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How do New York City's Recent Rezonings Align With its Goals for Park Accessibility?

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Abstract

In 2007, New York City adopted a long-term sustainability plan that announced a goal of ensuring that almost every New Yorker lives within a ten minute walk of a park of substantial size. At the same time, policymakers are rewriting the City's land use map through an unprecedented series of neighborhood level rezonings that involve changing the use type and residential capacity of affected lots or groups of lots. Despite the confluence of these interventions, no research has analyzed how the rezonings interact with the City's park infrastructure, and specifically, whether residential capacity changes in areas close to parks differ from those in areas further away. In this research, we employ a database of every tax lot in New York City to investigate how well the City-initiated rezonings correlate with the goal of providing New Yorkers with good access to the City's parks. Our results indicate a mixed picture; while most 'upzoned' lots (lots where residential capacity was added) were near parks, we also find that the majority of 'downzoned' lots (lots where residential capacity was reduced) were also close to parks. The net impact of these rezonings was a modest increase in residential capacity for the City as a whole, but the increases were disproportionately focused in areas further from parks.

Keywords

Land use; zoning; park proximity

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INTRODUCTION

Urban green space provides many benefits to City residents, from recreational opportunities to improved air quality. With these benefits in mind, New York City's long-term growth and sustainability plan includes the goal of having a significant open space within a ten-minute walk of every home in the City by 2030. In furtherance of this goal, the City has added hundreds of acres of new open space in recent years and plans to add thousands more in the coming decades.

New York City policymakers are also engaging in an unprecedented series of zoning map changes throughout the City. Some of these have covered only a few blocks while others have encompassed dozens or even hundreds of blocks. Together, these actions have altered the land use regulations applicable to approximately 20 percent of the City's lot land area. These rezonings have added residential development capacity to some neighborhoods and removed capacity from others. Each zoning change is proposed, studied and debated individually; however, until recently, there has been little analysis of the cumulative impact of these changes and how they intersect with the City's stated goals or other planning principals.

In this study, we investigate the relationship between the rezoning actions the City enacted between 2003 and 2007 and the geography of the City's existing park infrastructure. Using Geographic Information Systems (GIS) analysis and a database created through a related study (McDonnell et al. In Press), we estimate the impacts of these rezonings on the residential development capacity of individual lots located within and outside a quarter-mile walk of City-operated parks. A quarter-mile is the City's measure for a ten minute walk for a child or senior citizen (City of New York 2007) and a key measure of park proximity in the City. We then calculate the total change in residential development capacity for lots in these two groups to better understand whether or not the rezonings will help the City meet its open space accessibility goal.

BACKGROUND AND PREVIOUS LITERATURE

New York City has approximately 29,000 acres of urban open space that is owned and managed by the Department of Parks and Recreation. However, because of the City's population density, New Yorkers have less open space per capita than residents of almost any other American city (City of New York 2007). The median ratio of open space is about 1.5 acres per 1,000 residents and, as a planning goal, the City designates an area with at least 2.5 acres of open space per 1,000 residents as a well-served area (Mayor's Office of Environmental Coordination 2010). It is in this context that Mayor Michael Bloomberg launched the City's long-term sustainability and land use strategy, *PlaNYC 2030*. One of its key open space goals is to ensure that virtually every New Yorker is within a ten minute walk of a park greater than a quarter-acre by 2030. In addition, the City is attempting to increase the supply of open space. It is also upgrading play space and park land, including what the City defines as underdeveloped destination parks, expanding usable hours and re-conceptualizing streets and sidewalks as public spaces. These strategies will create or improve almost 4,000 acres of open space (City of New York 2007).

