Visual Case Study for Visual Resource Stewardship Conference Proceedings: Landscape and Seascape Management in a Time of Change

Visual Resource Stewardship at the Neighborhood Scale: Methods for Assessing a Vacant Land Reuse Program

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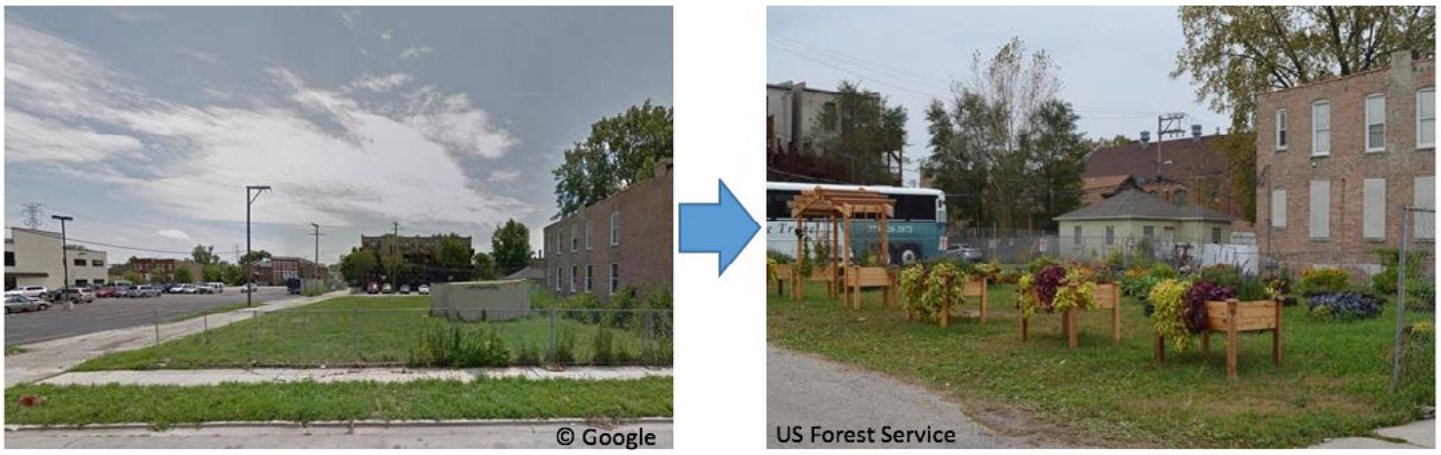

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Visual Resource Stewardship at the Neighborhood Scale:

Methods for Assessing a Vacant Land Reuse Program

Abstract.—Visual assessments are usually conceived of and applied to large-area landscapes such as national forests. Yet the visual resource is an important cultural ecosystem service at all scales of landscape, from small sites to regional and national scales. In urban landscapes, visual resource stewardship has been framed in ways that address parks, lawns, or yard artifacts, and has not specifically been linked to planning issues nor to a visible line of research. The neighborhood scale is particularly relevant to people's everyday perception and experience of cities, and the recent availability of high resolution aerial and street-level imagery through sources such as Google has opened up new opportunities to measure landscape change and incorporate neighborhood scale visual assessments into urban research and planning activities. In this Visual Case Study we describe and illustrate how such imagery was used in combination with open-source parcel data and coding protocols to identify visual signs of stewardship made by local residents to vacant lots purchased through the Chicago Large Lot Program. Mowing and weed removal and improvements such as gardens and fences express an aesthetic of care that can communicate personal and community values. We were particularly interested in assessing how these and other visual signs of condition and care changed as a function of residents' participation in the program. In coding images of lots before and after the time of purchase we were able to document important aspects of landscape change at the lot and block levels. We discuss the utility of the approach in advancing visual resource stewardship goals in the urban landscape.

