Research-Based Article

Can "Cleaned and Greened" Lots Take on the Role of Public Greenspace?

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Abstract

Cities are increasingly greening vacant lots to reduce blight. Such programs could reduce inequities in urban greenspace access, but whether and how greened lots are used remains unclear. We surveyed three hundred greened lots in Philadelphia for signs of use and compared characteristics of used and nonused lots. We found physical signs of use that might be found in yard space, such as barbeques, picnic benches, and swings, on approximately 10 percent of lots. Logistic regression showed that population density was the only statistically significant predictor of lot use. Findings suggest that greened lots could provide direct use benefits to neighbors.

Keywords

vacant lots, greening, environmental justice, greenspace access

Introduction

Programs to green vacant land are not new, but their numbers have increased recently, especially in older industrial cities (The Nature Conservancy 2012) because of a confluence of factors including high levels of vacancy, interest on the part of municipal governments in sustainability and environmental improvements, and concerns over equity in the distribution of greenspaces. Proponents of greening programs argue that greening initiatives offer benefits in all three realms of sustainability—environment, economy, and social equity—and they base this argument largely on evidence from research on parks and urban vegetation (Sherer 2003). New vacant land greening programs often produce small and utilitarian greenspaces that are not officially parks, and these spaces provide opportunities for research. Recent studies have shown that one such program in Philadelphia has increased property values, reduced crime, and improved health (Branas et al. 2011; Heckert and Mennis 2012), suggesting both economic and social benefits to the program. But no published research to date has attempted to establish direct resident uses of these new spaces. This study focuses on expanding our understanding of the social impacts of the program, primarily through the question of whether residents use greened lots and for what purposes, while also reporting on exploratory research on resident perceptions of the program.

The number of vacant and abandoned properties in the United States is increasing (US Government Accountability Office 2011). Suburban out-migration, economic transformation, and the recent housing foreclosure crises have had major negative impacts on the social and physical structures within many cities (Beauregard 2009; Mallach et al. 2010; Mallach and Brachman 2013). Approximately fifty cities across the United States, now referred to as legacy cities, continue to experience declining population and resources and are plagued by dilapidated buildings and vacant land (Mallach and Brachman 2013).

Vacant buildings and lots represent immense economic expenses to cities and taxpayers because of higher demolition and remediation costs as well as reduced property values and tax revenues (Accordino and Johnson 2000; Han 2014). Growing evidence suggests that the presence of vacant lots also impacts community health and safety (Spelman 1993). Vacant lots are often sites of illegal dumping, most often of materials such as construction debris, chemicals, oil and gas products, tires, and vehicles (Beauregard 2013). Vacant lots are also associated with fear of crime (Garvin et al. 2013; Hur and Nasar 2014) and crime itself (Branas et al. 2011; Garvin, Cannuscio, and Branas 2012).

Legacy cities are initiating programs designed to mitigate the social and physical problems associated with vacancy (Accordino and Johnson 2000; Cohen 2001; Katz and Bradley 2013; Teixeira and Wallace 2013). Many cities are undertaking systematic mitigation and reuse of vacant lots

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through greening. Vegetation and natural features are a common element of remediation strategies, which typically include "cleaning and greening" of lots, transformation into community gardens, or use as stormwater management sites (sometimes called "green stormwater infrastructure").

These approaches are not entirely new, as current vacant lot greening programs are related to historical small-park development efforts. Cities began to invest in the development of what have been called small parks, pocket parks, miniparks, or vest-pocket parks in the 1960s and 1970s. These small parks were often constructed on vacant lots as a way to deal with problems associated with vacancy (Marcus and Francis 1997). Yet small-park development generally occurred at a modest scale; for example, San Francisco built twenty small parks between 1975 and 1982 (Marcus and Francis 1997).

Current vacant lot greening efforts are also designed to mitigate problems associated with vacancy, for example, by removing trash and placing barriers to deter future dumping. However, they also differ from past efforts in terms of scale. Unlike historic efforts, current programs are being carried out on a large scale, likely because of the significant portion of legacy cities that have become newly vacant within the last decade. For example, between 2000 and 2012, a program (led by the Pennsylvania Horticultural Society [PHS]) greened 5,763 vacant parcels in Philadelphia, PA. These large-scale programs primarily aim to improve vacant land, reduce blight, and in some instances increase ecosystem services. Mitigated vacant lots are more likely to be designed to provide neutral or utilitarian lawned spaces, as opposed to parks that are designed with (passive or active) use in mind.

