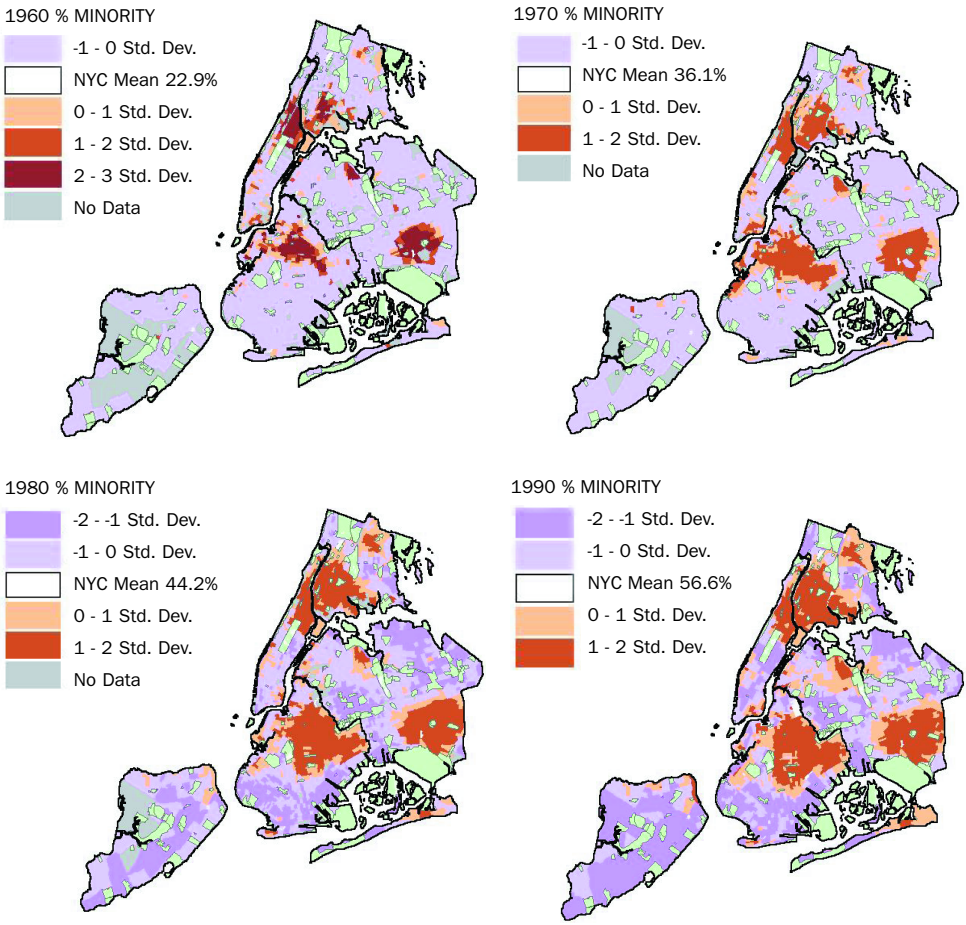
The data used in the case study area analysis included the census tract population data and the zoning change data used in the city- and borough-wide analysis, as discussed above. In addition, the case study area analysis used land use data obtained from archival land use maps, plan-

ning reports, zoning amendment applications, and other zoning change documentation specific to each area. Where applicable, information gleaned from interviews with zoning experts was also incorporated into the case study area analysis. The zoning experts were all people who had been active in New York City zoning issues at some time during the last 40 years, and they included past City Planning Commissioners, former and current DCP staff, planners from community, advocacy, and non-profit planning organizations, and urban planning academics. Because many still work in the New York City planning realm, their comments are presented without attribution. [5]

My examination of land use changes in the five case study neighborhoods gives a more detailed picture of how land uses changed in the four decades, essentially before and after the zoning changes examined in this study. This land use change "snapshot" was based on a series of land use maps produced by the Sanborn Map Company for the City Planning Commission in 1956 and updated in 1980 and 1990. These maps designate each property lot as belonging to one of about 20 main land use categories, with more detailed sub-categories. Because the land use maps were not in digital format, they could not be utilized within the GIS, and therefore, it was not possible to achieve an accurate quantitative analysis of land use categories and amounts by computer. Since tax lot size varies considerably within a typical New York City block, it would be insufficient and misleading simply to manually count lots, and any other type of manual measurement on such small-scale maps was unlikely to provide accurate results. The land use analysis of the various years was accomplished by a visual block-by-block comparison, noting for each block general differences in land use over the years. This yielded a reasonably accurate qualitative description of land use change, although actual acres of change from one land use to another would be difficult to determine with any degree of precision. The five industrial case study areas vary in size, ranging from 100 to 200 square blocks. Land uses were color-coded on the maps for the five case study areas, for all the time series of maps available for those map sections.

In general, the areas where M zones had been expanded in areal extent or had their zoning designation changed ("switched") to accommodate heavier (more polluting) industrial uses show an intensification of industrial uses. These uses are often not manufacturing, but waste-related industries. Non-conforming homes within the M zones in 1956 were largely gone by 1990, replaced by industrial uses, auto-related uses, junkyards, and vacant lots. On the other hand, in the areas where M zones were reduced in areal extent, or had their zoning designation switched to accommodate lighter (less polluting) industrial uses or mixed uses, the industrial land uses diminished over time, and there were more vacant lots in the pockets that remained industrially-zoned. Vacant land in the newly created residentially-zoned areas was rare, and many formerly

Figure 1. NEW YORK CITY'S "MINORITY" POPULATION BY CENSUS TRACT, 1960 - 1990
Data Source: US Census Bureau, 1960, 1970, 1980, 1990



industrial use lots now within R zones had been converted to residential use.

Bathgate, Bronx

Bathgate was chosen for the purposes of this study to represent a community that had experienced a major increase in its M zones. About 45 acres of residentially-zoned blocks were re-zoned as M zones, including the de-mapping of an "abandoned" playground, according to the Mid-Bronx Industrial Urban Renewal Plan (New York City Department of City Planning, 1982). During the study time period, Bathgate was transformed from a neighborhood of mainly white, lower middle-class and working-class residents to an overwhelmingly minority and poor neighborhood. The 1969

Figure 2. MAJOR MANUFACTURING ZONES + PERCENT "MINORITY" IN NEW YORK CITY, 1990
Data Sources: US Census Bureau, 1990; New York City Department of City Planning, Citywide Industry Study: Geographical Atlas of Industrial Areas, January, 1993