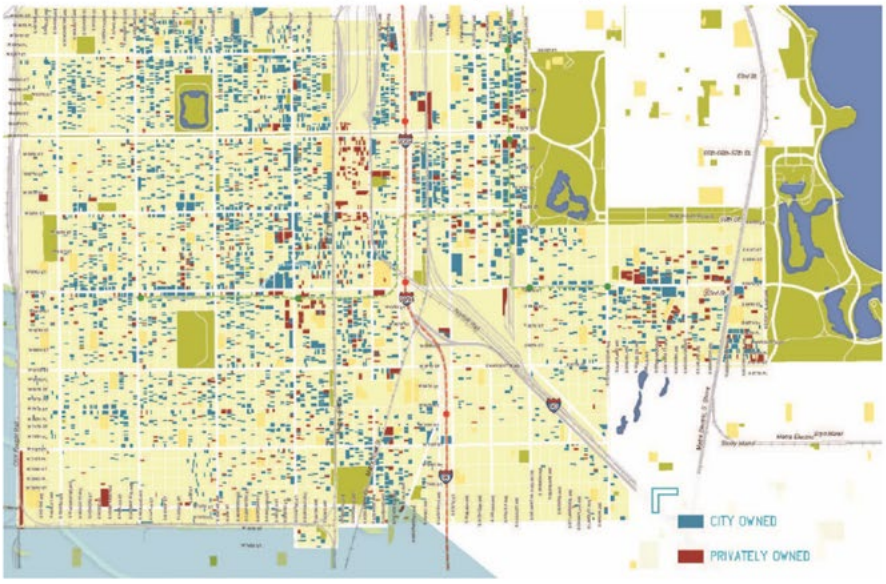
Urban Visual Resource Stewardship

INTRODUCTION

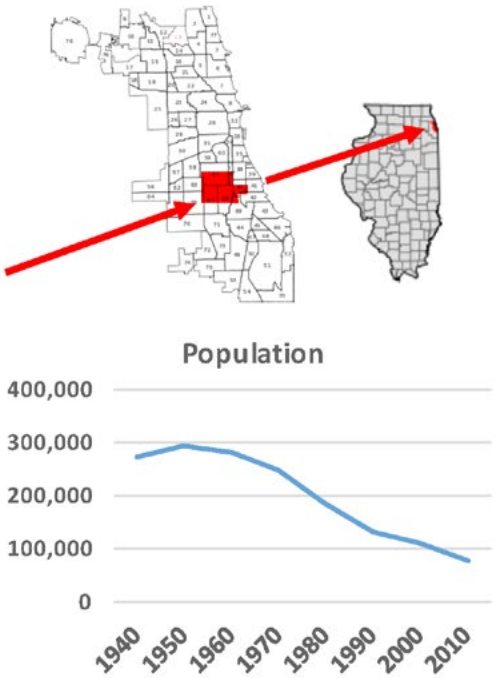
Visual resource stewardship aims to protect landscapes valued for their aesthetic characteristics and restore or mitigate landscapes when those aesthetic values have been damaged. While landscapes can be appreciated aesthetically irrespective of other landscape values, aesthetic values often coincide with other landscape values deemed important in sustaining social-ecological systems (Gobster et al. 2007). In urban landscapes, the neighborhood scale is particularly relevant to people's everyday perception and experience of cities (Palmer 1984, Sullivan 2001). At this scale, well-kept homes and lots express an aesthetic of care that is often seen as attractive to residents and visitors and can also help sustain neighborhoods through higher property values, reduced rates of crime, greater social cohesion, and even greater biodiversity and habitat values (Nassauer and Raskin 2014, Anderson and Minor 2017). Conversely, neighborhoods with boarded up homes and untended vacant lots typify urban blight and frequently also suffer heightened crime rates, loss of social cohesion, and health impacts to residents as well as to the urban forest (Quinn et al. 2014).

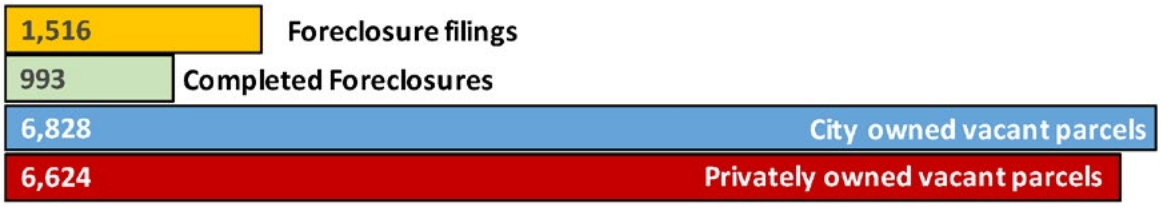
Issue: Urban Vacancy

Example: Greater Englewood, Chicago



Credit: City of Chicago (2014) Green Healthy Neighborhoods Plan





Problems related to urban vacancy have been particularly acute in some places such as the Greater Englewood area of Chicago's south side, where longstanding disinvestment, racial discrimination, failed urban planning policies, and other factors have resulted in a 40 year population exodus leaving more than 14,000 vacant lots held by the city and private concerns (City of Chicago 2014a). While urban greening is not a panacea for the many serious problems associated with shrinking cities and their remaining neighborhood residents, research has shown that urban greening efforts can help reduce crime and incivilities and increase resident interaction and physical activity, among other positive outcomes (e.g., Branas et al. 2011).

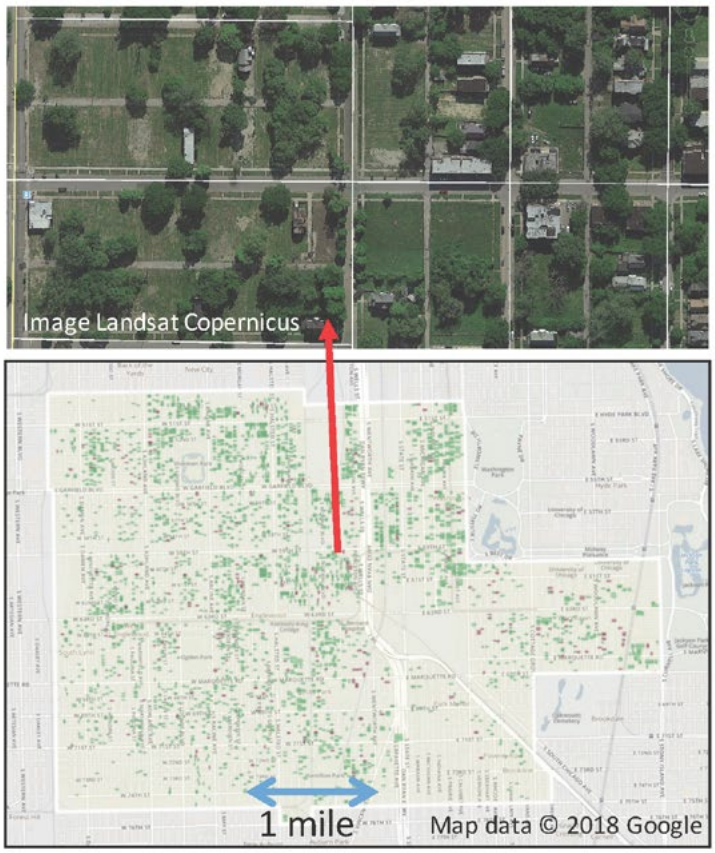
Case Study: Large Lot Program

Credit: City of Chicago (2014) Green Healthy Neighborhoods Plan

The City of Chicago's Large Lot Program is a recent example of such an effort and the subject of this Visual Case Study. Launched in 2014 as an outgrowth of a Department of Planning and Development's Green Healthy Neighborhoods participatory planning effort for the Greater Englewood Area, the program invites property owners in selected areas of the city with high vacancy rates to purchase one or two city-owned residential vacant lots on their block or the block behind their property for $1 (City of Chicago 2014b, LargeLots.org). The new owner must agree to fence the lot if it is not immediately to the side of their home, pay the property taxes, and maintain the lot for five years, at which time they are free to sell it. While large lot owners can build on their new property, based on the planning effort it was expected that most residents would use the lots to expand their existing yard as private or shared community space for gardening, children's play, and/or socializing. In other words, the stewards of the resource are not a public agency or regional organization, but the set of individual private land owners scattered across the city.