Urban environmental sustainability goals also contribute to recent municipal interest in these types of programs. Though the initial goal of these programs may have been blight reduction, proponents increasingly point to the potential environmental benefits of greening programs. For example, the ReImagining a More Sustainable Cleveland program in Cleveland, OH supports community-based vacant lot greening efforts and has explicitly linked vacant land management and environmental sustainability through the naming of the program (Cleveland Land Lab 2008). Additionally, vacant land is mentioned as a potential environmental asset in the sustainability plans of several cities, including Baltimore, MD (City of Baltimore 2009), Columbus, OH (City of Columbus 2015), Buffalo, NY (Western New York Regional Sustainable Planning Consortium 2013), and Philadelphia, PA (City of Philadelphia 2009).

In addition, environmental justice advocates and researchers focus on access to greenspaces as a significant social equity concern. While the environmental justice movement initially focused on race- and class-based disparities in exposure to environmental risks, it has increasingly been recognized that the movement's principles apply equally to access to environmental amenities (Crawford 2011), with strong emphasis on urban parks.

There are many potential benefits of living in close proximity to parks and green settings, such as increased property values (Hammer, Coughlin, and Horn 1974; Crompton 2005; Conway et al. 2010), reduced stormwater runoff, urban heat island effects, and improved air quality (Nowak, Crane, and Stevens 2006; Jansson, Jansson, and Gustafsson 2007), improved physical and mental health (Ulrich 1984; Maas et al. 2009b; Donovan et al. 2013), greater social cohesion (Coley, Sullivan, and Kuo 1997; Kuo et al. 1998; Maas et al. 2009a), and decreased crime (Kuo and Sullivan 2001; Branas et al. 2011; Kondo et al. 2015, 2016).

Access, measured as distance to the nearest greenspace, is often found to be lower in poor neighborhoods and in communities of color (Comber, Brunsdon, and Green 2008; Sister, Wolch, and Wilson 2010). In instances where direct park access has been equal or higher in these communities, often the park size or quality of amenities has been disparate (Boone et al. 2009; Day and Wager 2010; Sister, Wolch, and Wilson 2010). Communities of color may also face other social barriers to use of greenspaces, such as concerns over safety or discrimination (Lindsey, Maraj, and Kuan 2001; Gobster 2002; Day and Wager 2010; Garvin et al. 2013). The issue of equity and greenspace access relates to more than just lot use, as many potential benefits (such as reduced crime or stress levels) of greenspaces may not require actual use by residents (Branas et al. 2011; Garvin, Cannuscio, and Branas 2012; Kondo et al. 2015).

In acknowledgment of both the value of parks to residents and the importance of equitable distribution of such assets, many cities have explicitly created sustainability goals focused on increasing access to greenspace. Baltimore's sustainability plan calls for "safe, well-maintained public recreational space within ¼ mile of all residents" (City of Baltimore 2009, 69). New York City aims to "ensure that all New Yorkers live within a 10-minute walk of a park" (City of New York 2014, 12). And Philadelphia's sustainability plan contains an explicit Equity section that includes the goal of creating an additional 500 acres of accessible greenspace (City of Philadelphia 2009). Adaptive mitigation or reuse of vacant land and support of existing "efforts to clean and green vacant lots" are listed as potential means of addressing Philadelphia's park equity goals (City of Philadelphia 2009).

Though Philadelphia's vacant lot greening program was not designed for and has not been implemented specifically with a goal of improving access to environmental amenities, recent research has shown that it has reduced class- and race-based inequities in the amount of greenspace available to nearby residents (Heckert 2013). We further investigate the possibility that treated vacant lots serve as recreational and greenspace amenities to residents. A previous thesis study found that publicly owned mitigated vacant lots showed low levels of public use in Flint, MI (Bozgo, de Wit, and Haradon 2006). This study evaluated the extent to which residents actually use vacant lots cleaned and greened by the LandCare program in Philadelphia. Our specific research questions are

Figure 1. A vacant lot before and after PLC greening treatment.
Source: Photos courtesy of the Pennsylvania Horticultural Society.

as follows: (1) Are there signs that greened lots are being used, and if so, at what rate? (2) What types of uses are occurring on the lots? and (3) Do geographical characteristics determine which lots are used and which are not?

