Mapping Displacement & Vulnerability to Gentrification in the Greater Portland Region

Submitted as partial fulfillment of a Master of Science in Geospatial Technologies

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Abstract

Most major cities are experiencing some facet of urban renewal. After decades of disinvestment and white migration to suburbs, cities have been recently characterized by decayed urban center infrastructure. Redevelopment of these spaces has produced gentrification. Gentrification has a connotation of being a bad word, oft-linked to the 'whitening' of a city. This study asks, as more cities are redeveloping and trying to become smarter, are they having communities give up their sense of place and self-identity?

Traditional mapping techniques tend to show static populations and do not capture the ebb and flow of migratory patterns. This project will examine to what extent gentrification plays a role in the 'whitening' of reclaimed urban spaces, where the white populations are migrating in from, and where the displaced populations are moving to. Over the last two decades, technology has transformed how the city is used spatially. The use of space within the city does not follow a strict cartesian grid, so data and the use of city space must be looked at outside of the typical Euclidean representation of city blocks. The expected results are that as a city gentrifies, the white populace increases in historically minority neighborhoods, pushing minority populations to surrounding cities and suburbs. Looking at this data is important in understanding how redevelopment impacts certain demographics and how that information can be used to 'smarten' our cities' renewal. Cities must develop for mixed-use, mixed-income, and mixed-density, which they cannot do if they only cater to one population.

1. Introduction

The urban landscape is changing. After decades of disenfranchisement, certain neighborhoods within US cities are experiencing a resurgence of investment. This reinvestment is driving development and stimulating declining communities. "Neighborhoods experience gentrification when an influx of investment and changes to the built environment leads to rising home values, family incomes and educational levels of residents" (Richardson *et al*. 2019). Gentrification is not a bad process for a city to experience. In fact, it is necessary in order for the continued growth and expansion of a city, both socially and economically. Gentrification gets a bad reputation due to the displacement associated with redevelopment and the loss distinctiveness that the community once had. Displacement due to gentrification happens when current residents are priced out of their homes due to rising housing costs.

This project will study the effects gentrification has on the socioeconomic demographics within a neighborhood to look at shifts within certain spatial extents. This study will differ from others in that it will be looking to where the displaced population migrates to, looking to see if

they move to the same suburb, edge city, or exurb as those moving into the gentrified area. To answer that question, this project will look at three aspects of displacement. Also, access to services will be visualized to highlight any barriers, if any, from one neighborhood to another. First, data will be analyzed to see if the in/out migrations go to the same area(s). Second, will be to see if there is a measurable drop in socioeconomic demographics, such as lower educational attainment or a measurable drop in median family income, for the surrounding non-gentrified areas. Lastly, using spatial analytics, the project will look to see if there is a quantifiable, connective shift in socioeconomic demographics surrounding a gentrified area in order to see migration patterns because of and vulnerability to further gentrification following redevelopment.

Understanding how gentrification influences migration patterns within a region and identifying those vulnerable to it, can help affect local and federal policy to address the displacement of at-risk populations. Services that have been historically located in or near the CBD to help assist minority or low-income residents, may not be located where the displaced move to, causing an undue burden upon them. This burden may include an absence of services or increased travel times to access public services, due to limited access to public transportation. Cities located on the outskirts of a larger metropolitan city, may not be able to handle the influx of those on the lower end of the socioeconomic spectrum. They make have gaps in their public and private amenities that accommodate to certain needs of those residents. Also, residents lose their sense of belonging and may be ostracized within the new communities that they move in to.

In order to address those issues, literature will be reviewed to see how it will inform our processes of analysis. Also, the literature on radical cartography and alternative thematic mapping will be consulted to look at ways to map the phenomenon of displacement and gentrification. The literature will inform the methods that will be used to analyze and present the issues and findings to the reader. A detailed discussion of how the literature and analytical approaches answered the question regarding gentrification and displacement migration will follow the methodology section.

2. Literature Review

2.1 Background

During the post-WWII era, there was a mass exodus of the middle-class from central cities, slowing in the 1960s and 1970s (Kasarda *et al*. 1997). With the outmigration of the middle-class, disinvestment from the city followed. This disinvestment and migration, known as white flight, to the suburbs led to high-density low-income housing in American cities, colloquially known as ‘slums’ (Knight & Gharipour 2016). However, beginning in the early 2000s and continuing through today, some of these ‘blighted’ neighborhoods have seen a resurgence of investment and an influx of middle-class relocation (Sturtevant 2014), otherwise known as gentrification. The literature will be grouped into three sub-sections: Gentrification & Displacement, Initial Mapping, and Radical Space.