Study Areas

Greater Englewood



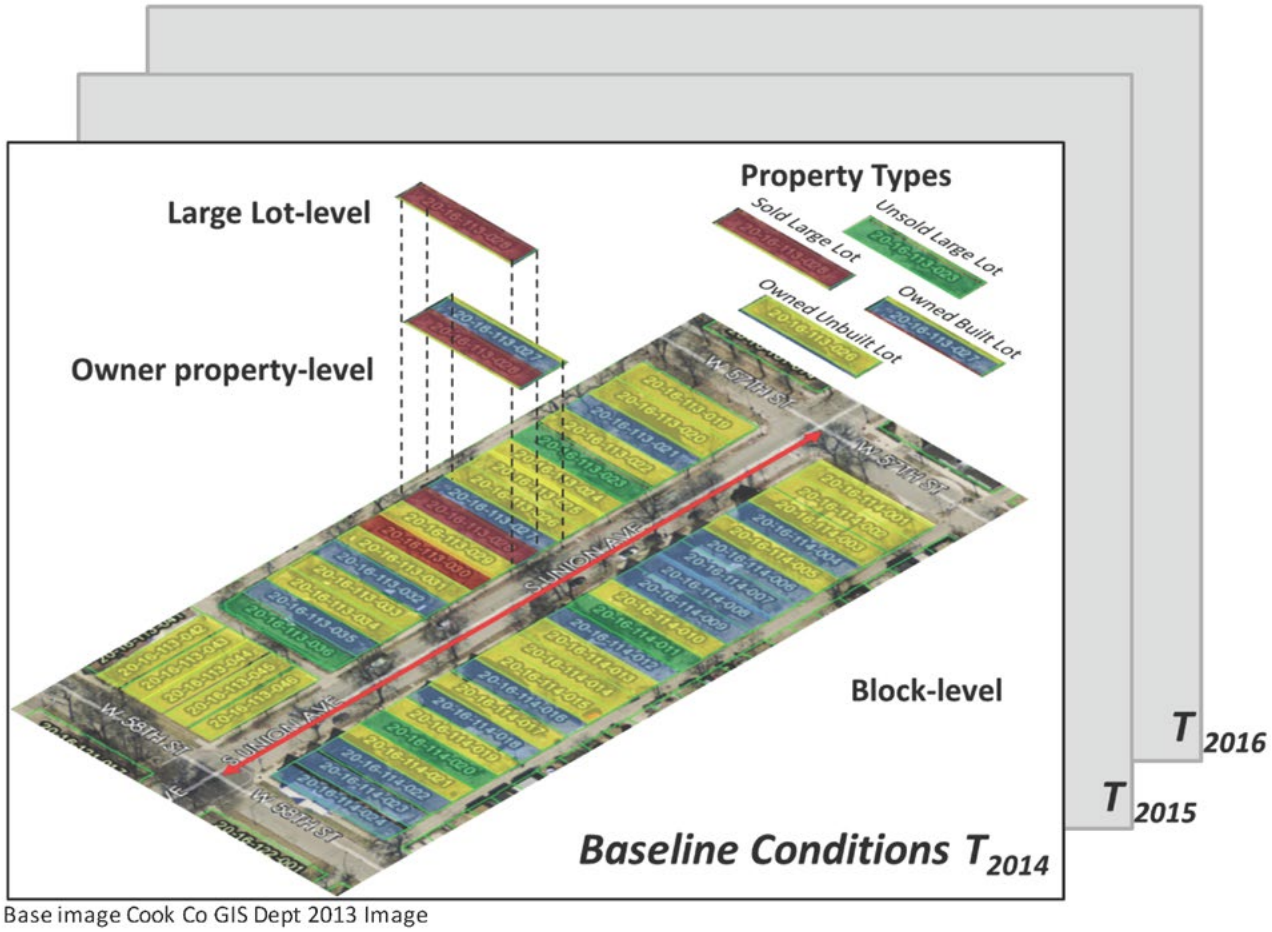
N=275 of 4062 eligible lots (7%)

East Garfield Park

N=149 of 418 eligible lots (36%)

This study tracks 321 owners who purchased at total of 424 lots in the inaugural offering of the Large Lot Program in Greater Englewood and a second neighborhood on Chicago's west side, East Garfield Park. We worked in cooperation with professional staff at The City of Chicago and non-profit Local Initiatives Support Corporation (LISC-Chicago), who were broadly interested in assessing the benefits of the program and improving it for future rounds of large lot offerings. We designed a study that combined the visual assessment component described here with a social assessment that included focus groups, a mail survey, and selected in-depth interviews. In this Visual Case Study, we detail methods and procedures used in the visual assessment portion of our study, which was aimed at identifying and documenting the physical attributes of large lots related to condition and care and how they change over time as a result of resident ownership and stewardship activity.