Though we arrived at these questions regarding lot use from the consideration of lots as potential recreational amenities, it is also important to consider that lot use may indeed serve other functions for residents. Resident use of space and especially physical alteration of it can be seen as a form of laying claim to that space, as noted in research on defensible space and territoriality (Andrews 2004; Brunson, Kuo, and Sullivan 2001; Newman 1995). Brunson, Kuo, and Sullivan (2001), for example, found that public housing residents who appropriated public space through regular use tended to feel safer in their communities and that those who engaged in more active appropriation such as caretaking not only felt safer but also felt their communities were more cohesive. Architect John Habraken has argued that "any human presence is a territorial claim" (quoted in Andrews 2004, 8), which suggests that resident use of lots must be seen as not only a recreational act but also a territorial one. Through use of vacant lots, residents could be perceived as exerting control over those spaces and thus actively signaling a new set of norms for who can use these spaces and how. While the research questions do not directly explore issues of territoriality or space appropriation, the rates and types of use found must be seen as having implications along these lines as well.

The Philadelphia LandCare Program

Philadelphia, PA, like other legacy cities in the United States, is dealing with the effects of historical deindustrialization, economic restructuring, and suburbanization. In the years leading up to 1950, the city grew to accommodate a population just over 2 million. Between 1950 and 2000, the city's population was in constant decline, though a slight uptick between 2000 and 2010 brought the population to just over 1.5 million (US Census Bureau 2010). Despite this recent increase in population, Philadelphia suffers from high vacancy rates due to the significant overall population loss, and a 2010 assessment conducted for the Redevelopment Authority of the City of Philadelphia and the Philadelphia Association of Community Development Corporations found the presence of approximately forty thousand structureless vacant lots (Econsult Corporation 2010).

While there are some vacant lots in all sections of the city, they are not evenly distributed. Neighborhoods in north, west, and south Philadelphia have been particularly hard hit, while the northwest, northeast, and Center City sections of the city have relatively low vacancy rates. In the 1990s, the PHS began a small-scale pilot greening process in one of these high-vacancy neighborhoods as an interim strategy for managing the blighting influence of vacant land. The program was deemed a success in its initial iteration and PHS expanded the program to several additional neighborhoods in 2000 and then citywide in 2003.

Philadelphia LandCare (PLC), as the program came to be called, would "clean and green" more than five thousand of Philadelphia's approximately forty thousand vacant lots by 2013. These vacant lots were mostly residential parcels. The standard PLC treatment involves (1) removing debris, (2) importing topsoil, (3) planting grass and two to three trees per parcel, (4) constructing a split-rail fence surrounding the lot perimeter with an opening for pedestrian access, and (5) maintaining the lot every two weeks during the growing season (Pennsylvania Horticultural Society 2015). Maintenance work is competitively bid out each year, and PHS selects landscape contractors (including local nonprofit groups). Most are minority-owned businesses or community organizations with landscape maintenance ability.

Figure 1 depicts a vacant lot before and after PLC treatment. Most PLC projects involve multiple adjacent parcels or a series of parcels on the same block that are greened together, so the 5,763 parcels that were still being maintained in the program as of 2013 consisted of 1,527 individual projects. Hereafter in this article, the term PLC lot refers to one of these multiparcel projects, rather than a single vacant parcel.

Vacant parcels are owned either privately (approximately 74 percent) or by the city of Philadelphia. Private owners of blighted lots targeted for the PLC program first

receive notice that their lot is in violation of City ordinances, and if they do not respond (by cleaning the lot within ten days), then PHS, as contractor to the City, may receive access to the lot to clean and green the property. The final decision on which properties to include in the program rests with the city of Philadelphia. After the lot is cleaned and greened, the property owner is sent a bill for the associated costs. If the owner does not pay the bill, a lien is placed against the property. The City maintains the ability to issue citations, conduct cleanup, and bill the owner for services, per regulations stated in the Philadelphia Property Maintenance Code. Ownership rights are not transferred, and therefore PHS cannot formally invite nearby residents to use the lots, and nearby residents do not have legal authority to alter the lot such as by building permanent structures. Nevertheless, though the initial goal of the program was blight reduction and the long-term intention is redevelopment, the standard PLC treatment incorporates the potential for any use other than trash-dumping. This idea was in fact central to the treatment design, with the fence structure preventing driving on the lot but including openings that allow for access not only by maintenance staff but also by the general public.