2.2 Gentrification & Displacement

Hwang and Sampson (2014) describe gentrification as “the process by which central urban neighborhoods that have undergone disinvestments and economic decline experience a reversal, reinvestment, and the in-migration of a relatively well-off middle- and upper-middle-class population.” While at its heart gentrification is not bad for a neighborhood or city, it has become

a ‘bad word’ within urban planning and studies. Rupasingha *et al*. (2015) found that over the past two decades there has been more migration from metro to non-metro, which is a shift from previous decades.

Changing demographics within a neighborhood also alter its socioeconomic makeup. As more middle-class move into a predominantly minority area, goods and rent command a higher median price. This increase in prices displaces those on the lower socioeconomic scale forcing them to leave an area. Not all predominantly black neighborhoods are facing this ‘white’ invasion, in fact, according to Freeman *et al.* (2015), only about 10 percent are. However, those neighborhoods facing gentrification are at risk of losing not only its identity but the very people that helped create the culture that made it alluring to suburban immigrants in the first place. Additionally, Freeman *et al*. (2015) identify numerous metropolitan areas that have seen displacement due to gentrification.

Many studies have looked at the in-migration and its effect on a gentrified urban area. This study will be looking at the migration pattern from the suburbs but also the displacement migration to see if there is movement to and from the same general areas. This is significant because if those who are displaced are moving into formerly or still currently white enclaves, they may not have ready access to services or specific needs being met. Also, it would allow follow-on research into the subject of whether the displaced population affects the socioeconomic demographics of the area they moved into to the extent that the middle-class has on gentrified neighborhoods.

2.3 Initial Mapping

Before displacement can be mapped, this study needs to determine which metropolitan areas have gone through gentrification in order to look for areas affected by ‘white invasion’. There are many markers by which gentrification can be analyzed. This study has selected a number of ways by which to look at, transit-oriented development (TOD) along metro rail transit systems (Dong 2017), recent addition of bike lanes to a neighborhood (Hoffmann 2016), and Shelton’s (2018) definition of racially/ethnically concentrated areas of poverty and affluence. Along with Bates’ (2013) demographic markers of race, housing stock, education attainment, and median family income.

Once the gentrified areas have been identified, this study will then move on to finding where the displaced population settled. To find those areas, a reverse of the previously used table (Shelton 2018) will be used to. Additionally, Holm and Schulz’s Gentrimap (2017) model will be used to measure displacement as well as gentrification.

2.4 Radical Space

Shelton (2018) also stresses how one thinks of urban space needs to change. The spatial extent of cities is changing with the advent of technology, which affects how people move through a metropolitan area. Gentrified areas are not the “apartheid-like landscape” (Freeman *et al*. 2015) of post ‘white flight’ urban spaces. The usage of space within the urban environment is complex (Forer 1978) and more relational, instead of absolute than ever before. (Harvey 2006). The use of urban space is no longer defined solely by Euclidean geometries. Traditional mapping of these new spatial urban extents may not highlight the relation between two areas effectively.

This study will use techniques of radical cartography (Denil 2011) to highlight how the middle-class and displaced are connected in a way that traditional mapping techniques cannot show. Because radical cartography moves away from the “absolute, Euclidean and Cartesian

perspectives on space" or the "as the crow flies" distances (O'Sullivan *et al*. 2018), this study looked to how fictional mapping in literature (Reuschel & Hurni 2011) and humorous map, such as those examined by Caquard and Dormann (2008), were created and theory behind them.

Relational mapping is not a new practice, Bill Bunge and the Detroit Geographical Expedition and Institute did it in the late 1960s and 1970s (Thatcher 2017). Bergmann and O'Sullivan (2018) have been doing more modern relational mapping, with their "relational representation of the global flights' network" map. "Blockmodeling" (Bergmann and O'Sullivan 2018) is a way to combine both Euclidean and Cartesian perspectives on space (O'Sullivan *et al*. 2018) with radical cartography. The association between the gentrified and displaced lends itself to be mapped relational as the spatial distance matters less than highlighting how those communities and demographics have now shaped and impacted each other.