Research Design and Questions

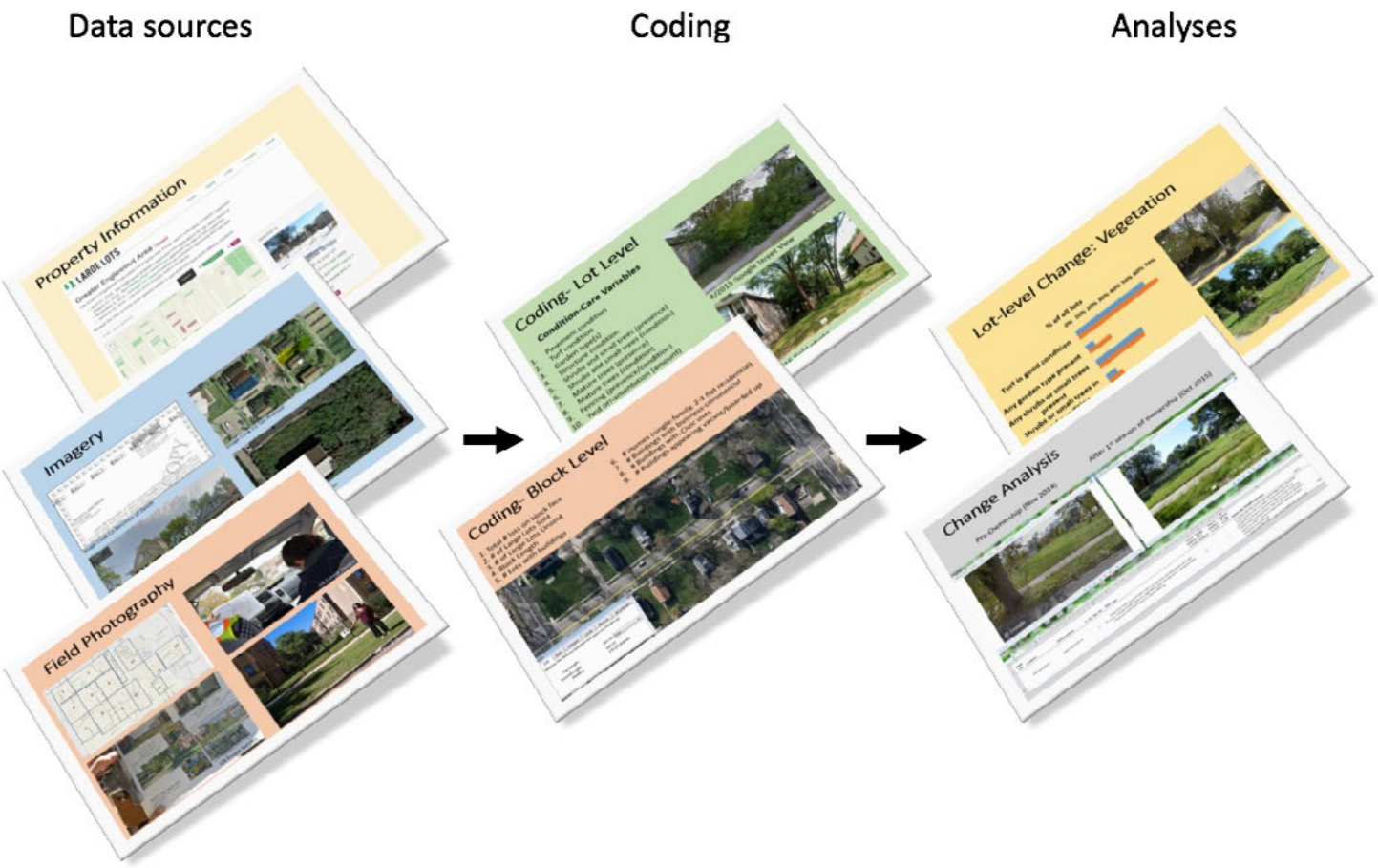


Base image Cook Co GIS Dept 2013 Image

METHODS

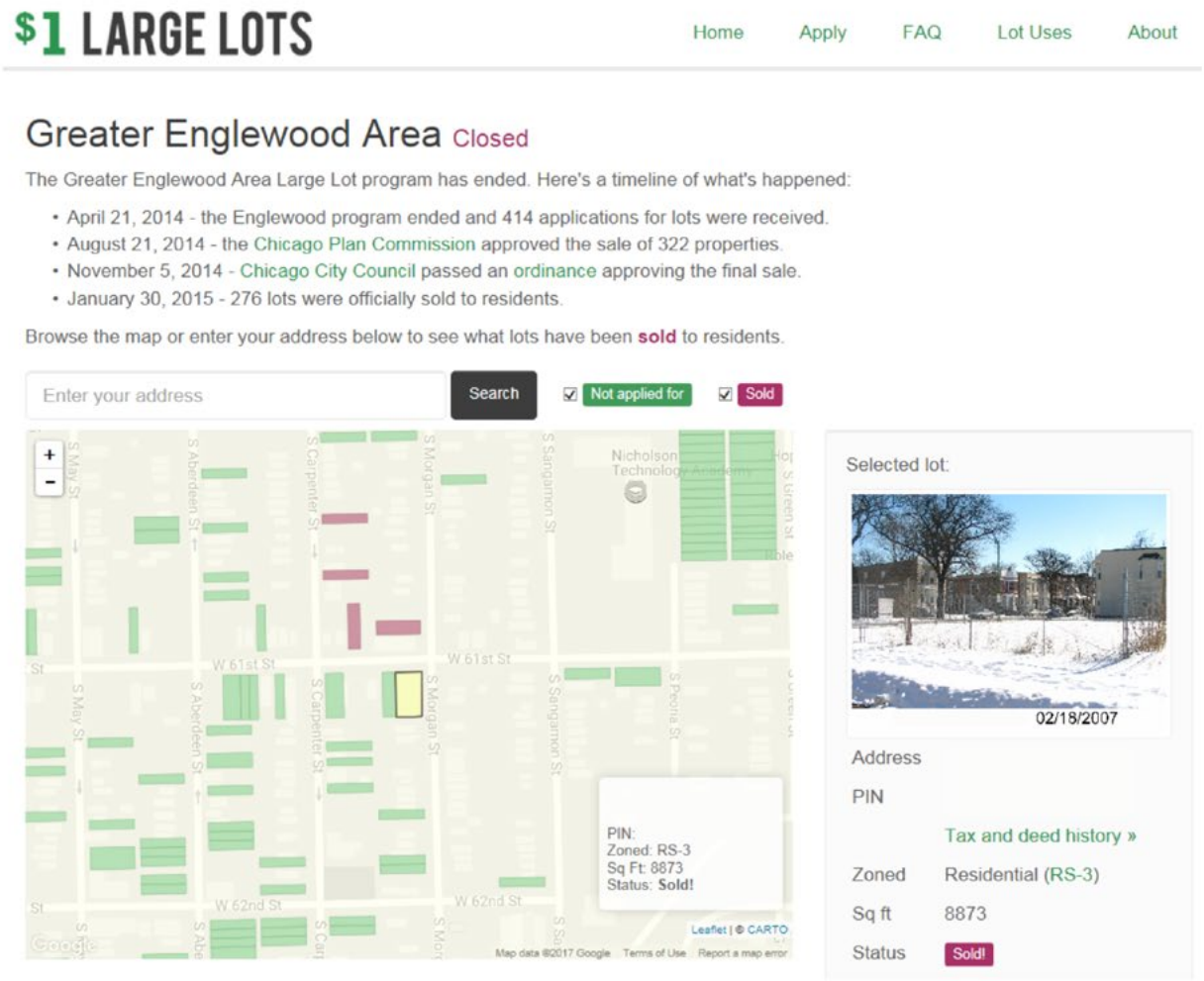
The visual assessment examined large lots at three levels of analysis—the lot level of each large lot purchased, the large lot in relation to the purchaser's previously owned property on the block, and the block in which the purchased lot was located. These levels were then also considered within a temporal context that assessed baseline conditions prior to purchase and at subsequent periods after purchase. The major focus of the analysis was at the large lot level, which included 424 lots across the two study areas. Specific research questions at this level focused on the nature and magnitude of changes made over time. At the property owner level, we sought to understand how the condition and adjacency of an owner's existing property affected treatment and changes made to their purchased large lots. And at the block level, our initial interest was to see whether existing block level conditions would help predict improvements made to large lots after their purchase.