The accessibility of parks is inextricably intertwined with residential development patterns. New residential construction in areas far from existing or planned park infrastructure may undermine the City's open space accessibility goals. Recent research indicates that while new residential construction between 2000 and 2008 in Brooklyn, Bronx and Queens tended to be as near or nearer to parks than the existing housing stock, the opposite was true in Manhattan and Staten Island (Furman Center 2010). The relationship between new housing and parks is especially important given predictions of significant population growth over the next two decades (City of New York 2007). In addition, by United States' standards, New York is relatively dense and its housing stock is relatively old. The median age of

buildings on residentially zoned land in New York City as of 2003 was over 70 years of age and less than half of those buildings were single family homes (Been et al. 2009). This suggests that access to private open space, such as back yards, is limited for most New Yorkers. As a result, accessibility to public open space is an especially important quality of life.

A key determinant of where any additional housing in the City will be located is the City's zoning code. The current version of the zoning code (known as the "Zoning Resolution") was enacted in 1961, but has been amended many times. Since 2002, however, when Mayor Michael Bloomberg took office, the pace and scale of changes to the Zoning Resolution has accelerated dramatically. Between 2002 and early 2010, New York's City Council adopted more than 100 neighborhood-sized changes to the City's zoning map that were formally proposed by the City's Department of City Planning (DCP). Some of these rezoning actions were restricted to a few blocks, others encompassed hundreds of blocks. In total, these rezonings, which are in addition to rezonings requested by landowners for individual lots, effectively changed the land use rules for approximately 20% of the City's lot land area (McDonnell et al. In Press). Accordingly, they will play a large role in defining where and in what form future residential development will occur, and whether or not it is in close proximity to existing or new green space as contemplated by *PlaNYC 2030*.

The DCP cites specific planning goals for each individual rezoning, which generally are to protect existing residential neighborhoods from out-of-context development, to change the permitted uses of any areas to encourage economic and residential development, or a combination of both (New York City Department of City Planning 2009a; New York City Department of City Planning 2009b). As such, each rezoning serves localized goals; however, they also provide the building blocks of the City's overall development strategies and goals. Our analysis of zoning changes and park proximity covers City-initiated rezonings enacted between 2003 and 2007, a period that coincided with a widespread real estate boom (Furman Center 2010).

Open space is important to any city. *PlaNYC 2030* cites environmental, health and quality of life benefits of open space (City of New York 2007). Indeed, there is a relatively large literature that focuses on the value of open space in urban areas. McConnell and Walls (2005) review more than 60 such studies and find that open space is valued positively but that these values differ based upon proximity, size and type of the open space and the method of analysis. Similarly, a review of the literature by Voicu and Been (2008) finds positive property values impacts for small parks and community gardens on nearby properties.

Other literature focuses on the potential health benefits of open space resulting from increased physical activity (Giles-Corti et al. 2005; Sherer 2003). Accepting the benefits of proximate open space, Maroko et al. (2009) measure disparities in access to parks and physical activity sites of residents in New York City by analyzing the density of park acreage and physical activity sites. The authors note that GIS tools have often been used by researchers investigating environmental justice topics to examine a population's exposure to an environmental "bad" such as hazardous waste sites. However, these tools have been applied less frequently to explore the relationship between the socio-economic characteristics of a population and their proximity to an environmental "good" such as parks. The authors find that while there is a geographically inequitable distribution of park space and physical activity sites, it is not well predicted by race, ethnicity, or socio-economic status. The study focuses on the distribution of residents as of 2000, however, so does not shed light on how more recent development patterns, or the City's recent changes in its land use regulations, will affect the disparities in park access the research identifies.

No doubt as a result of the quick pace of rezoning activity in recent years, many researchers have analyzed various aspects of the recent zoning changes. For instance, Wolf-Powers (2005) explores the planner's role in rezoning for economic development in Brooklyn's Greenpoint-Williamsburg and Long

Island City in Queens. Armstrong and Lund (2005) also adopt a case study approach by examining land zoned for manufacturing uses in one neighborhood in each of the City's five boroughs. Both Alex Garvin & Associates (2006) and Been et al. (2009) analyze residential capacity in New York City. The more systematic of the two, Been et al. (2009), assess the City's residential development capacity by counting underdeveloped residentially-zoned land (lots not built out to their permitted capacity) in addition to lots vacant in 2003 throughout the entire City. Using an Euclidian GIS methodology, they find that 35% of residentially-zoned underdeveloped lots (built out at less than 50% of their estimated zoned capacity) in New York City in 2003 were within 500 feet of a park, compared to only 29% of lots built out to more than 50% of their zoned capacity.