While Philadelphia is home to one of the largest public park systems in the United States (Fairmount Park), these park lands are largely concentrated in a series of large "watershed" parks in select areas of the city, notably the northwest, northeast, and west. Though blighted areas do tend to have small parks, several notable gaps in park availability coincide with some of the more blighted areas of the city (PennPraxis 2010), and it is precisely these areas that have been the target of the PLC program. Even when areas of high vacancy have parks, the parks tend to be small and the total amount of greenspace in the area quite low in comparison to other parts of the city (Heckert 2013). Because of its distribution in areas of low park access and the scale of its implementation, PLC provides an excellent opportunity to ask whether simple and low-cost greening initiatives on vacant land can in fact provide some of the use benefits of parks in addition to the other economic, health, and safety benefits already established.

PLC has created more than 1,500 new greenspaces in blighted neighborhoods across the city. This study provides a preliminary assessment of whether these greenspaces simply represent an aesthetic change or are engaged with more actively. We performed a survey of 300 randomly selected greened lots during July and August 2013 to document physical signs of use. We also conducted a limited set of qualitative focus groups and one-on-one interviews with residents living in neighborhoods targeted for greening activities before and after PLC's fall 2013 greening treatment to assess neighbors' regard for the program. We present the methods and results of this study, along with implications for similar projects moving forward.

Methods and Data

We used two primary methods to answer our research questions: a vacant lot survey and a spatial and statistical analysis of the survey results. These methods were supplemented by the findings of focus groups and interviews with residents that were conducted as part of a different study but which touched on issues relevant to this one, in addition to interviews with PHS staff.

First, we conducted a physical survey of a random selection of PLC-treated vacant projects, most of which consist of several adjacent parcels (referred to as "PLC lots"). In 2013, we consulted a master database of 1,523 individual PLC projects that were still considered active by the PHS. We used random-number assignment to select 19.7 percent of the total treatment projects to survey. In total, there were 300 PLC lots included in the random sample. During the summer of 2013, we chose three clear sunny days to complete the lot survey (July 22, July 24, and August 2, 2013—all weekdays) during daytime hours (approximately between 9:00 A.M. and 4:00 P.M.). Each day surveyors traveled by car to selected lots and completed approximately one hundred surveys. Lots that were determined during the survey to be actively under construction or that had fallen out of maintenance were excluded from the final analysis.

The lot survey method is presented in the appendix and included the following steps: the two surveyors drove by each lot, spending approximately one minute at each lot when there was no sign of use and two to three minutes when there was a sign of use. The surveyors independently assessed whether they saw physical signs of use and then consulted with the other surveyor. Any deviation from the basic PLC treatment of grass and trees was considered a sign of use, which could include physical presence of people or items left on the property designed to support use such as barbeques, seating or picnic tables, shelters, swimming pools, basketball hoops, or swings. If both surveyors agreed that there was a sign of use, they noted the type of sign and took a photograph. In addition, during the survey, if a surveyor passed by PLC lots in use that were not part of the sample, the surveyor noted the observed uses. However, these uses are not included in the formal survey findings.

We chose this method over observational techniques for two primary reasons. First, these lots are not parks and the typical treatment does not include any benches or seats of any kind. The lots are located primarily in residential neighborhoods, and sitting for any length of time to observe a lot would require sitting on private property or in a vehicle, neither of which activity would be likely to be unobtrusive or go unobserved. Because of the necessarily conspicuous nature of any attempt to directly and regularly observe the lots, we felt that such observation might actually serve to discourage lot use. Second was our expectation, based on both living in Philadelphia and observing many PLC lots on a regular basis as part of our daily lives and also based on conversations

with PHS staff, that lots were being used but that rates were fairly low, and thus the chances of any single observation finding people actually active on the lot were low. We would not have been able to observe such a large sample of lots for any significant amount of time, and a smaller sample combined with low lot use rates would have made for a high potential of not selecting any sample lots that were in fact being used. The drive-by snapshot sample technique enabled us to avoid any bias due to the act of observation and to sample a much larger selection of lots. This decision represented a trade-off, as we recognize that our approach only captures uses that leave physical signs, while many uses may be valuable to residents but undetectable outside of the actual moments of use.