Data and Protocols for Analysis



Data for the visual assessment came from multiple sources including: 1) property information from the City of Chicago and Cook County Tax Assessor and Register of Deeds offices to locate large lots and owner properties; 2) Google Earth and Street View imagery from which land use and landscape features were coded; and 3) field photography to supplement street level imagery. These sources were brought together and coded to derive meaningful measures of condition and care, then analyzed at multiple points in time to assess whether and how changes due to stewardship activity occurred.

Property Information



Ready and open availability of data used in this study has greatly facilitated the development of neighborhood scale visual assessments in ways that were not possible just a few years ago. In the case of property data, publicly accessible computerized land information records now exist for many cities and counties across the US, allowing for parcel-level investigations. For the Large Lot Program, the assessment was also aided by efforts of the City and civic groups in their creation of largelots.org, a user friendly interface developed for prospective large lot buyers to search and apply for available properties. We used this open-source database to identify and locate large lot purchases and connect them with their owners, then integrated the information across the three sources of data. Street addresses, Property Identification Numbers (PIN), lot sizes and boundary lines, aerial and street level lot photographs, and quit claim deed records were among the types of information derived through the largelots.org database.

Imagery

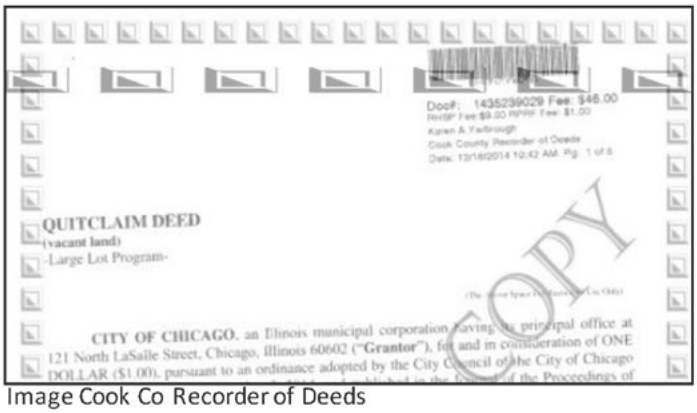


Image Cook Co Recorder of Deeds

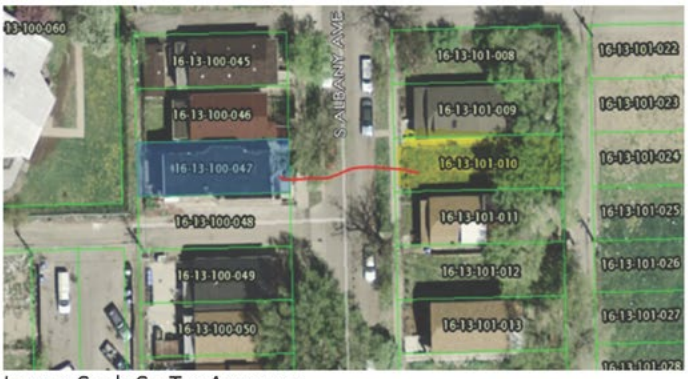


Image Cook Co Tax Assessor


© Google


Image Landsat Copernicus

Google has also been very active in developing and making available for public use high resolution street level and aerial imagery. This is especially so in big cities such as Chicago, where imagery for many neighborhoods is updated every 1-2 years. For the case study neighborhoods we were fortunate to have street level imagery for 80% of the large lots taken during June-October 2014, just before purchasers were given title to their large lots (January 2015). Likewise, most Google Earth aerial imagery was taken between October 2014-April 2015, prior to purchase or the start of the spring gardening season. This imagery provided a record of "before" conditions, and when supplemented with field photography from the first and second growing seasons after ownership (October 2015, August 2016) and subsequent Google Earth aerial photography (May-June 2016), we were able to compile a good set of imagery to examine changes made since purchase.

Coding—Lot Level

Condition-Care Variables

1. Pavement condition
2. Turf condition
3. Garden type(s)
4. Structure condition
5. Shrubs and small trees (presence)
6. Shrubs and small trees (condition)
7. Mature trees (presence)
8. Mature trees (condition)
9. Fencing (presence/condition)
10. Yard ornamentation (amount)
11. Social/recreational use (amount)
12. Vehicles (number/condition)
13. Dumping (not vehicles)
14. Vandalism and graffiti

Test-Retest Reliability ICC (.531-.906)
avg. = .656

4/2015 Google Street View

8/2016 field photo

The assessment procedures used for this study were adapted from neighborhood auditing protocols developed as a means of systematic social observation (e.g., Sampson and Raudenbush 1999, Bader et al. 2015) and vegetation assessment approaches used in studies of urban ecology (Li et al. 2015, Taylor and Lovell 2012). Our protocol most closely follows the work of Dewar, Nassauer and Dueweke (2013), who developed a set of "cues to care" indicators for assessing vacant land and structures as part of their Detroit Sustainability Indicators Integrated Assessment. We adapted a subset of their indicators for measuring the condition and care of vegetative and built features (14 variables), and operationally defined them to best cover the range of conditions present in our study areas. While this and other work provided some established guidance for our measurement efforts, the multi-level spatial and temporal analyses undertaken in our work are novel contributions to this literature

These indicators were visually coded in terms of presence/absence or condition (usually 3-4 qualitative categories) from the street level photos by a trained research assistant. A subset of 100 randomly selected large lots was re-coded by the same assistant six months later to assess the test-retest reliability of lot level measures. Intraclass Correlations ranged from r = .531 to .906, and the average of r = .656 across the measures is just short of the r = .700 range considered good for reliability (Howell 2011).