To our knowledge, this paper is the first analysis of the relationship between the cumulative impact of New York City's recent rezonings on residential development capacity, on the one hand, and park accessibility, on the other. In contrast to Been et al. (2009), we focus on the changes in capacity resulting from the rezonings, rather than development capacity already existing under the Zoning Resolution that for various reasons was never used. Furthermore, we estimate actual walking distances from individual lots to park perimeters rather than simply using Euclidian distance calculations to determine park proximity. Ideally, we would like to estimate distances to actual park entrances, but as of 2010, we could find no complete dataset of park entrances for the City's park infrastructure. As a result, we use park perimeters as a proxy for park accessibility, recognizing that in some cases this may overstate accessibility. Nor does this research attempt to estimate the impact of City-initiated rezonings on the City Environmental Quality Review (CEQR) Technical Manual park density guidelines of 2.5 acres of open space per 1,000 residents (Mayor's Office of Environmental Coordination 2010) as our focus is the connection between residential capacity and park accessibility rather than estimating resultant population density changes¹. Finally, while the City is also adding capacity through increased hours and improving underutilized "destination" parks, our focus is on park accessibility. As such, we are interested in exploring where capacity is being added and taken away with respect to the closest park. We don't take account of the quality or size (beyond our minimum threshold) of said park.

This research builds upon the work of a related study by McDonnell et al. (In Press) which assesses the City's rezoning actions in relation to rail transit access. In addition to its park accessibility goal, *PlaNYC 2030* also sets a goal focusing development in areas well served by public transit.

DATA AND METHODOLOGY

Our period of analysis is from 2003 to 2007, the earliest and most recent years for which reliable data was available. That period allows us to include 76 of the approximately 100 zoning changes proposed by the Bloomberg administration between 2002 and 2010. Our dataset therefore is extensive enough to allow significant insight into how the City's rezoning actions affect residential development capacity.

Our analysis identifies lots that were subject to City-initiated zoning changes during our study period and estimates the resulting change in residential development capacity over that period. We group these lots by borough, neighborhood, proximity to parks, and type of zoning change imposed in order to better understand how the net change in capacity is distributed.

Our methodology closely mirrors that used in McDonnell et al. (In Press), in which we analyzed the relationship between these same zoning changes and access to rail transit. We rely on a database of lots we create by joining GIS basemaps from the 2003 version of LotInfo and 2007 version of Primary Land Use Tax Lot Output (PLUTO) to the 2003 and 2007 versions of the New York City Real Property

¹ For more information see: http://www.nyc.gov/html/dep/html/public_notices/moeepn.shtml

Assessment Database (RPAD), a proprietary data set maintained by the New York City Department of Finance for property tax assessment purposes.

To calculate changes in development capacity, we estimate the applicable maximum allowable floor area ratio (FAR) for every lot in the database as of 2003 and 2007. A lot's FAR represents the ratio of the gross building square footage built on that lot to the lot's land area. A maximum FAR specified in the Zoning Resolution effectively caps the amount of building area that can be built on a lot to a multiple of its land area (for example, a 10,000 square foot lot with a maximum FAR of 2 can be developed with a building no larger than 20,000 square feet). In order to estimate a tax lot's maximum FAR, we begin with the default maximum FAR specified by the Zoning Resolution for the zoning district in which the tax lot is located (as indicated by RPAD) and then adjust it based on other lot characteristics (generally determined using GIS) that, pursuant to the Zoning Resolution, affect the maximum FAR (such as whether the lot fronts on a wide street). This estimate also makes several assumptions regarding discretionary and bonus programs in the Zoning Resolution that permit developers to either exceed the base maximum FAR if they include certain amenities (affordable housing, for example), or exclude the square footage of certain building elements (enclosed garages, for example). For a full description of this model see McDonnell et al. (In Press). For lots in zoning categories that do not permit residential uses, we assign a maximum residential FAR equal to zero.