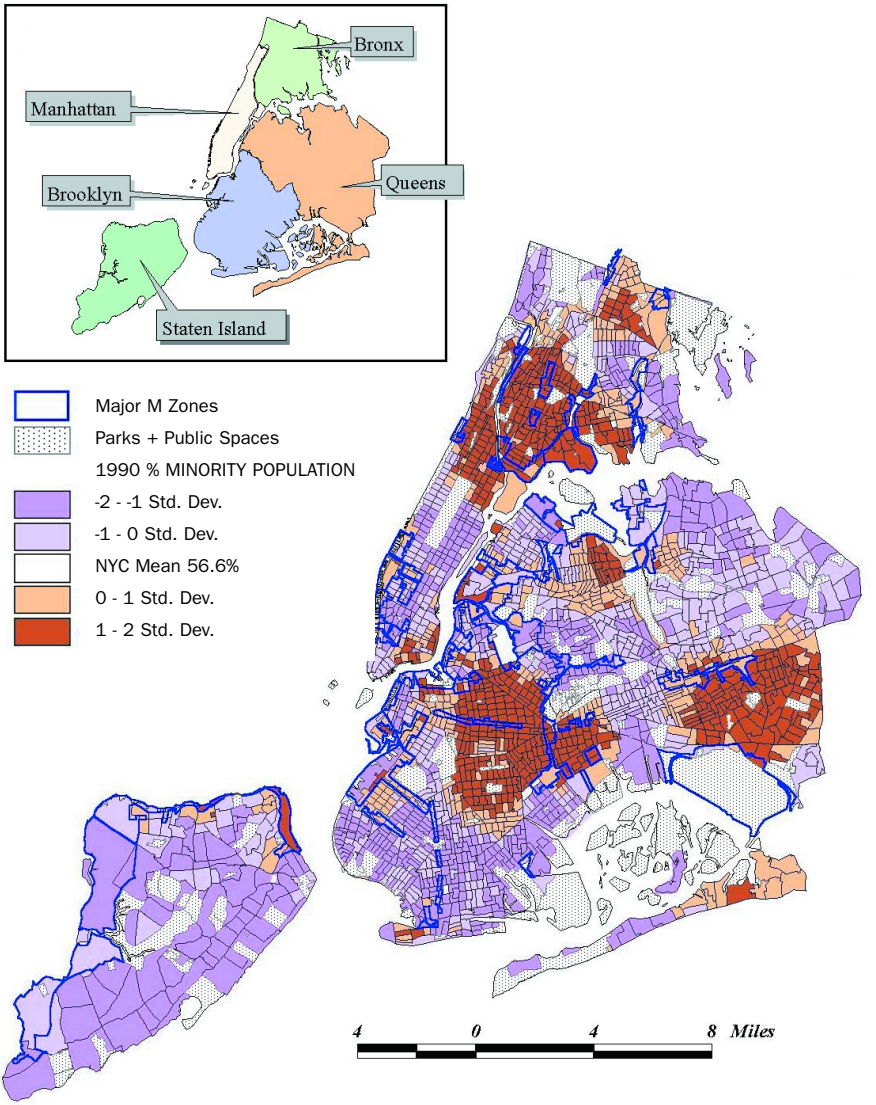


Figure 3. **MAJOR MANUFACTURING ZONE CHANGES IN THE BRONX, 1961 - 1998 WITH 1990 MEAN HOUSEHOLD INCOME, WITHIN 1/2 MILE OF ZONING CHANGES**
Data Sources: US Census Bureau, 1990; New York City Department of City Planning, Map Sections 1-35, Archival Record of Zoning Map Amendments, 1961-1998

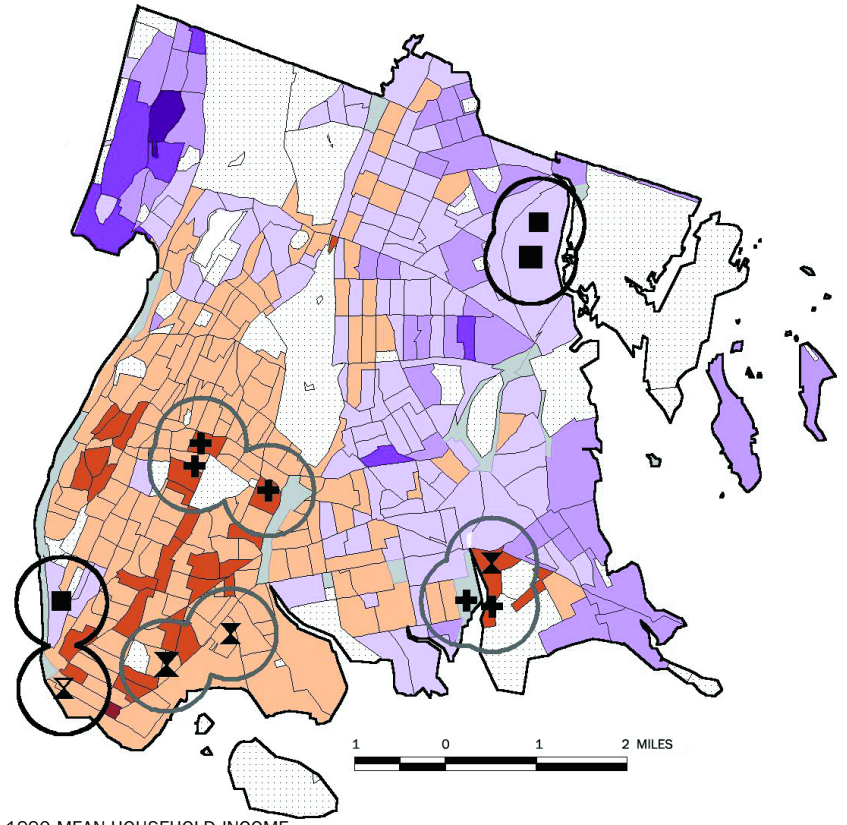


Figure 4. BATHGATE, BRONX CASE STUDY AREA POPULATION DENSITY, 1960 + 1990
Data Source: US Census Bureau, 1960, 1990

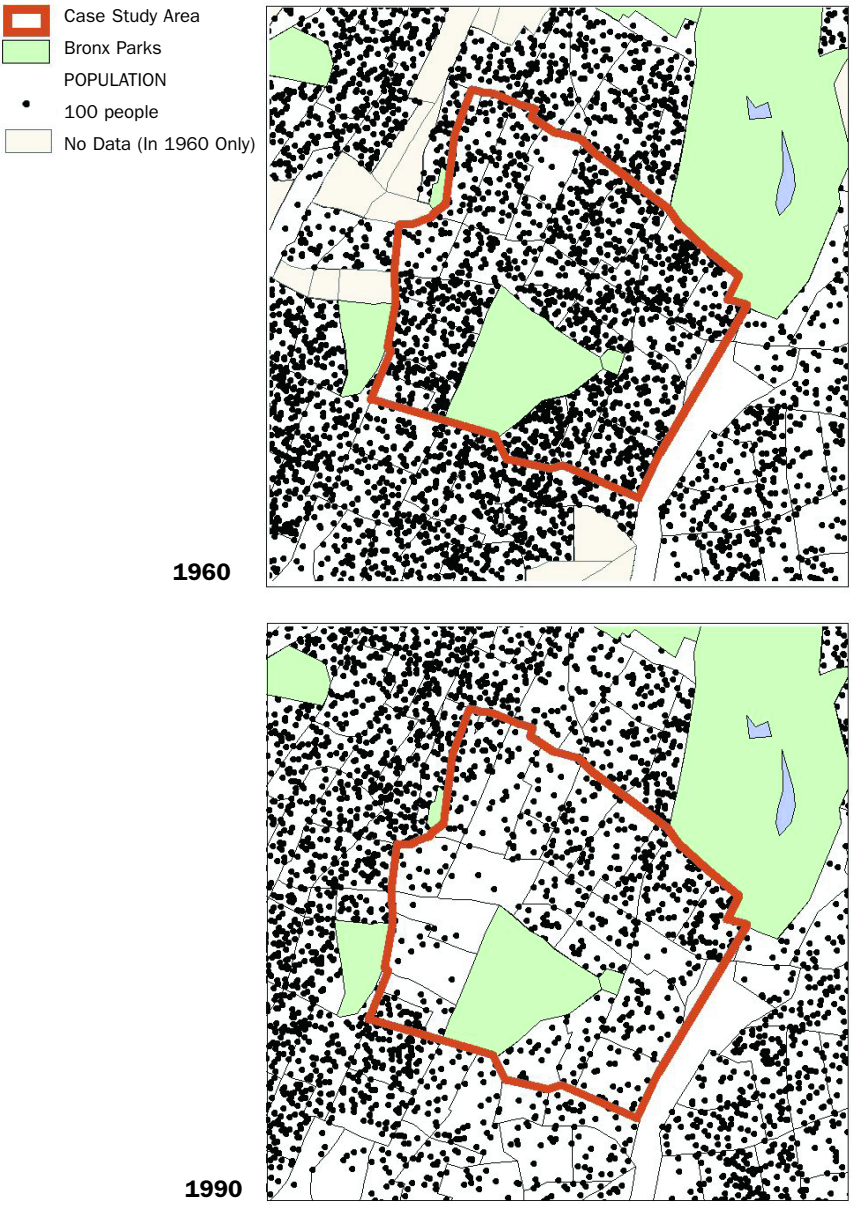
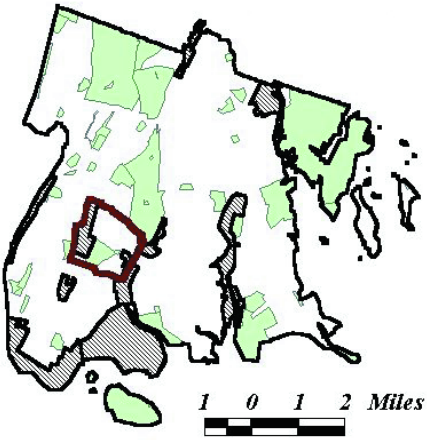
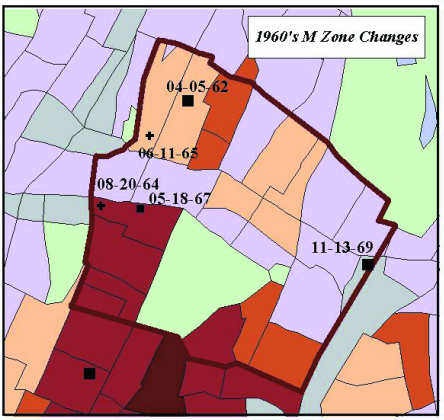


