

Higher Income Households Enjoy Close Proximity to Green Open Spaces: A Case Study of City of Los Angeles

PPD631 Fall 2012 Final Project

I. Introduction

After the great surge of urbanization in the past few decades, the unfortunate pattern of growth in America is leaving our cities in disrepair. Industries have built huge, sprawling corporate centers where farmers once worked. Developers have constructed sprawling housing developments that continuously turned green spaces into concrete structures. Our nation's natural environment is consistently being raided by the name of economic progress and development. The city devotes less land to green open spaces because we are constantly losing land to accommodate freeways, transit projects, and mega housing developments. However, current environmental concerns relating to energy, climate, health, and global warming has forced Los Angeles into building *green* choices.

Los Angeles is seemingly ahead of the game. The city reached its twenty percent target of deriving energy from renewable resources by 2010. It has significantly reduced water consumption, increased energy efficiency, set green building standards, and increased green open spaces. Yet, these benefits and improvements are not shared equally across the City of Los Angeles. People in higher household incomes have a larger share of the advantages from these innovations, while lower household incomes have been consistently squeezed out of green open spaces.

Green space can optimize the livability of urban communities by increasing aesthetic appeal and restoring the balance of our ecosystem that ultimately will aid to alleviate common urban problems. Conserving and developing green open spaces represent the newest approach to city planning. However, not everyone is fortunate to have enough priority to have plans for open

spaces in their neighborhood. Recent open space planning efforts have begun to heat up the phenomenon of higher household income groups occupying land near green open spaces, and lower household income groups occupying land less accessible to green open spaces.

Open space is a spatial and abstract concept that is best understood through visualization, and household income is a quantity variable that does not have a visual representation. The application of GIS enables integration of different components and generates an easily apprehensive map. In this specific study, GIS will combine spatial patterns of green spaces and quantify data of median household incomes in Los Angeles to produce a single visualization that clearly represents both concepts.

The City of Los Angeles conjures images of large, upscale homes, extensive freeway systems, and most importantly insufficient green open spaces. In fact, City of Los Angeles is one of the most green-impooverished cities in all of United States, devoting approximately four percent of land to public greenery (comparatively, about seventeen percent of New York City, and nine percent of Boston is comprised of green open space). Not all spaces are created equal, and especially with a lack of green open spaces, this study predicts high income households to agglomerate near, and low income households away from green open spaces. This paper will focus and present GIS based analysis in the City of Los Angeles and the disparities between household income level and access to green open space. A final map will seek to demonstrate through GIS output, a visualization of open spaces and the distribution of household income groups relative to these open spaces in the City of Los Angeles.

II. Data Collection

Since the analysis is specifically looking at the relationship between green open space and household income in the City of Los Angeles, three important pieces of data were used to

complete this study. First, I acquired an ArcMap ready shapefile of *The General Land Use Map of City of Los Angeles* from the City of Los Angeles Department of City Planning website.

Second, I downloaded the shapefile of *2010 County of Los Angeles Census Tracts* from the U.S. Census Bureau website. Last, I retrieved in .cvs format the *2010 Household Income City of Los Angeles* from the U.S. Census Bureau American Fact Finder website, where I had to reprocess and save in .xls format to be ArcMap usable.

2012 census information is not available. Thus, both census related data sources in this study were gathered from 2010 census files. The 2010 County of Los Angeles Census Tracts was included to offer a basic geographic organization of the city, and it was also needed to derive the City of Los Angeles Census Tracts, since the city census tracts wasn't exclusively accessible. Household income is usually highly vulnerable to social and economic makeup of the household such as race, ethnicity, and family structure. Therefore as an average, I utilized only the information from *2010 Median Household Income City of Los Angeles* of the entire 2010 Household Income City of Los Angeles census file. The General Land Use Map will provide the necessary basemap to extract the green open space land use pattern of the city.

III. Data Limitation and Accuracy

There are no perfect ways and precise data for anything. All forms of data are limited and will be erroneous in some way, so we can only guarantee the sources obtained are correct and will maximize accuracy.

First, the term green open space is vague, and it carries numerous different definitions. Open space patterns extracted from the General Land Use Map of City of Los Angeles strictly follows the zoning codes of the city, and it is extremely incorrect to entirely refer to green open space based upon zoning. For example, many green spaces such as California Plaza, Saslow Dog

Park, and others are perceived as green open spaces, but it is not included as green spaces in the zoning codes. These hidden green spaces are excluded from this study, but without doubt a necessity for the analysis. A better alternative might be to rigidly define the term “green open space”, and provide classifications for different types and forms of what a “green open space” can be. Field work can also be performed by physically visiting all green open spaces around the city and manually edit them into ArcMap.

Second, confined census tracts for the City of Los Angeles were not available and were instead clipped from the County of Los Angeles census tracts for this study. However, census tracts do not share the same political boundaries with the city. The clipped census tracts therefore could only provide a relatively close representation of the city but not the precise boundaries of the city. With more time and skills, I do believe personally digitizing the City of Los Angeles boundaries will give the analysis the most precise geographic illustration.