The maps developed need to be as such that the reader can visually process and interpret the information being expressed. As with the maps in 'Mapping Literature' (Reuschel & Hurni 2011) and 'Humorous Maps: Explorations of an AlternativeCartography' (Caquard & Dormann 2008) the maps need to be recognizable to the reader. Yet, the maps need to be presented in such a way that they step away from the modern Geographic Information Systems (GIS) computational representation and analysis of Newtonian space (Bergmann & O'Sullivan 2018).

Radical cartography and counter-mapping can inform a reader of a topic that normally would not be mappable by absolute spatial extents. The linkage of displacement and gentrification in one such scenario which unconventional mapping can help visualize a problem that would normally only be able to be described via text. The literature supports that displacement follows gentrification and that more work had been put into studying gentrified areas than following those displaced by redevelopment. This study will build on the methods applied to find gentrified neighborhoods, by expanding on and reversing them to find areas, where those displaced, have moved in to.

3. Intervention Description

In order to answer the questions of displacement caused by and vulnerable to gentrification within the Greater Portland region of Oregon, US Census provided data was prepped using Visual Basic Script (VBScript) and Python so it could be sorted into ranks and calculated in order to get a vulnerability to gentrification ranking. Using the prepared data, 2000 and 2017 four key demographics were taken from the available data: Race, Income, Education Attainment, and Housing Stock. These yearly demographics were compared against each other to look for changes to be used in a vulnerability index and to look for migration patterns. The 2000 figures were subtracted from the 2017 numbers to look for changes in certain tracts that indicate either gentrification or out-migration from gentrified areas. The years chosen were selected for two reasons, the first being that the Census does not provide census tract shapefiles from before the 2000 census. Second, 2000 was before most of the urban renewal happened, with 2017 being the up-to-date year that the Census has data for. Gapless density equalizing cartograms using the Gastner and Newman (2004) method were used to help visualize selected demographics to highlight those areas that are susceptible to gentrification and to highlight the pressure that displacement is placing on communities to the north and east of Portland's CBD.

4. Methodology

4.1 Geographic Scope

The urban area of Portland/Gresham in Oregon served as the area of interest for this study (Figure 1). The area was selected due to its areas of gentrification and known lack of racial diversity when compared to the US average (Table 1). It features an urban area that over the past few decades have seen select neighborhoods take part in urban renewal. This investment to certain areas has lessened Portland's non-white presence in the urban core, forcing those residents north and east. With Portland's tiny African American population being displaced to the fringes of the city, leading to even less diversity in the city's center.

4.2 Demographics

The data being mapped consisted of census tract data from the 2000 & 2010 US Census and the 2005, 2015, & 2017 American Community Survey (ACS). This data was formatted, edited, and attached to either a 2000 or 2010 US Census Tract Tigerfile depending on whether it came before or after the 2010 Census. Demographics data used for vulnerability ratings were pulled from the 2017 ACS and included racial demographics, housing stock, education attainment, and median family income. For the race demographics, all non-white races were combined to highlight communities of color. Also, educational attainment had multiple columns that were combined to just show those over 25 years of age that had obtained a bachelor's degree or higher. Poverty levels were obtained by looking at which census tracts a had a median family income (MFI) in 2017 that was 80%, or $69417, of the Portland region's median family income of $86771.

Figure 1. Portland and Gresham Oregon.

4.3 D3.js and Demographic Visualization

Rather than present web-based viewers a static table, such as Table 1, D3 (Data-Driven Documents) JavaScript was employed to make an interactive bar chart to highlight the racial demographic differences between the US, Oregon, and Portland, and amongst the differing races. D3.js was selected for its ability in producing dynamic, interactive data visualizations in web browsers (Bostock *et al*. 2011).

Table 1. Racial Composition, 2015 & 2017 ACS.

Race	USA	Oregon	Portland
White	73.3%	85.1%	77.4%
Black or African American	12.6%	1.8%	5.7%
Native American	0.8%	1.2%	0.8%
Asian	5.2%	4.0%	7.8%
Hawaiian and Pacific Islander	0.2%	0.4%	0.6%
Other races	4.8%	3.4%	2.3%
Two or more races	3.1%	4.1%	5.4%

4.4 Decimals

Once the data was prepared, calculations were then performed to get the percent total for all the demographics. A simple VBScript was run within ArcMap's field calculator in order to get the percent of each category from the total. This returned a large decimal that then required a Python script to be used to round the decimal places to just the tenths place (Figure 2) for ease of data manipulation and mapping.