Figure 5. BATHGATE, BRONX CASE STUDY AREA ZONING CHANGES + PERCENT "MINORITY" POPULATION, 1960 - 1980

Data Sources: US Census Bureau, 1960, 1970, 1980; New York City Department of City Planning, Map Sections 1-35, Archival Record of Zoning Map Amendments, 1961-1998



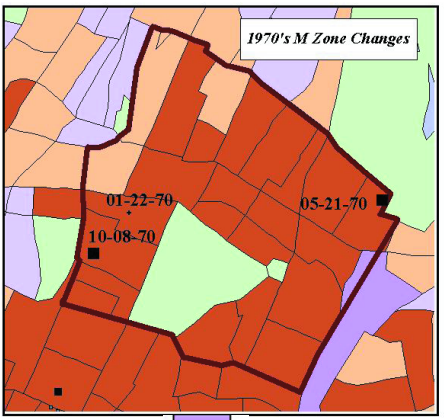


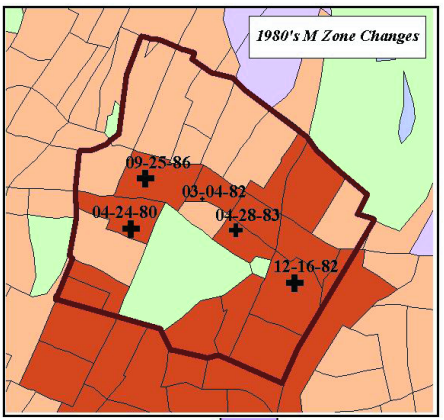
Case Study Area
Major M Zones 1993
Bronx Parks + Public Spaces

Minor Increase
Small Increase
Small Decrease
Medium Increase
Medium Decrease
Large Increase

1960 % MINORITY

-1 - 0 Std. Dev.
Bronx Mean 25.4%
0 - 1 Std. Dev.
1 - 2 Std. Dev.
2 - 3 Std. Dev.
> 3 Std. Dev.
No Data





1970 % MINORITY

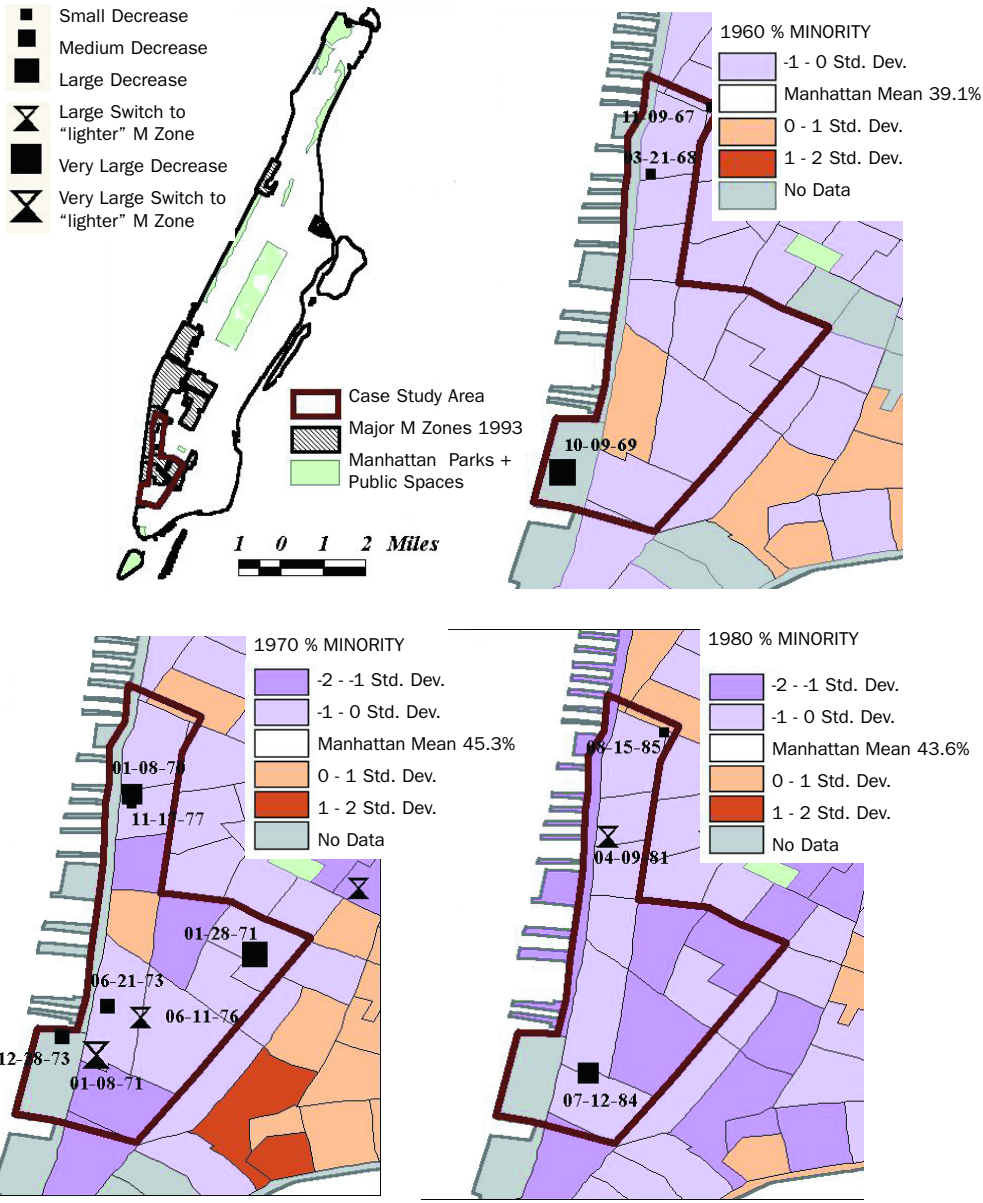
-2 - -1 Std. Dev.
-1 - 0 Std. Dev.
Bronx Mean 49.2%
0 - 1 Std. Dev.
1 - 2 Std. Dev.
No Data