By multiplying the maximum FAR assigned to each lot by that lot's land area (again, contained in RPAD), we calculate the maximum amount of residential building area (which we refer to as residential development capacity) that can be built on the lot. Although other regulations, including parking requirements, height limits and open space requirements, may indirectly limit the amount of building area that can be developed on a lot, for simplicity, we assume that the building area calculated from the maximum FAR is attainable. Our estimates therefore are likely to somewhat overstate the allowable residential capacity.

In order to identify which 2003 lots were subject to City-initiated rezonings, we overlay on our 2003 lot base map with a GIS shape file of rezoning "study areas" provided by the DCP. The DCP generally defines areas of initial investigation for a possible rezoning, but not all lots within the study areas will ultimately be rezoned. Of the 816,600 tax lots that form our initial sample of the total universe of identifiable lots in New York City in 2003, we estimate that approximately 244,000 lots were subject to a rezoning study.

To address changes in lot structure and/or size over time, we use the GIS spatial overlay process we developed in earlier work (Been et al. 2009) to compare the 2003 lot to the same parcel of land in 2007. Finally, we compare the 2003 zoning district information in RPAD for each lot within DCP study areas to its 2007 zoning district information, to identify which lots were actually placed into different zoning districts by the City-initiated rezonings. We then classify all of the rezoned lots as one of the following:

- "Downzoned:" if the 2007 maximum residential FAR is less than 90 per cent of the 2003 maximum residential FAR;
- "Upzoned:" if the 2007 maximum residential FAR is more than 110 per cent of the 2003 maximum residential FAR;
- "Contextual-only rezoned:" if there is a change in the lot's zoning designation, but the 2007 maximum residential FAR is within +/- 10 per cent of the 2003 maximum residential FAR².

² We include the "contextual-only" category because many zoning changes do not explicitly change a lot's residential development capacity at all, or change capacity by a very small amount.

To create our parks proximities analysis, we utilized a parks properties shapefile database for 2009 from the Department of Parks and Recreation. The database includes parks, medians and green streets but excludes school yards, which *PlaNYC 2030* counts towards its green space accessibility goals. Because the open space goals in *PlaNYC 2030* focus on open spaces that are bigger than a quarter-acre (City of New York 2007), we include only those spaces. Limiting the analysis to those spaces eliminates "pocket parks" that may not be suitable for recreation. The exclusion of school yards, especially those included in the schoolyards-to-playgrounds program (City of New York 2007), however, may result in an underestimate of accessibility. All proximities are generated through the service area function in ArcGIS Network Analyst after converting the parks database shapefiles from polygons to points as Network Analyst can only compute distances between points³. After testing for accuracy, and to aid computational ease, the parks shapefiles were split into two groups depending on size. For greenstreets and parks of less than 2 acres, polygons boundaries were converted to points. The maximum distance between these points was 5 feet (in the case of malls, which tend to be smaller, the maximum distance was 2 feet). These points accurately approximate the boundaries of these small open spaces. For park polygons of 2 acres or greater, we were able to directly pinpoint intersections in the pedestrian network to approximate park boundaries. These pedestrian intersections are selected from the City's pedestrian network GIS dataset called "LION" that are within 150 feet of park polygons. The thresholds for the division between small and large parks, for the maximum distances between points in small park boundary approximation and for the pedestrian intersections were selected after multiple tests for accuracy. We then calculate the walking distance to the nearest park for every tax lot in New York City. As noted, we define a ten minute walk as a quarter-mile -- the distance that a child or senior can travel in ten minutes -- rather than the more generous estimate of a half-mile that an able-bodied adult might be expected to travel in that time (City of New York 2007).