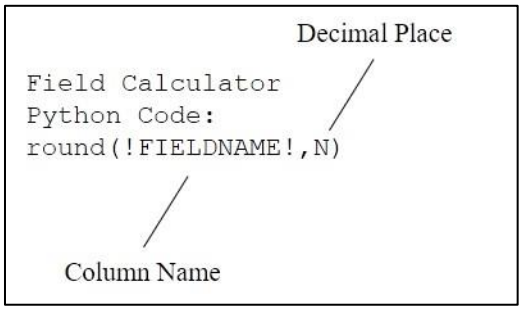

Figure 2. Python Rounding Script.

4.5 Quintiles and Vulnerability Scores

Using Bate's *Gentrification and Displacement Study* (2013), the percent/total columns were placed within quintiles ranging from 0 to 4, or 20% of each column. This was accomplished through another Python script (Figure 3) that assigned 20% of each column a risk factor of either a 0, 1, 2, 3, or 4. These scores were then totaled to get an overall vulnerability to gentrification score, see Table 2 for an example. With those totaling 10 through 16 being highly vulnerable to gentrification and seeing a drastic change in socioeconomic makeup of that specific tract.

```
import arcpy
import numpy as np

input = 'c:/PATH TO DATA/'
arr = arcpy.da.FeatureClassToNumPyArray(input,
('FIELDNAME'))

p1 = np.percentile(arr, 20)  # rank = 0
p2 = np.percentile(arr, 40)  # rank = 1
...
p5 = np.percentile(arr, 100)  # rank = 4

with arcpy.da.UpdateCursor(input , ['FIELDNAME','RISK'])
as cursor:
    for row in cursor:
        if row[0] < p1:
            row[1] = 0  #rank 0
        elif p1 <= row[0] and row[0] < p2:
             row[1] = 1
            …
        else:
             row[1] = 5
        cursor.updateRow(row)
```

Figure 3. Example Python Quintile Script.

Table 2. Example of Vulnerability Index.

Tract	Rent	Risk	Non-White	Risk	w/o Bachelor's	Risk	Poverty	Risk	Total
40.01	58.1%	3	51%	4	71.5%	3	60%	4	14

4.6 Density Equalizing Cartograms

In order to highlight proportional differences within the individual demographics and the overall areas of vulnerability, an area cartogram was selected. A density equalizing cartogram tool developed using methodology from Gastner & Newman (2004) was chosen specifically for its balance between good density equalization and low distortion of spatial regions. It creates cartograms without gaps and that maintains spatial reference, latitude/longitude & projection so that the area cartogram can be converted into a JSON for easy web mapping. This allows for the showing of a normalized choropleth map and a proportionally distorted cartogram within the same web mapping application to the viewer.

The individual scores were used to distort the spatial area of each factor. Those of 3 & 4 were distorted proportionally more than those of 1 &2. This created the effect, for the viewer, of showing that factors with a higher vulnerability score of taking up more area than in reality, further highlighting the risks over a regular choropleth (Figure 4).

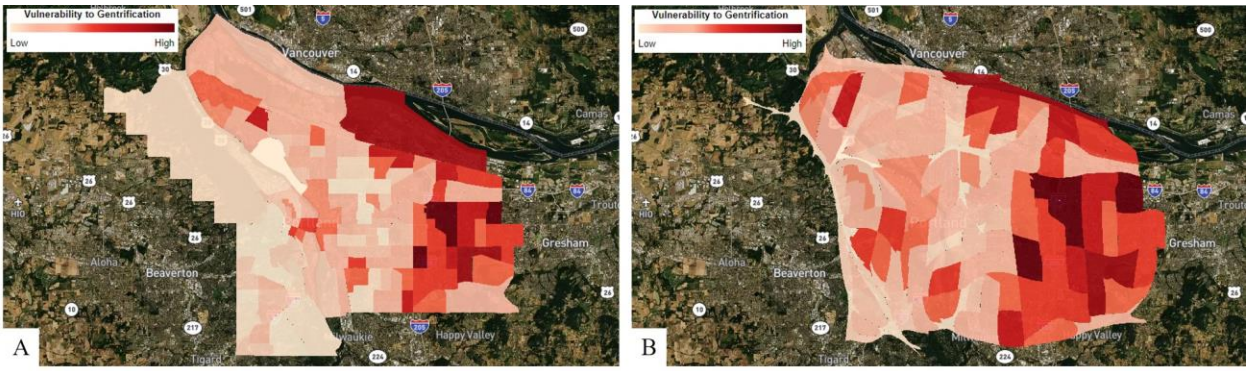

Figure 4. Vulnerability Choropleth (A) and Cartogram (B).