Coding—Lot Level

Land and Tree Canopy Cover Aerial Measures

15. Percent bare ground cover
16. Percent pavement cover
17. Percent turf cover
18. Percent garden cover
19. Percents structure cover
20. Percent tree canopy

4/30/2015 Google Earth

4. **LLTurfPct:** Turf Cover (grass, weeds, and other turf veg. that is mow-able)
   - 0 = No vegetative ground cover visible
   - 1 = 1-10% veg. ground cover
   - 2 = 11-50% veg. ground cover
   - 3 = 51-100% veg. ground cover
   - 9 = can't tell

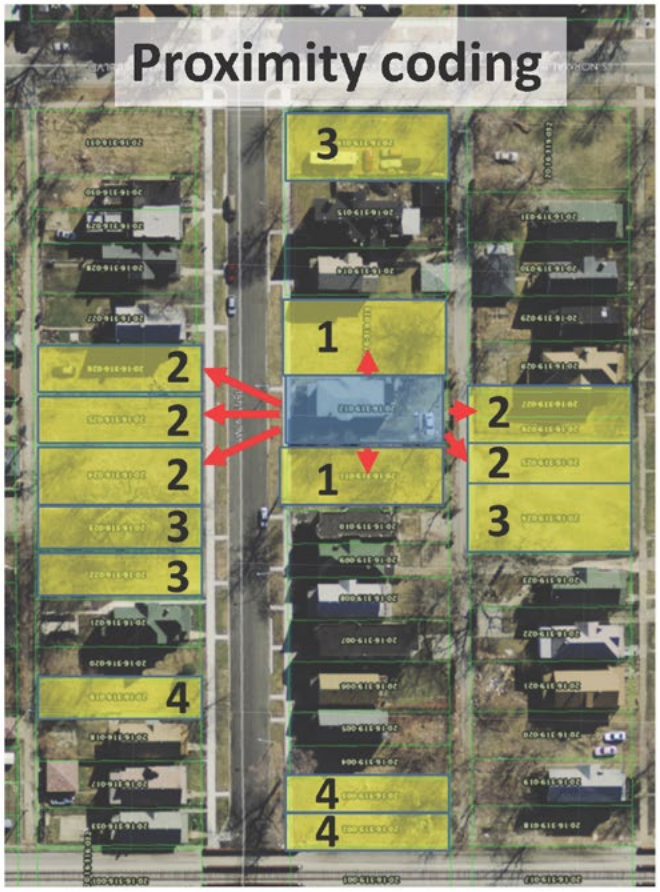
Example of qualitative coding for the turf cover aerial measure

5/22/2016 Google Earth

We also included a set of 6 aerial measures to quantify the extent of and changes made to land and tree canopy cover at the large lot level. At first we visually estimated cover types in terms of broad 4- or 5- level qualitative categories but then, to provide a more nuanced appraisal, redid the work by calculating the areas of each cover type using the Polygon measure in the Ruler feature of Google Earth Pro. In cases where shadows or canopy cover obscured ground areas, they were cross-checked with Street View or field photographs or by alternate aerial imagery to help maximize accuracy.

Coding—Owned Property Level

Proximity Codes	N Lots	% Lots
Adjacent Purchases	231	54%
1. Side Lots	194	46%
2. Front Lots	26	6%
2. Back Lots	10	2%
Non-Adjacent Purchases	193	46%
3. < 5 lots away	102	24%
4. 5+ lots away	92	22%
Total	424	100%



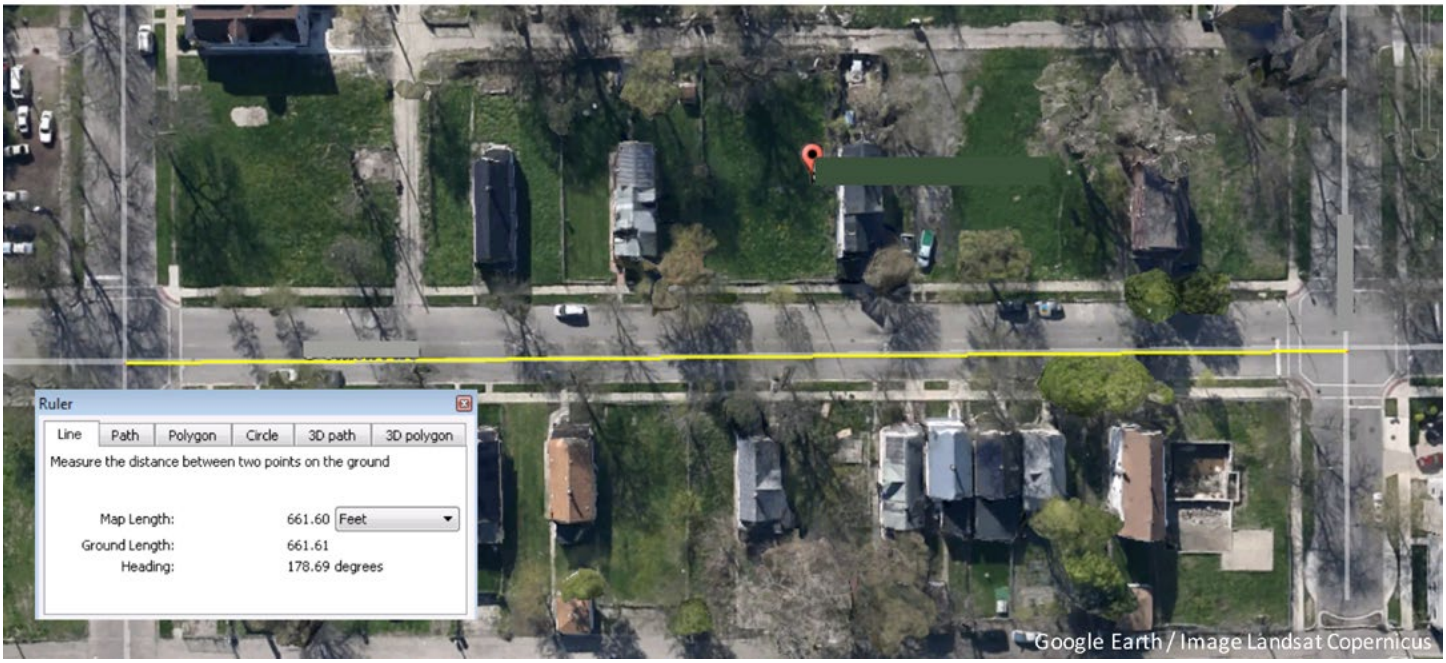
Base image Cook Co GIS Dept 2013 Image

We applied the same 14 measures of large lot condition and care and 6 qualitative measures of land and tree cover area to the owner's existing property on the block. Measures for the owner property were only assessed for their "before" condition prior to large lot purchase.

The owned lots were located through owner address information listed on the quit claim deed for the large lot and accessed through the Cook County Register of Deeds office (upper left image, page 9). This location information enabled us to code the proximity of the purchased large lot(s) to the owner's existing lot, and from this information we developed a 4-category ordinal measure of proximity. If two large lots were purchased, we used the closest lot as the proximity measure.