1980 % MINORITY

-2 - -1 Std. Dev.
-1 - 0 Std. Dev.
Bronx Mean 63.7%
0 - 1 Std. Dev.
1 - 2 Std. Dev.
No Data

Figure 6. LOWER WEST SIDE, MANHATTAN CASE STUDY AREA ZONING CHANGES + PERCENT "MINORITY" POPULATION, 1960 - 1980

Data Sources: US Census Bureau, 1960, 1970, 1980; New York City Department of City Planning, Map Sections 1-35, Archival Record of Zoning Map Amendments, 1961-1998



New York City Master Plan describes the area as "economically and socially depressed and physically blighted" (New York City Planning Commission, 1969, p. 36). This did not happen overnight, nor was there any one cause, but the changes were propelled, in large measure, by the construction of the Cross-Bronx Expressway, which tore the neighborhood in two and destroyed the physical fabric of Bathgate, as well as its community cohesiveness (Caro, 1979; New York City Department of City Planning, 1993). As these demographic and socio-economic changes occurred, other broader trends and far-reaching circumstances led to severe private disinvestment in neighborhoods like Bathgate. Wholesale landlord abandonment of its housing stock took place, leading to widespread destruction of property and city take-over of buildings. Although the city inherited much of the property in the community, becoming in effect its biggest landlord, it also declined to invest in the area, and the housing stock deteriorated further.

> Many residential buildings [in Bathgate] were vacant and derelict, and we didn't have a housing program [funding opportunities for new housing construction or renovation] at that time [the 1970s-1980s], and the philosophy was to create jobs for people. The only way to create jobs, it was thought, was to create sites with large floor plates so that you could build new manufacturing plants that could accommodate the single story production flow… (Z.I. #7).

Using the land use maps, one can trace the dramatically increasing numbers of vacant lots, the increase in public housing projects, the reduction in the number of private homes and, often, the change in use of the housing over the study time period. Some of the remaining private houses which previously had been designated as #3, #4, or #5 on the land use map, meaning they had been single-family detached, single-family attached, or two-family homes, were now given a designation such as "#4-12" on the map, indicating that although it was considered a single-family attached structure, it was now being used for (public) social services purposes. The over-saturation of "community facilities," such as drug rehabilitation centers and homeless shelters, also may have contributed to the downward spiral of Bathgate. It obviously had become a convenient dumping ground for the city's most locally undesirable land uses. There had been a building boom in large-scale public housing projects in the Bathgate vicinity starting in the 1960s. Several thousand new dwelling units had been built in the area during the study time period, but despite the large and almost permanent "captive" population in the new public housing, substantial overall depopulation occurred in the area from 1960 to 1990, with a two-thirds reduction of the population from 1970 to 1980 alone. The population of the case study area went from about 144,000 to about 52,000 in that 10-year period (see Figure 4).

Bathgate was one of the poorest and most heavily minority neighbor-

hoods in the Bronx, and possibly in the entire city, at the time that three of its large residential areas were proposed for re-zoning to industrial districts, as part of an urban renewal plan to establish several industrial parks (see Figure 5).

> Bathgate had been burned out - it had been one of the first victims of the South Bronx syndrome. It was thought to be an appropriate area to symbolize the phoenix that rises up out of the ashes. [The Bathgate Industrial Park] was meant to be a showcase – to address the lack of suitable jobs and the high unemployment at the time among this population. The idea was that the people living in the neighborhood would be the ones benefiting from the jobs. One of the great myths of city planning is the walk-to-work myth … Bathgate had so many low-income housing projects that you almost had to do a Bathgate [Industrial Park] to justify the concentration of low-income housing if you were redeveloping the area (Z.I. #5).

The neighborhood was viewed by the DCP staff and Commissioners as a "marginal residential neighborhood" and as "attractive for re-zoning to

Table 6. **MINORITY POPULATION IN THE BATHGATE CASE STUDY AREA**
Compared with New York City + the Bronx, 1960 - 1990 (Percent)

	Bathgate/Crotona Park	Bronx	New York City
1960	39.10%	25.40%	22.90%
1970	90.80%	49.20%	36.10%
1980	96.20%	63.70%	44.20%
1990	98.70%	77.10%	56.40%

Table 7. **MEAN HOUSEHOLD INCOME FOR THE BATHGATE CASE STUDY AREA**
Compared with New York City + the Bronx, 1970 - 1990 ($)

	Bathgate/Crotona Park	Bronx	New York City
1970 MHI	$5,900	$9,600	$11,600
% of NYC MHI	51%	83%	100%
% of Bronx MHI	61%	100%	121%
1980 MHI	$9,800	$16,400	$21,000
% of NYC MHI	46%	78%	100%
% of Bronx MHI	60%	100%	128%
1990 MHI	$18,900	$29,200	$41,700
% of NYC MHI	44%	70%	100%
% of Bronx MHI	65%	100%	143%

industrial uses." Following are some excerpts from three different re-zoning documents that outline the planning rationale behind the proposed changes from residential to industrial:

> The objectives of the Mid-Bronx Industrial Urban Renewal Plan are...to remove blight, unsanitary, and hazardous conditions presently within the urban renewal area, to demolish and clear existing substandard and unsanitary structures...[and to establish] land use patterns consistent with modern planning concepts and conducive to the creation of a superior living and working environment... (A-1358 / 820721ZMX, 1/1981, from the Mid-Bronx Industrial Urban Renewal Plan).

> The proposed action is the re-zoning of all or portions of seven blocks of the Bathgate area from residential with commercial overlay to manufacturing. The goals of the proposed actions are to encourage industrial/commercial development in the area, enhance the market potential of unproductive real estate (private and public) and provide employment opportunities for area residents (A-1453 / 860696ZMX, 2/25/86, from ULURP Application form).

> Over the past decade, Bathgate North has become a marginal residential neighborhood. The Community experienced the same decline, deterioration, obsolescence and abandonment of residential real property which spread through much of the South Bronx during the 1970s. The area was originally considered a desirable residential neighborhood, adjacent to the Crotona Park extension...However, the deteriorating character of many of these buildings, together with the demographic changes of the past two decades, resulted in a declining demand for the housing stock of the area...The project area has abandoned residential buildings, an increase in property reverting to city ownership, and a considerable amount of ongoing demolition. Manufacturing uses have replaced residential uses as the predominant land use in the area. Housing conditions suggest that residential use will not recover in the foreseeable future...The area proposed for re-zoning is attractive for industrial uses...The commission has therefore concluded that the proposed re-zoning is appropriate... (A-2453 / 860696ZMX, 8/6/86, From City Planning Commission Report, Calendar No. 80).