4.7 Gentrification and In-Migration of Those Displaced

The City of Portland lays out which areas of the city has gentrified (Durbin 2019) buy census tract. These tracts were, in turn, turned into a used feature class to show which areas of the city have gone through gentrification. In order to find displacement migration within the city of Portland, demographic changes from 2000-2017 were looked at. Tracts that had any 3 of the 4:

- The number of renters increased by more than 1.2%
- The white population decreased by more than 3.0%
- The population 25 years and older without a bachelor's degree decreased more than 7.9%
- The median household income decreased by more than 8.5%

or experienced only 2 out of the 4:

- The white population decreased by more than 3.0%
- The population 25 years and older without a bachelor's degree decreased more than 7.9%

were selected as having experienced in-migration of displaced populations (Bates 2013). These tracts were also made into a feature class for mapping. Because the availability of ground-truthing lies outside of the scope of this project, the in-migration of those displaced solely comes from current literature and 2000-217 census data.

5. Discussion

Once all the data was prepared, manipulated, and mapped, an analysis could be performed to look for answers to the questions if there is a measurable racial out-migration of gentrified areas. Seeing if there was a measurable drop in socioeconomic demographics in the surrounding non-gentrified areas. Through the use of spatial analytics, to see if there is a quantifiable, connective shift in socioeconomic demographics surrounding a gentrified area in order to see migration patterns because of and vulnerability to further gentrification following redevelopment.

5.1 Gentrification and Displacement Migration

As more capital investment enters an area, redevelopment and renewal happen. What was once a blighted or down community now commanding a higher market price for rent and housing, drawing in a different socioeconomic base than who is currently residing in that neighborhood. Those current residents are then priced out and need to move elsewhere more in line with their income level.

When looking at Portland gentrified areas and comparing them to the calculated areas of displacement in-migration, those displaced are being pushed eastwards towards the city of Gresham (Figure 5), a suburb of Portland. Putting pressure on a city that may not be equipped to handle the rising number of poor families, ethnic minorities, and people with lower education levels. Governmental and social services that have been historically located near the CBD and may not be situated conveniently in the suburbs. As stated previously, the areas of gentrification were identified by the city of Portland (Durbin 2019) and the displacement migration is solely based on calculations from the 2017 ACS.