After the surveys were completed, we conducted a statistical analysis of surveyed lots to determine spatial predictors of use. We tested the hypothesis that occurrence of lots with signs of use was independent of the surrounding density of people or buildings, percent nonwhite residents and low-income residents, amount of lawn space available, proximity of formal parks or playgrounds, and parcel placement on the block. We used ArcGIS v10.1 (ESRI, Inc., Redlands, CA) to determine the attributes of all surveyed lots. Environmental attributes included population density (people per square mile), building density (buildings per square mile), the number of residential properties within 500 feet of the lot, the average amount of vegetation per parcel (as a proxy for lawn space) within 500 feet of the lot, whether the lot was located on a corner, the distance to the nearest playground, and the distance to the nearest park. Distance values were calculated based on the centroid of PLC survey lots. Social attributes included percent nonwhite and percentage low-income by Census block group. We defined low-income by Census block group as percentage of the population earning less than 200 percent of the poverty level to be consistent with the measure used by the US Environmental Protection Agency's environmental justice mapping and screening tool (EJSCREEN). Results are presented in odds ratios, which represent the odds that a lot will contain signs of use. We also tested for differences in means between used and nonused lots using a Wilcoxon rank-sum method.

In a secondary and supplemental study, we conducted qualitative focus groups (before lot greening occurred) and interviews (after lot greening occurred) with residents living near the PLC lots. Through these focus groups and follow-up interviews, we sought to understand whether residents noticed pre- and postgreening changes, and also their feelings toward the lots and the PLC treatment. PHS identified two neighborhoods that received concentrated greening efforts during fall 2013 and we recruited residents of these neighborhoods for participation in focus group conversations about vacant lots. We used two recruitment methods. First, we distributed flyers to all homes on blocks that were specifically targeted for greening. Second, we distributed additional flyers at neighborhood meetings. We conducted the initial focus group meetings at a recreation center and a community organization office in the targeted neighborhoods. The distribution of flyers at community meetings likely led to the recruitment of a more biased sample, but the focus groups and interviews were conceptualized as an exploratory portion of the study and are not intended as a representative sample.

Prior to PLC treatment, we conducted two focus groups. The first focus group had three participants and the second focus group had eight participants. The focus groups followed a semistructured format. In both focus groups, some participants were familiar with the PLC program while others were not. The purpose of these focus groups was to assess resident perceptions of their communities and major challenges facing these communities. We asked residents specifically about vacant lots and the extent to which residents viewed these lots as a problem. We briefly described the PLC program and showed before-and-after pictures of treated lots. We then asked participants about their impressions of the program and expectations for their neighborhoods. Specific focus group questions included "Is vacant land an issue that you see as important in your neighborhood?" "What, if anything, about the PLC program appeals to you?" and "What, if anything, about the PLC program raises concerns for you?"

During the summer of 2014, after PLC greening interventions had been completed in both neighborhoods, we contacted all focus group participants and invited them to participate in one-on-one interviews. We conducted 5 one-on-one semistructured interviews with the same participants. Interviews were intended to assess whether residents had noticed the PLC interventions or any changes associated with them. The interviews included questions such as "Have you noticed the greened lots?" "How do you feel about them?" and "Do you interact with the lots, and if yes, how?" The results of these interviews and discussions are included only insofar as they spoke to the question of use of greened lots.

One final supplemental approach was to discuss with PHS staff the uses that they have observed on greened lots. Because they visit lots on a regular basis while surveying communities to identify new lots, during implementation, and to check on maintenance, they have the opportunity to observe a much wider range of uses and a much larger number of lots, though not in any systematic way. We asked the PHS staff about the types of uses that they have observed and include them primarily in the broad discussion of lot uses, not in any calculations of rates of use.

Results

Of the 300 randomly selected PLC lots, 278 met the criteria for lot survey. We excluded 22 lots because they were actively under construction or were not being maintained (e.g., they were overgrown with weeds or littered with trash).