Last, as mentioned above, household income is usually highly vulnerable to social and economic makeup of the household such as race, ethnicity, and family structure. Since these characteristics are not definitive in itself, the derivative of household incomes from them will always be erroneous. There are no ways around this data and we can only boost accuracy by using an “average”.

IV. Methodology

After retrieving the necessary data and converting the data into ArcMap usable form, all data were imported as separate layers into ArcMap for integration.

I began by importing the General Land Use Map of City of Los Angeles and turned off all land use except *open space*. This was achieved by changing symbology of this shapefile by categorizing and exporting in *properties* only *open space values*. There were four unique values

related to open space embedded in the layer, i) open space, ii) other public space, iii) public I open space, and iv) public/ quasi open space. However, I have omitted ii through iv due to its insignificant numbers comparatively to i. For a clearly representation, I also changed the open space layer symbology with a *10% Simple Hatch* overlay widen the hatch line width to 3 so the census tracts will be visible under hatch.

Since the census tracts were from the County, and it was distracting to have too much empty map space, I decided to clip the City of Los Angeles census tracts from the County of Los Angeles census tracts. A second copy of the General Land Use Map of City of Los Angeles was imported along with the 2010 County of Los Angeles Census Tracts. I performed a *clip* inputting the *2010 County of Los Angeles Census Tracts* and clipping it as the *General Land Use Map of City of Los Angeles*. Output feature became city census tracts from the county clipped using the land use map as a cookie cutter. However, I ran into a problem during clipping. Since the General Land Use Map of City of Los Angeles followed political boundaries, and it is not the same as census tracts boundaries, the clipped feature was inaccurate at the edges. To resolve this issue and in aim to get a clipped census tract boundary as close to the land use boundary, I first clipped everything inclusive of both data layers, and manually *select by rectangle* at the boundary line and exported, then *union* with the inclusive clipping of the internal area.

2010 Household Income of City of Los Angeles was downloaded in .cvs format. It had to be saved in .xls format to be ArcMap usable. With reference to the steps performed in our “Census 2010” assignment for the class, I imported the .xls file into ArcMap and anticipated a join with the city census tracts. First, I had to *Add Field “GeoID_Join”* in the *Census Tracts Attribute Table*. Then, using *Field Calculator “1400000US & [GEOID10]”* for calculating the necessary joining values. Last, I carried out a *Join* of the *Census Tracts Attribute Table* and

Household Income .xls Table using columns *GeoID_Join* from the census tracts attribute table and *Geo#id* from the household income table.

After the *Join*, I changed symbology for *2010 Median Household Income* only (the specific representation of field headings were found in the .cvs metadata file downloaded along with the original .cvs income file. The field heading representing 2010 median household income was *HC02_EST_VC02*). I used a *Graduated Color s* with *Quantile* and *4 Classes*. I tried many value ranges and finally set *Manual Breaks* at 50000, 75000, 10000, and 200000.

In conclusion, I tested out different sq sizes and colors for all layers in aim to convey a clear and self-representing map. Finally finishing off by adding a *Title, Legend, Scale, North Arrow, Map Credits* and exported in .pdf format in layout view.

V. Methodology Limitation and Future Study

This project's data collection and most professional studies do utilize regional data sources. For example, this study made use of City of Los Angeles land use map, so it only presented a regional level definition of open space without capturing local and neighborhood level open space. In convention, regional parks targeted tourists and higher income populations, and the general public is accustomed to visiting local and neighborhood parks. This analysis therefore did take on a biased approach and will indicate the biased result that higher household income groups do reside close to green open spaces.

Future study can take a detail focus on the disparities between household income level and access to green open space in a few neighborhoods in Los Angeles. It might be optimal to choose a few adjacent neighborhoods, and include as much income class diversity as possible. Compile data by physically walking through, and marking down each green space parcel in the neighborhoods. Instead of utilizing the city census tracts, a base map can be exported from

Google maps, and neighborhood boundaries can be digitized, and amounts of green open spaces can be represented using graduated symbols.

VI. Conclusion

Centuries ago, there were no clear relationship between green open spaces and household income levels because green open spaces were *natural* and existed as a public good. However, as the city of Los Angeles consistently prioritized freeways, transit projects, and housing projects, green open spaces transformed into an *artificial* and constructed as a planned luxury good. Parks as we know it are natural and belong to the public. Slowly, green open spaces became an artificial good that higher household income groups *purchase* into their surrounding areas. Thus gradually, green open spaces become an entity that can be associated with how much a household earns.

The disparities between household income levels and access to green open spaces in the City of Los Angeles are proven correct with this brief analysis. The expected deprivation of green spaces from lower household income groups are enjoyed by higher household income groups.