Coding—Block Level

1. Total number of lots on block face
2. Number of Large Lots sold
3. Number of Large Lots unsold
4. Block length
5. Number of lots with buildings
6. Number of homes (single-family, 2-3 flat residential)
7. Number of buildings with business-commercial
8. Number of buildings with civic uses
9. Number of buildings appearing vacant/boarded up



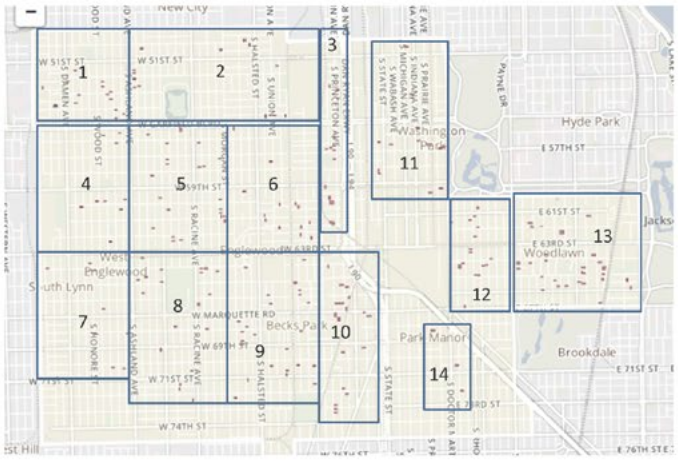
The block-level assessment inventoried and assessed 18 macro characteristics of land and tree canopy cover and features reflecting care and occupancy. The scale of interest is the “block face,” the visible portion of the block (both sides of the street) between intersections as viewed by one who might be walking or driving down the street. Imagery for the block-level assessment included both Google Street View and Google Earth. Assessment entailed aerial counts of objects and a distance measurement using Google Earth to calculate block length.

Coding—Block Level

10. Number of unbuilt lots with parking
12. Number of street trees
13. Percent of block that is unwalkable
14. Presence of street calming devices
15. Green/open space on or adjacent to block face
16. Number of lots with cues to care/occupancy
17. Number of lots with cues of neglect/mistreatment

The block-level assessment also entailed multiple “virtual walks” down the block using Street View imagery and its pan and zoom capabilities to count items such as the number of street trees and canopy trees, lots exhibiting cues to care and occupancy, and various other aspects of properties and the streetscape. These were tallied and aggregated for both sides of the street, and from these initial measures a number of derivative variables were computed. Many of these used block length, total lots per block, or total lot acreage to standardize block level measures to account for different block sizes. For example, a common measure for assessing the completeness of street tree stocking is to have 1 tree planted every 25 feet, so a stocking index measure was computed based on the initial count of trees per block plus measurement of block length (% stocking = # street trees on block * (block length *2))/25.

Field Photography



One problem with relying on free imagery for analysis is that the timing of its release may not coincide with project needs and schedule. We were fortunate to have aerial and street level images for our study sites taken just prior to the first growing season of large lot ownership but had no idea when the next update of imagery would be available. So to capture and provide feedback to the City on the changes that had been made to the large lots during the first season, we collected our own street level photography in October 2015. Each case study neighborhood was divided into “reaches,” logical segments that could be traversed by car without frequently crossing a major road and which could be covered within a reasonable time period. The field team consisted of 2-3 people sharing the roles of driver, navigator/note taker, and photographer. Field sheets were compiled using Google aerial and street photography and notes and property lines were added where needed so that large lots and owner lots could be accurately located in the field. This was critical in areas where multiple vacant lots existed side by side and only one or two of them were the large lots in question. Photos were identified in the field by first taking a picture of the field sheet entry for the lot; in the second field season the team used a numbered card placed in front of the lot or held by a field crew member. This facilitated filename labeling, which was done by large lot and owner lot street addresses.

Field Photography

All photos US Forest Service

Field photography was scheduled for good weather days during the work week when traffic was low and most neighbors were at work or school. Optimal photographic conditions were overcast days or times when the sun was high to avoid long shadows that might obscure the identification of features when viewing the photograph. In such cases, multiple shots were taken including close ups, and in a few instances raising the camera to an elevated position helped to identify changes inside of fences. Notes were also taken of key changes compared to the “before” shots on the field sheets.

While contact with residents was minimized in the interest of time, most large lot owners and neighbors we did encounter were very positive about the program and our efforts in assessing it. Of interest to the assessment, these chance encounters corroborated what we had learned via our focus groups and mail survey: that a significant number of those who had purchased large lots had previously cared for them, in some cases for many years prior to actual purchase (Stewart et al. 2016).