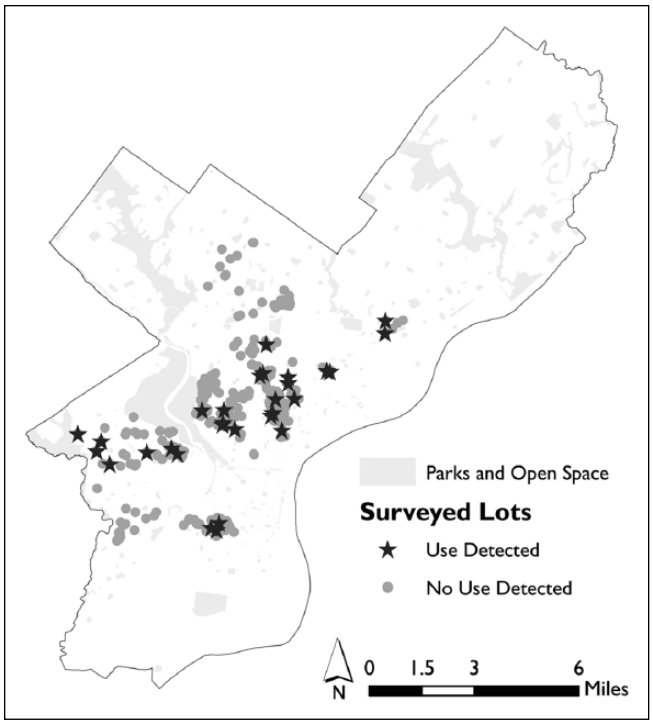

Figure 2. Surveyed lot location map.

Lack of maintenance could be due to the fact that the lots were no longer part of the PLC program or because contractors had not fulfilled their duties there. Twenty-nine lots showed physical signs of use (see Figure 2 for locations), for a rate of 10.4 percent (±3.6 percent, $p < 0.05$). Signs of lot use included presence of tables and chairs (present on 11 lots), gardens (11 lots), barbeques or grills (5 lots), inflatable swimming pools (2 lots), basketball hoops (2 lots), tents (2 lots), or swings (1 lot) (see Figure 3). Four of those lots were actively being used at the time of observation—two by groups of adults who were sitting and talking, one by a group of children playing tag, and one by a single child setting up a swimming pool.

A comparison of raw mean values of social and spatial attributes of lots (based on spatial analyses) found some differences, though none were statistically significant (see Table 1). Population and building density were higher around lots with signs of use (23,542 people per square mile vs. 22,205 people per square mile, and 1,719 buildings per square mile vs. 1,592 buildings per square mile). We failed to reject all null hypotheses tested with the logistic regression model except one—population density surrounding the sites was a very small (positive) but statistically significant ($p < 0.1$) predictor of lot use (Table 2). The odds that a lot will be used increased by 0.006 per increase in 100 people per square mile. Building density, percentage nonwhite residents and low-income residents by Census block group, number of nearby residential parcels, average surrounding lawn space, and distances to the nearest playground and park, based on a comparison of means and logistic regression analyses, did not explain lot use. However, it is important to note that average percentage low-income residents by Census block group at the PLC lots (both used and unused) was 68 percent compared with 47 percent for Philadelphia overall, and average percentage nonwhite residents was 94 percent compared with 58 percent for Philadelphia overall.

Surveyors also noted uses on nonsample lots observed while traveling for the lot survey. Noted uses included play areas, picnic tables where a day care program was serving snacks, chairs and tiki torches, dogs tied to trees with water bowls, and a lemonade stand. PHS staff, who frequently visit PLC lots, for example for maintenance purposes, also stated that they have seen and been informed of a wide range of lot uses including all of those observed in the survey as well as games of football, baseball, and cricket, rodeos, and lot use as a horse corral. These uses are not included in the estimation of lot use rates but are noted to get a clearer picture of the wide range of possible uses, including several that would be unlikely to leave physical signs that would be detected by our survey. In particular, the use of lots as dog parks and settings for games of tag would not leave any physical signals of use afterward.

Interviews with residents living near PLC lots revealed that the treatment can go unnoticed. During posttreatment interviews, only two out of five interview participants stated that they had noticed the PLC treatment occurring nearby, and both of these were residents living on a block on which vacant lots had recently been greened. Of these two participants, one reported active use of the lot by block members, and the other reported that they wanted to use the lot but that they were not sure how to use it. Both reported positive feelings about the change in the lot since greening. Of the three participants who did not notice any particular changes, one interviewee lived close to a previously treated PLC lot, but there was a vacant lot immediately adjacent to her property that dominated her thinking about vacant land and was the primary topic of her comments. She did note that she would have liked "her" lot to be treated in the same manner as the PLC lot that was in fact adjacent to it on the other side from her home. The other two participants lived several blocks from any lots that had been greened during fall 2013 and did not report use of the lots or any direct impact on their lives.