To interpret our results, we calculate the aggregate capacity changes of lots affected by City-initiated rezonings for the city as a whole, for each borough and for areas within and beyond a quarter-mile of a park.

RESULTS

Baseline Park Proximity

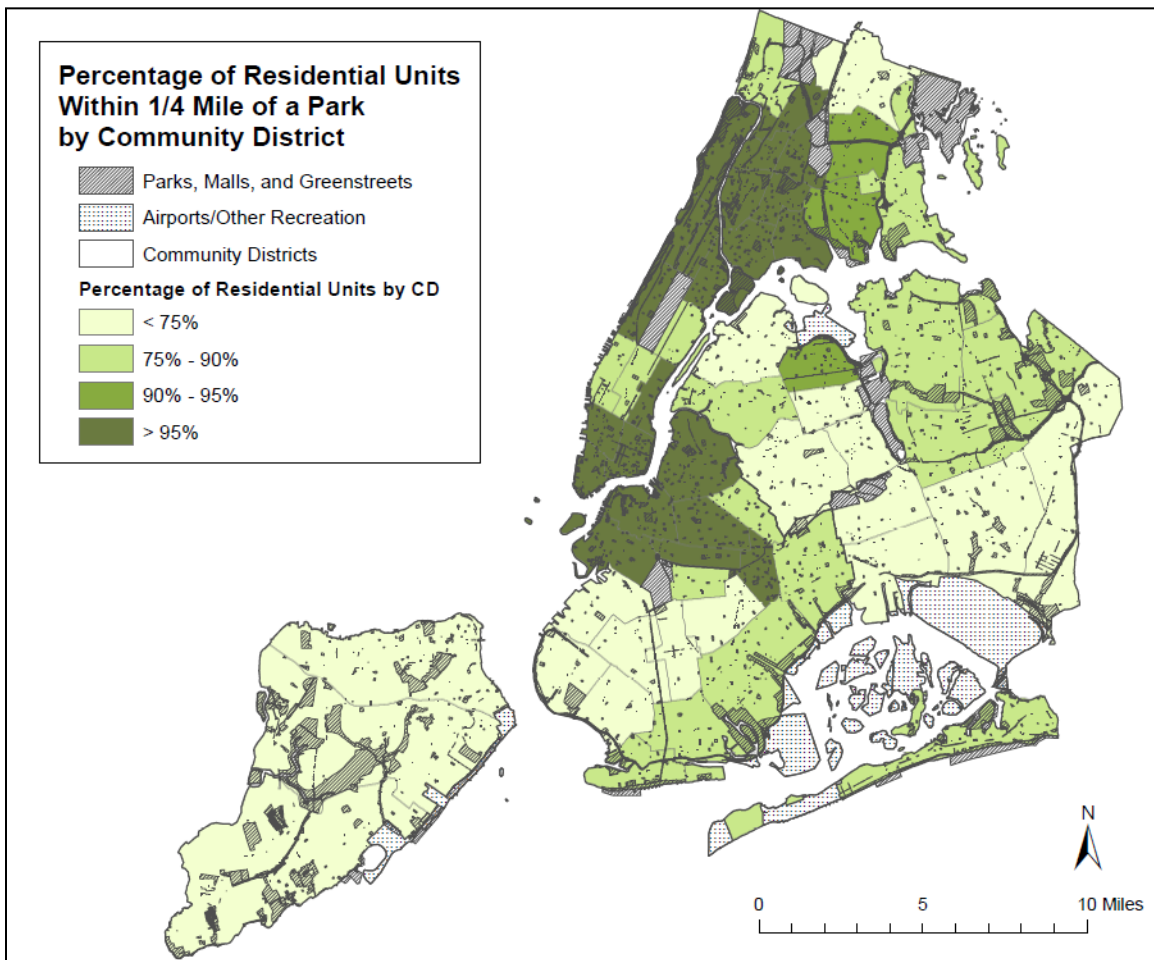
In order to assess how the City's rezoning actions have affected residential capacity near parks, we first establish baseline estimates of the number of lots, lot land area and residential units that exist in the City as of 2003 (the earliest year for which we have data). Table 1 presents these baseline estimates. Using the database we created, we identify about 816,000 lots throughout New York City in 2003. Combining the tax lot data with the walking catchment areas we established, we find that over three quarters of the City's tax lots were within a quarter-mile walk of a park, a greenstreet or a median over a quarter-acre in size in 2003. This ranged from a high of over 94% of lots in Manhattan to under 64% in Staten Island. Only about two thirds of the City's lot land area in 2003 was within a quarter-mile of a park, suggesting that the lots further from parks tend to be larger than those that are close. When we estimate the residential development capacity of every lot, we find that over 82% of the 5.8 billion square feet of total residential capacity (including existing built and zoned) in the City was within a quarter-mile of a park as of 2003. This number closely mirrored the percentage of actual residential units that were close to a park in 2003. Both of these numbers indicate the land near parks is more densely developed and zoned to permit more density than land further away from parks.