These statements were made at a time when the city was losing large amounts of its manufacturing-zoned areas in Manhattan due to "market pressures" and conversion to residential or mixed-use zones, as discussed below. The Bathgate industrial parks were intended to make a profitable use of the blighted area, in lieu of repairing or replacing housing and promoting community-based development schemes.

> The community was opposed to the Bathgate Industrial Park. The

> community would have preferred residential development. The Chairman of the Board in [Community] District 3 was also head of a community association in Bathgate, and he was opposed to the re-zoning and the whole industrial park strategy. His argument was that this was an area in between two parks, and that it could have been and should have been redeveloped as a low-rise residential area (Z.I. #6).

The re-zoning of R districts to M1-4 in Bathgate has not had an uplifting impact on the surrounding residential community, which is now even poorer in comparison with the 1990 New York City mean household income than it was in 1970 and 1980, before the re-zonings. It is also more heavily minority than most neighborhoods in New York City, being virtually 99 percent minority (see Tables 6 and 7).

> With all the public money poured into those industrial parks, so much more could have been done to help the people in those communities. Instead the money went to subsidize businesses. The industrial parks were not big successes even in terms of what they were designed to do, they were minimally successful in attracting industry, and from the community's standpoint, they didn't help revitalize the area at all (Z.I. #6).

The Lower West Side, Manhattan

The Lower West Side was selected for this study to represent an area that had experienced a substantial decrease in the extent of its M zones, and large switches from M districts zoned for heavier industrial uses to lighter M zones. The Lower West Side, roughly the areas known today as Tribeca, SoHo, and the Far West Village, was for over a century an industrial waterfront neighborhood, with some mixture of working-class residents, especially north of Houston Street in the Far West Village. In the 1960s and 70s, with the dislocation of many of the port activities and the technological changes in manufacturing processes and transportation, many industrial firms left the area. In the early to mid-1970s, the city experienced a severe financial crisis, accompanied by an increased exodus of industry from the city. Shortly after, the city decided to re-zone the area to allow housing in the manufacturing lofts, a process that had started illegally some time earlier.

During the study time period, the Lower West Side area had received only reductions in M zones, some of them quite vast relative to Manhattan land availability. The case study area had been re-zoned a number of times to facilitate specific projects, which consisted mainly of re-zoning M districts as R or C, in order to permit urban renewal schemes and housing development, including the more than 90-acre Battery Park City re-zoning, the 40-acre Washington Street Urban Renewal Area (URA) re-zoning, the SoHo loft conversion re-zoning, and Tribeca's Lower

Manhattan Mixed-Use District re-zoning.

The New York City 1969 Master Plan described the area now known as the South Houston Industrial Area (SoHo) as follows:

> The largest concentration of industry in the district occupies a 40-block area between Canal, West Houston, and West Broadway. This area of industrial loft buildings is sometimes referred to as the "Cast Iron District" because of its many ornate cast iron facades. More than 1,100 firms provide some 25,000 unskilled and semiskilled jobs in such industries as textiles and apparel, printing and graphic arts, plastic goods and hardware. Increasing numbers of artists are beginning to occupy the smaller loft spaces vacated by industries moving from the area, particularly in the South Houston Industrial Area (SoHo). This is now illegal, but we are considering legalizing use by the artists of the narrow lofts that would otherwise be left vacant. Even though employment is declining, the area remains a prime source of employment for unskilled and semiskilled workers, particularly black and Puerto Rican. The firms in the section perform a necessary function and should be encouraged to remain at this time (New York City Planning Commission, 1969).

Although long an industrial area, SoHo became increasingly seen as a blighted and inefficient use of the land. Various new uses were proposed for it, including that the area be razed in order to become part of the Lower Manhattan Expressway, and failing that, that the area be razed to form a continuation of the Washington Square South Urban Renewal Area (moderate-income housing). In 1963, an extensive survey of the South Houston Industrial Area was conducted under the aegis of the DCP. The Rapkin Report, as it came to be known, surveyed the historical development and contemporary land use of SoHo, and provided a detailed account of the types of firms that were located in the area, as well as advantages and drawbacks of the area for industry. The report found that although the area was no longer a large-scale manufacturing center, it still contained many smaller industrial firms (New York City Planning Commission, 1963). Although none of the firms were critical to the city's economy, in total they formed an efficient system for fostering small wholesale trades and start-up type industries, functioning as what are today called "incubators." These incubators, the report claimed, were vital to the continued presence of industry in New York, as well as to the many thousands of jobs dependent on them. These jobs, in turn, employed unskilled and semiskilled workers, who were typically less well-educated, less affluent, and usually minorities. The Rapkin Report was influential in turning the tide of opinion away from razing SoHo for any large-scale development schemes, but it did not prevent the eventual re-zoning of SoHo less than 10 years later. The loft conversion re-zonings created, in effect, an exclusive residential neighborhood that proved incompatible with the continu-

ation of SoHo as an industrial area.

> In the 1960s, this [the SoHo manufacturing district] was considered a blighted area, ripe for urban renewal. SoHo didn't fit into City Planning's vision of modern industrial use. That is why they were considering it for the Lower Manhattan Expressway and then for urban renewal [mainly housing]. The first set of loft conversion changes came in the 70s, and they came largely in response to increasing reports of vacancies in loft buildings - primarily in SoHo...What Rapkin wrote about was the importance of space like that - incubator space for industry. By the time of the first [Zoning Resolution] text changes in the early 70s that allowed joint living-work space, in typical city planning fashion, they did not list the new use in the residential use categories – it was listed under manufacturing, with the emphasis being on the "work," with the "living" part

Table 8. **MINORITY POPULATION IN THE LOWER WEST SIDE CASE STUDY AREA**
Compared with New York City + Manhattan, 1960 - 1990 (Percent)

	Lower West Side	Manhattan	New York City
1960	9.35%	39.10%	22.90%
1970	14.90%	45.30%	36.10%
1980	12.60%	43.60%	44.20%
1990	15.10%	51%	56.40%

Table 9. **MEAN HOUSEHOLD INCOME FOR THE LOWER WEST SIDE CASE STUDY AREA**
Compared with New York City + Manhattan, 1970 - 1990 ($)

	Lower West Side	Manhattan	New York City
1970 MHI	$12,400	$14,200	$11,600
% of NYC MHI	107.0%	122.4%	100%
% of Manhattan MHI	87.3%	100.0%	81.7%
1980 MHI	$25,900	$27,100	$21,000
% of NYC MHI	123.0%	129.1%	100%
% of Manhattan MHI	95.6%	100.0%	77.5%
1990 MHI	$82,900	$57,100	$41,700
% of NYC MHI	198.8%	136.9%	100%
% of Manhattan MHI	145.2%	100.0%	73.0%

> incidental. And the image everyone had was of these enormous sculptures that were metal, so it was like a factory. That was the image, and rather naïve of the planners…Ironically, of course, the zoning that legitimized the loft living drove the prices up so that neither the intended artist residents nor the industrial tenants found the lofts affordable anymore (Z.I. #5).

Many of the urban renewal plan documents express "the provision of housing" as a primary objective of their proposals. In practice, this amounted to a certain type of housing, one designed to meet the housing needs of people who already had abundant choices for housing outside the city, but seemingly not so many choices for housing inside the city. A letter from the Department of Housing and Urban Development (HUD) to the Chair of the City Planning Commission reiterated some of the reasons for their proposed Washington Street URA: "To provide a powerful new magnet for housing in the City's core area; to broaden its share of that part of the region's new housing market composed largely of younger households amenable to central city living…" (October 26, 1970 letter).