Discussion

Cities across the United States are initiating new programs for adaptive reuse and repurposing of the vacant land that has emerged with declining inner-city industry, population, and resources. Repurposed vacant lots are now the new neighbors to thousands of residents in cities such as Philadelphia. While these programs aim to bring about landscape-level changes (e.g., economic and public health improvements), localized impacts on nearby resident quality of life are also expected. This study presents the first published use survey

Figure 3. Photos of lot uses observed in the vacant lot survey.

Table 1. Comparison of Spatial Characteristics of Use and Unused Lots.

	Lots, mean			
	All (n = 278)	Unused (n = 249)	Used (n = 29)	*p* Value[a]
Population density[b]	22,344	22,205	23,542	0.94
Building density[c]	1,605	1,592	1,719	0.30
Nonwhite (%)	94	95	92	0.70
Low income (%)	68	68	69	0.90
Distance to nearest park[d]	813	807	865	0.90
Distance to nearest playground[d]	1,096	1,099	1,073	0.54
Corner lot (%)	46	46	48	0.69
Residential parcels within 500 feet (n)	137	138	128	0.37
Average lawn size[e]	401	403	385	0.84

[a]*p* value is based on the Wilcoxon rank-sum test of equality of means between used and unused lots.
[b]Units: persons per square mile.
[c]Units: buildings per square mile.
[d]Units: feet.
[e]Units: square feet.

Table 2. Logistic Regression Odds Ratios for Predictors of Use of Study Lots.

Variable	OR	SE	*p* Value
Population density[a]	1.00	0.00	0.09
Building density[b]	1.00	0.00	0.11
Nonwhite (%)	0.18	0.31	0.31
Low income (%)	0.73	1.07	0.83
Distance to nearest park[c]	1.00	0.00	0.19
Distance to nearest playground[c]	1.00	0.00	0.31
Corner lot (%)	1.18	0.50	0.69
Residential parcels within 500 feet (n)	1.00	0.00	0.13
Average lawn size[d]	1.00	0.20	0.40
N	278		
Model χ^2	9.70	$p = 0.375$	
Log likelihood	-88.13		

Note: OR = odds ratio; SE = standard error.
[a]Units: persons per square mile.
[b]Units: buildings per square mile.
[c]Units: feet.
[d]Units: square feet.

of a vacant lot reuse program. Our research produced two key findings: first, that residents are in fact using greened vacant lots for recreational purposes; and second, that the forms of observed use may be seen as more commensurate with lawns than parks.

Residents Do Use Greened Lots

Our vacant lot survey, conducted over three days during summer 2013, found physical signs of use on approximately 10 percent of lots. However, we assume that our method produced a low estimate of actual use for a number of reasons. First, our survey method provides only evidence of use that can be captured for a single time point. Other evidence, collected from PHS staff and nearby resident interviews, indicated that other uses exist but were not captured because they did not occur during the survey. In addition, uses likely exist, but were undetected, either because they do not involve physical evidence (e.g., a block meeting) or because objects may be taken in after use. That being said, we felt it was important to perform this baseline study to confirm that the lots are actually being used and record the types of uses that are occurring.

Population density was the only statistically significant predictor of lot use. We interpret this to mean that the odds of a lot showing signs of use are slightly higher with higher population density. Other social and physical attributes we tested did not explain lot use. For neighborhood characteristics such as building density and distance to parks and playgrounds, this finding could be influenced by the fact that used and unused lots were often in close proximity, and are often found on the same block. Given that the uses were commensurate with yard-based activities, this may suggest that lot use is more dependent on the residents living close to the lot than on broader neighborhood characteristics, though the identities of actual lot users would have to be explored in a more systematic way to detect this.

The fact that residents are actively using lots for recreational purposes may add a new dimension to our understanding of the impact of PLC on crime. Branas et al. (2011) found a decrease in gun crimes in areas surrounding greened lots and suggested that the greening intervention could be decreasing crime by reducing the disorder of blighted lots per the "broken windows" theory. Decrease in crime with increasing resident use of the spaces would additionally be consistent with the idea that greening the lots turns them into defensible spaces that can be appropriated and thus watched over by nearby residents. Thus, order and control may be signaled not only by the greening intervention itself but also by direct uses of the newly greened spaces. This may be a fruitful area for further study with regard to the postgreening dynamics of crime.