³ <http://www.esri.com/software/arcgis/extensions/networkanalyst/index.html>. Accessed June 30th, 2010.

Table 1. Baseline –2003 New York City Lots and Park Proximity.

Total Lots in New York City (2003)	816,536
<i>% Within a ¼ Mile of a Park/Greenstreet/Median:</i>	
Lots (2003)	75.5%
Lot Land Area (2003)	67.4%
Residential Development Capacity (2003)	82.3%
Residential Units (2003)	84.3%

Map 1 shows the percentage of units in each of New York City’s 59 Community Districts that were within a quarter-mile of a park as of 2003. Areas with relatively high residential density such as Manhattan, the south Bronx and northwest Brooklyn also had the highest levels of park proximity. In contrast, lower density areas on the periphery of the City have lower levels of accessibility.



Map 1. Percentage of Residential Units Within a ¼ of a Park (By Community District), 2003.

Rezoning and Park Proximity

Between 2003 and 2007 almost 250,000 of the over 800,000 lots in New York City were subject to a rezoning study. Of those, almost 188,000 lots, or 23% of the total, were actually rezoned. The vast majority of these lots, about 63%, were subject to what we define as contextual-only zoning changes, which do not explicitly change a lot's residential development capacity. In contrast, only about 14% of rezoned lots were upzoned and about 23% were downzoned.

Table 2 shows the percentage of each category of rezoned lot that was located close to a park. Of the approximately 26,000 lots that were upzoned, almost 85% were close to a park. This figure is almost 10 percentage points higher than the baseline distribution of all lots in New York City, indicating that upzoned lots were relatively concentrated in areas with high levels of park access. However, about 77% of downzoned lots were within a quarter-mile walk of a park. While this is close to the baseline rate of park proximity for all lots, it suggests that rezonings that reduced capacity were not particularly targeted towards areas with relatively poor access to parks. Finally, approximately 72% of all lots that received a contextual-only rezoning were in areas close to parks. While the distribution of rezoned lots between areas closer to and farther from parks is a useful first measure of the relationship between rezonings and park geography, it does not reflect variations in lot size and the degree to which a rezoning changes an individual lots maximum residential FAR.

Table 2. Percentage of Lots Rezoned Near Parks.

	All Lots	Upzoned Lots	Downzoned Lots	Contextual-Only Rezoned Lots
New York City	816,536	26,585	43,024	118,284
Within a ¼ mile of a Park	616,326	22,441	33,098	84,144
%	75.5%	84.4%	76.9%	71.1%