From the GIS map illustration, the highest median household income group benefits from being within or at the edge of the city's largest green spaces. The highest median household income group also occupies majority of the city's mid-size green spaces, with a few \$75000 - \$100000 median household income group edging a few. The \$50000 - \$75000 median household income group sparsely resided within close distance of the city's small green spaces. The lowest household income group comparatively did not seem to have relatively close access to any green spaces.

City of Los Angeles has constantly been in difficult situations to meet the high demands and amounts of green open spaces that its population wishes. Green spaces are jewels of the present city, and this study has proven that the scarcity of green open spaces in the city tends to favor higher household income groups by providing this population a close proximity to green open spaces, while lower household income groups are left unattended.

VI. References

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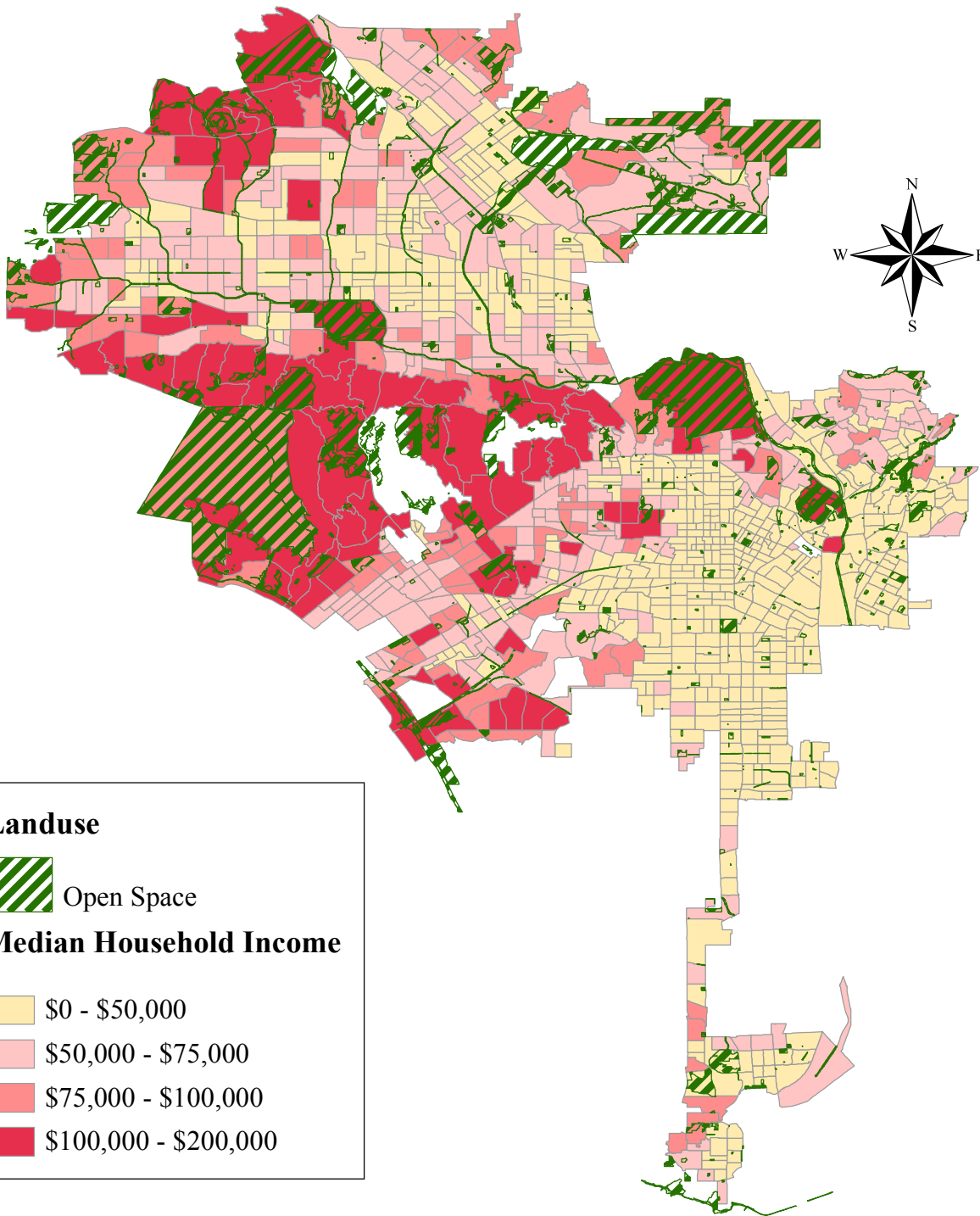
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City of Los Angeles


Green Open Space vs. Median Household Income





Landuse


 Open Space

Median Household Income

 \$0 - \$50,000

 \$50,000 - \$75,000

 \$75,000 - \$100,000

 \$100,000 - \$200,000

Source of Data: City of L.A. Department of City Planning; U.S. Census Bureau
Date of Data: 2012
Creator: Joanna Chan
Date of Creation: November 30, 2012
Projection: Lambert_Conformal_Conic

0 3 6 9 12 Miles