The application for the re-zoning of the Battery Park City (BPC) area, for example, stated that one of the main purposes of the BPC was "to broaden the regional choice of residence by introducing new housing in the vicinity of the major employment center of Lower Manhattan; to provide a range of housing choice…" The regional choice that was ultimately broadened was that which was offered to the affluent. Although the original plans called for a mix of housing types and rental rates, with subsidies available to promote a mix of income levels and affordable housing in the complex, in fact the low-income housing was never built at BPC. The requirement for the project to contain a certain percentage of low-income housing was waived, and credit was given for the Battery Park City Authority (a New York State quasi-governmental agency, with broad powers and the ability to circumvent New York City regulations) to build low-income housing in another part of the city as a substitute for that required at BPC. This new low-income housing was never built, neither at BPC nor anywhere else in the city (Lipton, 2001).

The series of re-zonings covering non-project-specific loft conversions as well as the urban renewal projects contributed to the area's burgeoning population and extreme upward shift of the average residents' economic status. Although population increased significantly during the study time period, the percentage of minority population did not increase at the rate of New York City as a whole. In 1960, the population of the Lower West Side was 9.3 percent minority, when Manhattan's was 39.1 percent and New York City's was 22.9 percent. By 1990, the case study area's minority population comprised 15.1 percent of the total, while Manhattan's was 51 percent, and New York City's was 56.1 percent (see Table 8). In

1960, residents' average family income was approximately 87 percent of that of Manhattan. By 1990, the average income was 145 percent of Manhattan's, making it one of the most affluent enclaves in Manhattan (see Table 9).

Land use also changed significantly over the course of the study time period. Industrial uses in the areas re-zoned from manufacturing to districts permitting housing had diminished visibly between 1956 and 1990, but industrial uses also diminished in areas adjacent to those re-zoned, but which remained officially M zones. Formerly industrial buildings were now shown on the Sanborn maps as residential uses for many of the older loft buildings.

The general land use policy trend in effect for virtually the entire study time period seemed to favor the development of housing and shopping amenities for the affluent, commercial office towers, and waterfront recreational uses, designed to appeal primarily to the resident and work-day office populations. The policies were intended to "liberate" the valuable land on the Lower West Side, away from New York City's downward sliding industrial base and towards what was seen as the future: the ascendancy of the consumer society. The underlying subtext of these policies stated the forecast and hope that this strategy would serve to jump start New York's failing economy, and reverse the distressing socio-economic changes that had taken place and continued to take place.

The case study area today is one of the most affluent parts of the city. As of the 1990 census, there was a very low percentage of minorities, as compared with Manhattan as a whole and with all of New York City. M zones have been severely curtailed, and an examination of land use maps revealed that there has been a dramatic increase in residential uses. Few vacant lots remain, and the area's population has more than doubled in the study time period. Entire industry centers have disappeared from the case study area: electrical supplies, wholesale produce, dairy and eggs market, paper packing, recycling and other waste-related businesses, most of the import/export firms, distribution and trucking firms, and some of the printing and graphic arts industries. Many of these industries have relocated to the Bronx and other remaining industrial zones.

THE CITY'S RESPONSE TO ENVIRONMENTAL INJUSTICE

New York City has developed two principal means of addressing distributional inequity and other land use planning challenges: an increase in the mandated public participation opportunities in the planning process, and the formulation and use of the Fair Share Criteria.

Community-based, or participatory, planning has been seen as a necessary, but not sufficient, means of achieving environmental justice. Although some view community-based planning as a way to empower the "underdogs" and alter the balance of power (Renn, Webler, & Wiedemann, 1995), community-based planning has also been thought of as promoting NIMBY-ism rather than promoting environmental justice. If each community has the right to make its own land use decisions, the result may be each community's plan rejecting the siting of all perceived LULUs within their community, based on the Not In My Back Yard philosophy, and in keeping with exclusionary zoning principles. The right to determine the direction of development in their community may translate into an unwillingness to accommodate any objectionable land use, even if it is a land use required to address the community's share of the burdens, such as the solid waste produced by the community. Additionally, a comprehensive plan for a city that is comprised solely of a collection of individual community plans ends up being piecemeal planning, by not addressing regional needs or larger city-wide land use issues.

New York City's 1990 revised Charter, Section 197(a), gave each Community District the opportunity to devise its own comprehensive community-scale plan. But this process is unlikely to result in enhanced environmental justice. The plans are difficult to develop, and are a lengthy and potentially contentious procedure. Therefore, few community districts have opted to make a community plan as yet, and many may never do so. The few community district plans that have been developed so far have been somewhat controversial, with no clear assurance at the end of the process that the plan actually reflects the community's visions. Added to this is the fact that the plans are strictly advisory, imparting no requirement for the Planning Commission or the City Council to abide by or implement them.

The potential for each community to implement its plan falls within the political realm, and thus depends on the political power of each community. Thus, community district plans may end up as just another way for the already empowered communities to retain power, and for the other communities to see their plans ignored.

> We have this 197-a process, same as we have the institutionalization of the Community Boards. I think these formal procedures end up empowering the already empowered communities and not having a major impact in the disempowered communities… In the lower income communities, the opinions of the Community Board are really, nine times out of ten, irrelevant to the decisions that are going to be made (Z.I. #6).

However, at least ostensibly, the new public participation provisions have produced some potential avenues for achieving environmental justice.

There are mandated opportunities for the public to comment on proposed actions, although, again, there is no requirement for the decision-makers to abide by the public's wishes. Nevertheless, they are supposed to take the community's viewpoint into consideration, and are often persuaded to do so by the negative political ramifications of going against the community. This is dependent on the visibility of the community, their political voice, and the media attention given to the issue. Planning decisions are also, however, subject to the shifting allegiances and alliances of the decision-makers in the Planning Commission and City Council, and often party or borough obligations and loyalties override other considerations in the vote.

Fair Share Criteria

The other major mechanism the city has developed to promote equity in the distribution of the benefits and burdens of city facilities is the Fair Share Criteria. The Fair Share Criteria (NYC DCP, 1991) are new procedures and standards for agencies to follow in the siting of city facilities. The new City Charter, Section 203(a), called for the mayor to promulgate rules for such procedures and standards. The Charter revisions were approved by the voters in 1989, and the Fair Share Criteria were created and became effective in 1991. The Criteria were developed in response to an on-going crisis encountered in the City's attempts to site locally-undesirable social service facilities and other types of city-owned or -operated facilities.

When the Fair Share Guidelines were first established, they were much touted in the planning field as being a positive step in the direction of environmental equity and locational conflict resolution. The American Planning Association gave New York City an award for the Fair Share guidelines because they were the best example of how "planning effectively addresses specific community needs" (Rose, 1993, p. 97). How well have the Fair Share Criteria addressed environmental justice issues in New York City?

There are some limitations inherent in the Fair Share Criteria that reduce their effectiveness in producing environmental justice outcomes. First, they only apply to city-owned, -operated, or -contracted facilities and programs, and as the city continues to privatize an increasing number of its functions, Fair Share becomes less of a protection for many communities against over-saturation of objectionable facilities. Many objectionable facilities are not even covered under the Criteria because of this limitation (e.g., solid waste transfer stations, which are predominantly private).