Types of Uses

While there were some surprising uses detected both in the survey and by PHS staff, the majority of uses, such as grills, gardens, and picnic tables, are uses that might be expected of yards, suggesting that these lots may be replacing not parks but lawns in neighborhoods that traditionally have tightly packed row houses with limited amounts of private greenspace, if any. While this could represent an artifact of our study methods, as park users do not generally leave behind the physical artifacts that we identified as signs of use, it also raises the possibility that residents are actually using these lots with an intention of signaling that the lots are not public spaces but instead claimed as more private territory, per John Habraken's ideas of territoriality and control.

This finding also suggests that the lot users are likely very close neighbors and that the impact of the lots as recreational spaces may in fact be quite limited geographically. The idea of a sharp distance-decay in the effects of the program is also supported by the interviews, in which the only residents to report using lots were those who lived on the same block, and not all of them actually reported use. These questions could be explored with further research that more directly engages a wider cross section of neighbors to determine who is using the lots, who is not, and how both groups perceive lot use.

Implications for Planning

For cities looking to increase greenspace access, this research suggests that greened vacant lots do provide recreational benefits and can therefore help toward reaching park-access goals. That being said, we would not suggest this as a long-term strategy, since there is no expectation that lots would remain green indefinitely and most remain privately owned.

It may, however, prove to be a valuable interim strategy for increasing greenspace access, especially as lots can receive a simple greening treatment more quickly and more cheaply than new parks are typically able to be established. At the same time, planners may want to be wary of the possibility of lots being appropriated into more private than public spaces.

While this study did not formally test questions of environmental justice, it should be noted that PLC lots, both with and without signs of use, were located within areas of concentrated poverty and racial segregation relative to Philadelphia overall. Younger children residing in low-resource communities tend to be more restricted in the distance they can travel from home for recreation and socializing and depend more heavily on streetscapes near their homes (Day and Wager 2010). In thinking about equity concerns and access to environmental resources, widely dispersed public spaces may be able to offer wider access than a similar amount of greenspace in a single park could, as long as they are being used, and especially in poorer and more densely populated communities. This may make programs like PLC more valuable in terms of actually providing amenities to a large population because of the dispersed nature of the lots.

Our study additionally reveals that there are opportunities for more direct interaction between nearby neighbors and these repurposed lots than currently exists and raises questions of whether there are more or different benefits that could come from closer interaction with these kinds of greened spaces. There may be ways to increase resident interaction with lots, such as community involvement in the design, construction, and maintenance of vacant lots or interaction with community groups to provide examples of potential uses. Vacant lot greening programs could also include a social component in the postconstruction phase that introduced neighbors to lots and invited them to use it, though any outreach would need to fit within legal constraints associated with lot ownership. Such invitations and encouragements could take the form of letters, talks at key neighborhood institutions, or inaugural events on the lot, for example. Outright transfer of ownership to nearby residents could also potentially increase the rate of use of lots (Bozgo, de Wit, and Haradon 2006). All of these measures could add costs to greening projects however, so financial support, or other creative low-cost measures, would be required.

Many legacy cities, including Philadelphia, are undertaking large-scale vacant lot reuse and repurposing projects to stabilize neighborhoods and reduce blight. A growing body of research demonstrates a wide range of positive community impacts of these programs, extending beyond simple blight reduction to include increasing property values, reducing crime, and improving neighborhood health. Our study adds to this list the direct use benefits of additional public greenspaces. Despite the low levels of use observed in our survey, the fact that any of the lots are being used indicates that they serve as recreational amenities to nearby residents. Because many of these lots are concentrated in poor communities with low amounts of greenspace, the fact that the lots are being used suggests that they may be addressing some concerns about equitable access to environmental resources.

Appendix

Vacant Lot Use Survey

Two surveyors are required to survey each lot.

1. Are there any visible differences between this lot and the standard PLC-treated lot (grass, ~2-3 trees, and permeable white picket fence)? If so, describe.
2. Are there any signs of use? If so, what are they? For example presence of people, or items left on the property designed to support use such as barbeques, seating or picnic tables, shelters, swimming pools, basketball hoops or swings.
3. If both surveyors agree that there is a sign of use, take a photograph.

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