Table 3 (below) shows the net change in residential development capacity in areas close to parks and in areas beyond a quarter-mile from a park. We estimate that the City-initiated rezoning actions in the City enacted between 2003 and 2007 together resulted in an additional 94 million square feet of residential development capacity. This represented an increase in capacity of about 1.6% over this period. Of that, almost 64 million square feet, or about two thirds of the net additional capacity, were added in areas close to parks. This translated to an increase in capacity of about 1.3% for these areas, slightly below the citywide total. In contrast, the 30 million square feet of net additional capacity in areas beyond a quarter-mile accounted for an almost 3% increase in residential capacity for these areas. The City's rezonings, then, added development capacity to areas less accessible to green space at a higher rate than it added development capacity near green space. As noted, our dataset excludes schoolyards, which, if of sufficient size, the City counts towards its goals of park proximity in *PlaNYC 2030*. Given the large number of primary schools in the City, we expect that including these spaces would decrease the share of new capacity located outside a 10 minute walk of an open space, but we are currently unable to estimate the impact of this omission.

Table 3. Changes in Residential Capacity and Park Access.

	Citywide	Within a ¼ Mile of a Park	Beyond a ¼ Mile of a Park
Net Change in Residential Development Capacity (sq. ft.)	+93.9m	+63.8m	+30.1m
% of Net Increase in Residential Development Capacity	100%	67.9%	32.9%
% Change in Residential Development Capacity	+1.6%	+1.3%	+2.9%

CONCLUSION

Between 2003 and 2007, New York City proposed and enacted 76 different rezoning actions that changed the zoning for about 188,000 of the City's lots. These actions, affecting almost one fifth of the City's land area, promise to have a significant impact on the City's development over the coming decades, during which the City anticipates the construction of hundreds of thousands of new housing units.

Our analysis reveals that these zoning actions may be in partial tension with one of the key goals articulated in the City's long term growth and sustainability plan, *PlaNYC 2030*: that every resident live within a ten minute walk of a significant open space by 2030. We find that upzoned lots were more likely to be near parks, which would appear to further the City's goal by increasing development opportunities within the desired 10 minute walking distance. However, downzoned lots were also more likely to be near parks than the average City lot, so policymakers have also removed significant residential capacity near existing parks.

When we estimate the change in residential development capacity resulting from these rezonings for individual lots, the relationship between the rezonings and the City's open space accessibility goals appears even more tenuous. The net result of the increases in capacity on upzoned lots and decreases on downzoned lots is that areas further away from existing parks gained about 30 million square feet of new capacity, an increase of almost 3% on preexisting capacity. Areas closer to parks gained much more in absolute terms, about 64 million square feet of capacity, but in percentage terms, this increase amounted to a more modest 1.3% addition to residential capacity. Accordingly, capacity was added to areas with poorer access to green space at a higher rate than it was added to areas with better access.

While the City may have had good reason to add so much capacity to areas further from parks (for example, some of these areas may be near transit or otherwise be desirable for redevelopment), our findings raise questions about the role the City's park accessibility goals played (if any) in its rezoning strategy. At the very least, our results indicate that the City will need to follow through on its ambitious plans to add more usable park space, and look at a broader geographical spread. Otherwise, if residential construction tracks the distribution of added capacity, the City's recent rezonings will make parks marginally less accessible to the City's housing stock, rather than furthering the goal of increasing accessibility. Our findings accordingly signal that policymakers need to bring the City's rezoning actions in step with its long term plans for accommodating growth and for sustainability. In addition, while we do

not explore the topic in detail here, the net impact of the City's rezonings actions should be cognizant of its stated CEQR park density planning goals of 2.5 acres of open space per 1,000 residents (Mayor's Office of Environmental Coordination 2010). This is something we will explore in future work.

In order to further assess the relationship between park accessibility and the City-initiated rezonings, we are extending our research both to include more recent rezonings and more park-based measures. The findings we report here are only a first step in analyzing that relationship. Nevertheless, our findings and methodology contribute to the debate over both land use regulation and environmental justice because they reveal that New York City's planning and zoning actions are shaping development patterns across the City in ways that may not align with the City's goals for the use of its infrastructure and assets such as parks. Our next immediate step is to include school yards that have been converted to open space in addition to parks, medians and large greenstreets. We also are exploring a broader measure of park accessibility encompassing density and the quality of park facilities.

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