Secondly, the Criteria only require that decision-makers take the criteria "into account" in their deliberations on whether or not to approve a given siting action. There are no formulas, quotas, or prohibitions for siting city-owned facilities, and thus no clear-cut ways of ascertaining what the fair

share for a community actually should be or when a community is "oversaturated." "The criteria do not prohibit the siting of facilities in the 'high concentration' districts, but do require closer scrutiny of the effect of facility clustering on neighborhood character" (Weisberg, 1993, p. 95). Therefore, interpretation of the Fair Share Criteria is fairly subjective. How thoroughly Fair Share considerations are evaluated and taken into account in siting decisions varies considerably from agency to agency. DCP subsequently issued guidelines to help agencies interpret the Criteria when proposing sites for their facilities (New York City Department of City Planning, 1998), but each agency adheres to the Criteria in its own way, some more diligently and rigorously than others.

> [F]or some agencies, the Criteria fulfill their intended function as a tool for careful analysis and disclosure of the potential impacts of a new facility on a neighborhood. For other agencies, the absence of a prescribed "roadmap" can allow for sloppy analysis and perfunctory consideration of difficult issues (Karnovsky, 2002, p. 43).

Ultimately, the major factor in evaluating the effectiveness of the Fair Share Criteria is what the purpose of Fair Share is perceived to be. Should the Criteria produce equitable outcomes, or merely provide an equitable process? Clearly, some planners and legal experts view the Criteria's purpose as being the provision of an equitable process, and view the Criteria as a success since they fulfill that objective.

> The intent of Fair Share is to regularize the process, make it more open, and bring into it previously disenfranchised participants. It rests on the hope that by making more people responsible parties in the deal-making, the public perception of illegitimacy will be lessened. Further, by setting up the process in which participation is to be ensured, parties who fail or refuse to make use of the prescribed administrative channels will lose their legitimacy and, hopefully, their legal standing to bring subsequent challenge against siting decisions (Valletta, 1993, p. 20).

Regardless of how fair the process is, legitimacy will not be conferred if people believe that the outcome is a foregone conclusion and their participation has no impact on the decision. In fact, this may be counterproductive, because people will feel that they are being allowed to participate just to add a veneer of legitimacy to the proceedings, with no hope of influencing the outcome, and they will eventually stop participating (and lending their legitimizing influence). In other words, the goal ought not to be that the public *perception* of illegitimacy be lessened, but that we strive to lessen actual illegitimacy as well.

According to the City Planning Department's own evaluation of the Fair Share Criteria, (New York City Department of City Planning, 1995), the Criteria have

not resulted in a more equitable distribution of LULUs; the most successful part of Fair Share has been the "advance warning" system embodied in the Annual Statement of Needs, whereby the public is notified of and has the opportunity to comment on agencies' proposals for facility sitings at an early stage in the site selection process. However valuable this turns out to be in achieving equitable siting solutions, it is reasonable to believe that most people view the purpose of Fair Share as preventing over-saturation of noxious uses in any given community, and not just providing public participation opportunities.

Perhaps including more specific guidelines in the Criteria would lead to greater distributional equity. Some would say that equitable distribution of noxious facilities is beside the point - the goal of environmental justice is not to spread pollution and health risks around so that everyone is impacted equally, but to address the root of the problem: by lessening pollution and health risks for everyone, by questioning the need for many of the environmental burdens being generated, and by challenging assumptions about the modes of production and consumption in capitalist societies (Lake, 1993).

Still, the most salient problem with the Fair Share Criteria, especially in light of the discussion on zoning and zoning changes above, is the fact that the location and uneven distribution of M zones precludes many communities in New York City from *ever* bearing their share of the burden. The underlying zoning for industry is taken as a given in siting analyses. Many types of facilities covered by the Fair Share Criteria can only be sited in an M zone. For those communities and people living in close proximity to an M zone, then, Fair Share does little to alleviate the concentration of noxious facilities.

> [T]he zoning map changed in the other boroughs, and the city never related the zoning map changes in the other boroughs to the impact that it would create in Hunts Point [in the Bronx]. If you eliminate manufacturing zoning in Manhattan, how then could that borough take its fair share of the burden? The DCP and the planning commission looked at M zones strictly as areas for manufacturing, rather than also acknowledging that they're the only areas that noxious uses of any sort can locate in. The idea of Fair Share becomes meaningless if a borough has little or no remaining M zones. They will try to stick anything they don't know what else to do with in an M zone. It is very inappropriate and ill-considered planning (Z.I. #7).

In his critique of the Fair Share Criteria, Joe Rose says: "a fundamental goal of zoning has always been to isolate noxious uses from the general population. This usually entails concentrating noxious facilities in particular areas, precisely the opposite of what New York's Fair Share guidelines prescribe" (Rose, 1993, p. 100). Unfortunately, siting noxious uses in M

zones does NOT isolate them from the general population – or not, at least, from the 22% of New Yorkers, predominantly poor and minority, who live in a census tract within a major M zone.

In fact, the key difference between Rabin's definition of expulsive zoning and the New York experience is that in New York, poor and minority people have *not*, by and large, necessarily been expelled by expansions of M zones, but continue to live in or near M zones having high concentrations of noxious uses. There is often no other place for them to move to within the city, especially given the amount of public housing that has been constructed in industrial areas. In this case, the zoning changes that increase noxious uses in a community would be more accurately termed "intensive" zoning rather than expulsive zoning (Arnold, 2000), although expulsive zoning still accurately describes what happens in New York when industrial areas are re-zoned to other uses, and poor and minority residents are forced out by gentrification.

Rose's primary complaint about the Fair Share Criteria is not their lack of specificity in determining "fairness," but the futility of trying to legislate fairness and of attempting to interject ethics into what is a difficult, political, and subjective balancing act of conflicting interests. However, based on my conversations with planners and policy-makers, many generally believe it *is* possible (and desirable) to legislate fairness (Maantay, 2000). In a way, that is what planning is all about: ensuring a high quality of life for all through the regulatory framework of zoning, environmental impact assessment, and other legal and policy approaches. In "Planning the Equitable City," R. Susan Motley contends that "[A]n equitable city can emerge only through a process that is equitable itself" (Motley, 1993, p. 208). For now, the equitable process must, to a large degree, be legislated.

Some states have woven environmental justice criteria into their environmental laws (Gross, Shafsky, & Brown, 2000), but these typically have to do with creating a more inclusive approval process for permit applications for noxious uses, assisting community members to participate in the regulatory process, or encouraging the equitable clean-up of already contaminated land. They do not get at the heart of the matter – the zoning designations and zoning changes that permit a concentration of noxious uses near certain groups of people. Although increased opportunities for public participation, community-based planning, and (to a much lesser degree) the Fair Share Criteria have brought additional political pressure and media attention to bear on the issue of environmental injustice in New York City, other effective ways of dealing with land use inequities are available, and have been used elsewhere.

Craig Anthony (Tony) Arnold discusses some of these methods in "Planning Milagros: Environmental Justice and Land Use Regulation," as well as in this volume's "Land Use Justice." Other cities have tried dif-

ferent planning and zoning techniques, such as comprehensive re-zoning to include overlays with "conditional uses" for certain use groups (East Austin, Texas); buffer requirements separating industry and residences, and a permitting process for noxious uses where approvals can be denied based solely on a community's over-saturation with hazardous material storage, use, or manufacture (Denver, CO); and zoning text amendments barring certain land uses from the city altogether, such as metal shredders in St. Paul, Minnesota (Arnold, 1998; Arnold, 2000). Arnold advocates changing zoning texts rather than zoning maps, since courts tend to uphold text changes more often than map changes as evidence of comprehensive zoning, and text changes could be used to alter use groups within a type of zone without altering property lot designation or zone boundaries.