Large Lot Condition/Care Scale

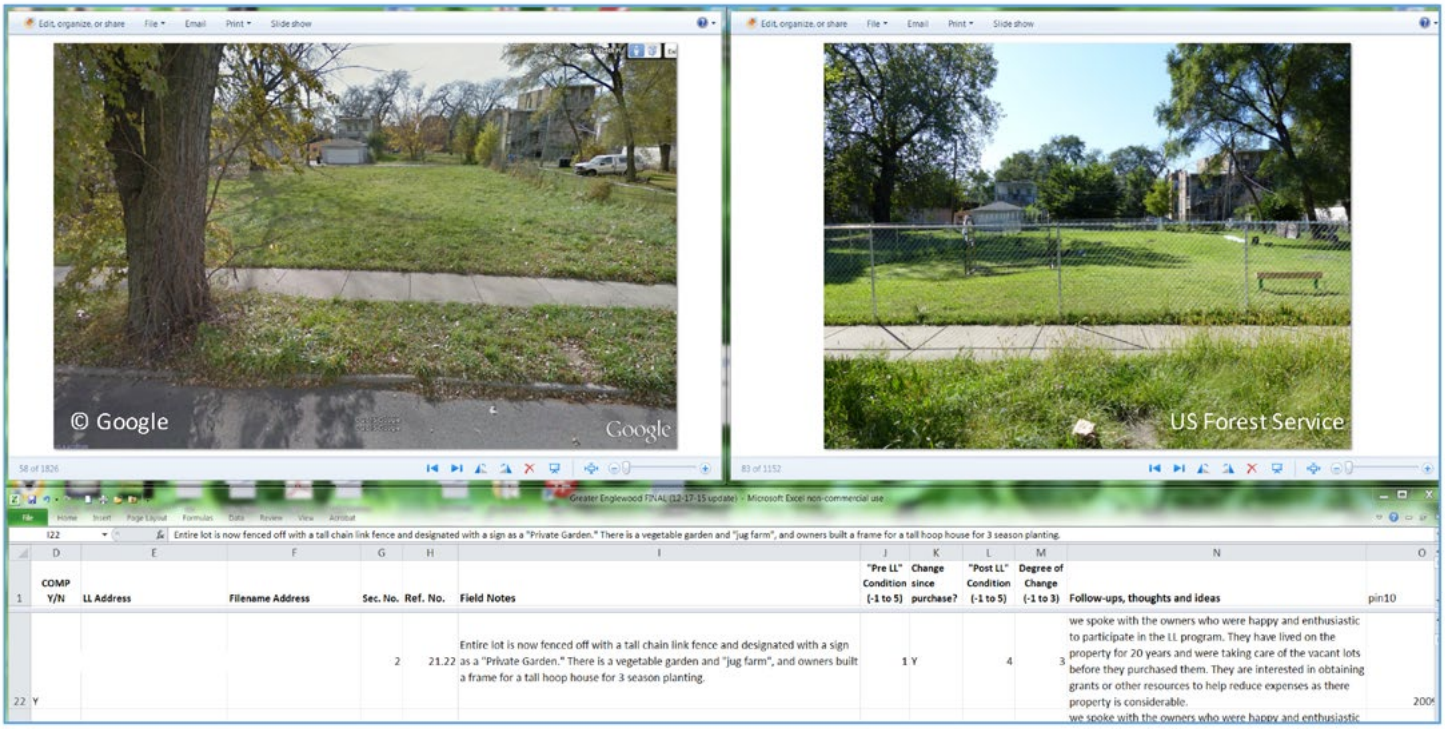
-1	***Mismanaged:*** obvious dumping, abandoned vehicles, large erosion, safety hazards, etc.	**Turf not compliant**
0	***Unmanaged:*** not recently mown but otherwise no major signs of abuse	
1	***Periodic mowing:*** recently mown but may be somewhat weedy/or tallish, may be unfenced or with bollards, may have cars parked on it, patches of dirt from car use, some litter	**Turf compliant**
2	***Regular mowing, weeding:*** fenced or unfenced but visibly cared for: recently mowed, predominantly lawn grass, may have cars parked in middle of prop but are clearly "in their place" and not randomly parked across lot and haven't eroded the turf	
3	***Small gardens/cues to care:*** small gardens, planted trees or shrubs, fencing (in good condition) or other signs of care/occupancy, may have visible cars in rear	
4	***Moderate sized gardens/cues to care:*** moderate gardens or other signs of care/occupancy, no vehicles visible or fenced in rear	
5	***Extensive gardens/cues to care:*** extensive gardens or other signs of care/occupancy, no vehicles	

While the field photography provided us with street level imagery of post-purchase conditions, until post-purchase aerial photography was available we could not use our assessment scheme to examine change or provide timely feedback to the City to evaluate program impact. As a short-term fix, we developed a rapid assessment "condition/care scale" to capture the essential street-level characteristics of our more detailed set of indicators. This 7-point scale ranges from -1 to +5, with descriptive categories that are meant to provide a report card of progress similar to that designed by McPherson and Kotow (2013) for urban forest assessments. In our application, the City was particularly interested in the extent to which new large lot owners were compliant with terms of agreement to mow lots and fence lots (all except for adjacent side lots). The condition-care scale, combined with information about property adjacency described above, provided a way to estimate not only rates of compliance but incremental improvements beyond it.

Change Analysis

Pre-ownership (Nov 2014)

After 1st season of ownership (Oct 2015)



	D	E	F	G	H	I	J	K	L	M	N	O
1	COMP Y/N	LL Address	Filename Address	Sec. No.	Ref. No.	Field Notes	"Pre LL" Condition (-1 to 5)	Change since purchase?	"Post LL" Condition (-1 to 5)	Degree of Change (-1 to 3)	Follow-ups, thoughts and ideas	pin10
22	Y			2	21.22	Entire lot is now fenced off with a tall chain link fence and designated with a sign as a "Private Garden." There is a vegetable garden and "jug farm", and owners built a frame for a tall hoop house for 3 season planting.	1	Y	4	3	we spoke with the owners who were happy and enthusiastic to participate in the LL program. They have lived on the property for 20 years and were taking care of the vacant lots before they purchased them. They are interested in obtaining grants or other resources to help reduce expenses as there property is considerable. we spoke with the owners who were happy and enthusiastic	200

The rating scale was applied to individual large lots using the fall 2014 Google Street View imagery and our fall 2015 field photos. We later also used it to rate a second field photo survey conducted by the City in August 2016. As with the detailed measures described earlier, the scale was rated by a trained research assistant using a side-by-side photo pair comparison. Images were displayed on a wide screen monitor and uploaded from individual folders sorted by address so that each could be advanced and zoomed or panned to examine in detail. A score sheet with address and adjacency information was positioned on the screen below the photo pair, and notes from the field sheets were added to assist with interpretation. Columns for rating large lot condition-care were included for pre- and post- periods, along with a column for indicating if any changes could be discerned even if they did not merit a numerical change in the rating scale. Single rater test-retest reliability of these ratings averaged r = .922 across the three assessment periods. The East Garfield Park pre- and first season post- photo sets were also rated by one of the project investigators, and tests between the two raters showed an average inter-rater reliability of r = .875.

Summary and Outlook

This visual case study described the steps used in examining visual changes in condition and care of vacant lots purchased by neighborhood residents under Chicago's Large Lot Program. The visual assessment protocol we developed and used in concert with high resolution aerial and street level photography was effective at identifying changes in care at the lot level and in linking these changes to care-related factors at previously owned property and block levels. Likewise, the 7-point condition/care scale we developed provided an efficient way for capturing an overall picture of changes in lot stewardship and showed good consistency in application within and across raters. Results from both approaches point to significant improvements made to lots after initial purchase and the importance of owner proximity, which will be detailed in forthcoming papers. In terms of their broader application beyond this case study, these approaches have potential for addressing other questions about landscape change at the neighborhood scale, particularly with respect to visual resource stewardship issues. And when linked with social information from sources such as mail surveys and the US Census, visual assessments can provide an integrated understanding of the social-ecological dynamics of change. This can be especially useful for policy and program evaluation, monitoring, and other cases where understanding the effects of interventions on land cover/land use is important.

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