These flexible zoning techniques recognize that we must make industrial zones safer. By creating regulations that force industrial neighborhoods to pursue a higher standard of environmental quality and by introducing flexible zoning techniques, improved performance standards for industry, and sensible mixed-use zoning designations, expulsive zoning problems can be addressed through: 1) stemming the tide of extreme racial segregation in industrial zones, which affects industrial areas that have been targeted to be dumping grounds for noxious uses; and 2) discouraging expulsion of minorities and industries from industrial areas that have been targeted by planners and private investors for gentrification.

CONCLUSION

Zoning as practiced in New York City is not a benign or neutral process. Decisions about the best locations for noxious uses have racial and class implications, since M zones are the only places in New York where noxious uses can be sited, and the people living in and near M zones have a much higher than average likelihood of being poor and minority. Areas where M zones are increased in extent are more likely to have a higher than average proportion of minorities and lower-income people, while areas where M zones are decreased often have a lower proportion of minority and lower-income people. As the city has re-zoned many areas from M to other uses, industrial uses have become intensified in the remaining M zones. The re-zoning of vast areas of the Lower West Side from M to other uses is not unrelated to the city's need to re-zone areas of the Bronx from residential to manufacturing.

We cannot say that the city purposely selected poor and minority communities as "appropriate" places to increase industry and noxious uses. Nor can we say that the city purposely selected more affluent and "whiter" industrial areas as "appropriate" places to discourage industry and begin gentrification. But, issues of intentionality aside, we must acknowledge the role of city planning in reducing some people's quality

of life and improving others', while ostensibly promoting equal protection under the law of zoning.

I spoke with many people about my study, both planning professionals and laypeople from a wide variety of backgrounds, and the response, almost invariably, was something along the lines of: "So, what else is new? Poor people live in lousy places. That's the way the world is. There has to be some land allocated for industry and unpleasant things, and those things are definitely not going to be put near rich people!" Unfortunately, expulsive zoning has become so naturalized in our society (even among some of the planners with whom I spoke) that few people think it noteworthy that planning policy and the law of zoning differentially protect communities behind a mask of scientific objectivity and the ideals of justice implied in an equal application of the law.

> No question that zoning protects some people better than others. Zoning is responsive to wealth, property, political power, and those areas or communities that are more politically empowered or connected clearly will be able to get done the zoning changes that they desire and to prevent the zoning changes they don't desire. Less politically or economically empowered communities, even though you have a formal structure [for public participation], will be less able to impact on changes that are taking place to them or around them (Z.I. #6).

> Of course zoning doesn't protect equally - but this is just part and parcel of our negative attitudes towards both industry and poor people...Zoning segregates not just land use, but also people. Zoning is best at protecting areas of one- and two-family homes. Zoning protects areas of home ownership. It protects areas of higher land values. These areas need to be protected because, reading between the lines, these are presumably the people who need to be most protected (Z.I. #1).

> Zoning is perceived as the law is: scientific-based and justice-oriented. Zoning is supposed to be impartial, even-handed. We assume that zoning, being part of our body of law, affords justice, but the purpose of zoning is not to provide justice, but to protect some more than others, based on the value of land, and by inference, the value of people. Zoning as we have it perpetuates a stratified economy (Z.I. #3).

> Everyone does not get equal protection [from zoning]. It simply isn't possible to provide that to everyone (Z.I. #2).

Zoning is the determinant in decisions about where the city continues to site (or allows to be sited) noxious uses. Zoning tends to concentrate

noxious uses in poor and minority industrial neighborhoods due to re-zoning of more affluent and less minority industrial neighborhoods to other uses. As long as "market forces" govern zoning and, therefore, planning, in New York, this concentration of noxious uses in poorer and more minority areas will result. When the main purpose of planning is viewed as the facilitation of market trends, the concentration of noxious uses in poor neighborhoods is inevitable. When planning tries to address quality-of-life issues in low-income populations, this concentration is less inevitable. Perhaps the first step in rectifying the inequitable city, and planning a livable city for all, would be to acknowledge the role zoning can play in perpetrating and perpetuating the disproportionate concentration of noxious land uses and the resulting environmental burdens in some locations and for some people.

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ENDNOTES

1 The difference between process equity (or procedural fairness) and outcome equality is a very important distinction to make in planning, since the way policy-makers have responded

to accusations of environmental injustice has primarily been to create additional public participatory processes, Fair Share Guidelines, and other mechanisms to ensure "fairness" in siting noxious facilities. However, recent history has shown that process equity has not necessarily resulted in more equitable outcomes.

2 Appropriateness is a rather vague, catch-all term, implying conformance with currently accepted planning standards and goals, compatibility with existing or desired land use patterns, or the city's Master Plan, if there is one in effect. For example, changes to the zoning resolution and zoning maps require the New York City Planning Commission (CPC) to find that proposed re-zoning reflects "appropriate zoning" for the area in question. A substantial amount of subjectivity creeps into this decision-making process regarding what constitutes "appropriate" land use for a given part of the city. While the term "appropriate" is rarely defined, it appears as a justification in virtually every re-zoning application and CPC decision, as well as many planning studies and policy documents (Maantay, 2000).

3 Geographic Information Systems (GIS) refer to the combination of computer hardware, specialized software, spatial and non-spatial attribute databases, and "people power" required to conduct spatial analyses and computerized mapping. By overlaying individual layers of spatial and attribute data (for instance, a layer showing the locations of manufacturing zones and a layer of demographic data by census tracts), the GIS analyst can extract the characteristics of the population within a given distance of the M zones. This analysis would be extremely laborious, if not impossible, to accomplish manually, especially given the large data sets involved and amount of areal and statistical calculations required. The GIS software permits summaries of statistics for various levels of data aggregation, e.g. for the entire city, by borough, by M zones, by census tracts, etc. Unions (the Boolean operator OR) and Intersects (the Boolean operator AND) can be performed on multiple data layers to examine possible spatial correspondence and association between variables, and to select portions of data sets meeting certain criteria. These types of analyses are only practicable with GIS.

4 The term "minority group" refers to the population that is not Non-Hispanic White. Many people consider the term "minority" to be a misnomer, because in many US urban areas, as in New York City, people classified as minorities actually constitute the majority. Based on the census definitions, and the guidelines established in Federal Statistical Directive No. 15 issued by the Office of Management and Budget in 1992, which provides standards on ethnic and racial categories for statistical reporting to be used by all federal agencies, this study used a derived variable of "Minority." This category (for 1990 census data) is a summation of Hispanic, Non-Hispanic Black, Non-Hispanic American Indian, Non-Hispanic Asian or Pacific Islander, Eskimo or Aleut, and Non-Hispanic Other Race. Other federal agencies, such as the US Environmental Protection Agency, construct a similar "Minority" category as above for their research on environmental justice issues. Because this study required a longitudinal analysis, census data from 1960 through 1990 were used. One of the problems with cross-census comparisons is the lack of consistency in many census attribute data categories over the years, especially with data on race and ethnicity. Variables, methods of data aggregation, types of information collected, and census policies on issues such as confidentiality, differ from one census to the next, potentially affecting the validity of cross-census comparisons.

5 Quotations from the zoning experts used throughout this article are attributed to numbered Zoning Interviewees, abbreviated as Z.I. #1, Z.I. #2, etc., in order to preserve the anonymity requested by some of the interviewees. The complete list of interviewees and their affiliations is given in Appendix B, Maantay, 2000.