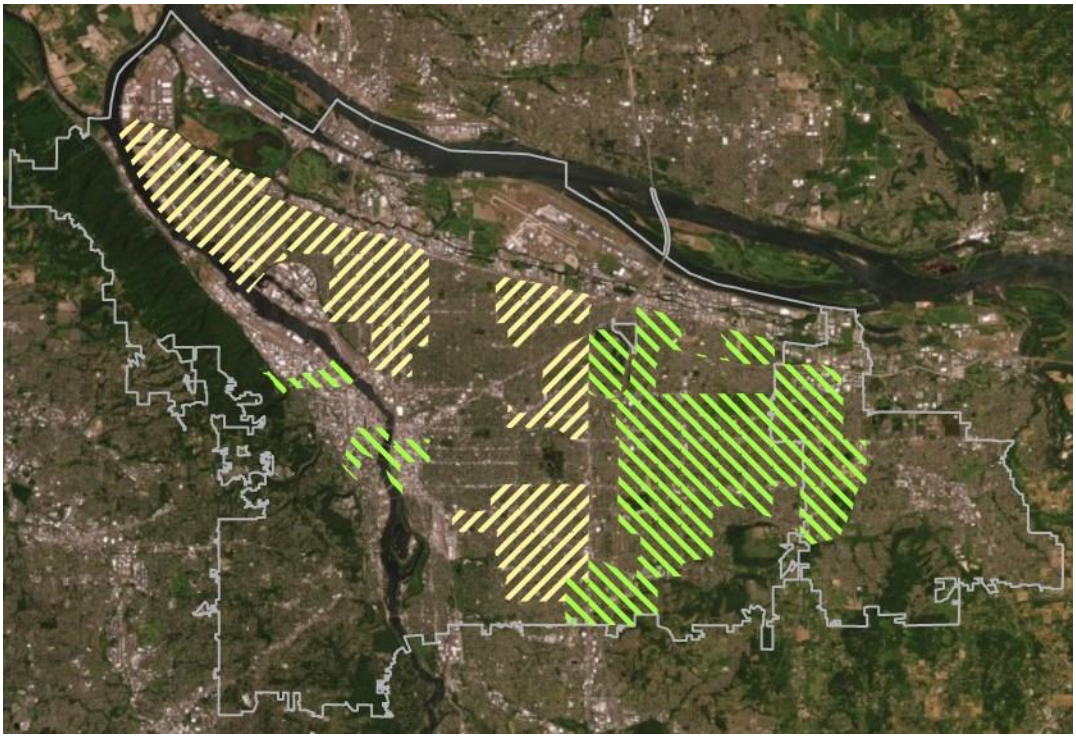

Figure 5. Areas of Gentrification and Calculated Displacement Migration.

Ground truthing migration patterns in and around Portland lies outside the scope of this project and follow-on research would be needed to precisely track the out/in-migration of those expatriated from an area that has gone through the urban renewal process. With that being stated, the areas identified through analysis are areas that have seen a growing number of poor families, ethnic minorities, and people with lower education levels. These areas have seen a shift in demographics from the 2000 census to the 2017 American Community Survey. By using those four markers as gentrification, areas that have seen a decrease are likely to have populations that have been displaced due to the gentrification of their previously neighborhood.

5.2 African American Migration

Many cities in post-WWII America, saw a rise into black migration (Freeman *et al*. 2015), especially northern and those on the west coast. Due to politics and disinvestment, African-America neighborhoods were located close to the downtown district, and Portland is no different. The majority of Portland's black communities in 2000 were concentrated slightly north of the CBD. However, once areas started to be redeveloped and gentrified, those communities were

pushed out. Much of the African American populace moving north towards the Columbia River/Vancouver, Washington or east towards Gresham (Figure 6).

While this is an example of only one race, it is a race that is historically at a disadvantage in the US and suffer from above normal ranges for the negative aspects of gentrification such as lower-income, lower college attainment, more likely to be renters rather than homeowners, and 6.4 times higher incarceration rates than whites (Jones *et al*. 2019). Also, urban redevelopment tends to happen around the CBD before other sections of a city, disproportionately affecting African American communities before any other race and other socioeconomic markers.

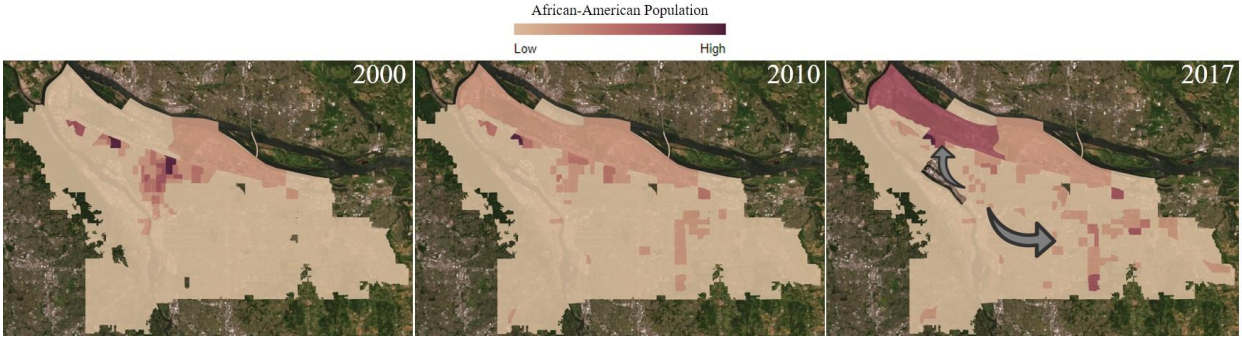

Figure 6. African American Migration within Portland & Gresham.

5.3 Vulnerability

To look at the pressure that gentrification puts on the surrounding neighborhoods, a vulnerability index was created as part of the methodology (Figure 7). This index measured four demographic aspects and assigned a score of 0-4 to each individual factor. Those numbers were then added up to get a total out of 16. Individual scores of 3 and 4 identify high susceptibility to gentrification, while overall totals of 10-16 show the same.

The vulnerability map shows areas that have high populations of minorities, low MFI, low bachelor's degree attainment, and higher numbers of renters. All issues identified as being susceptible to gentrification and displacement because of. When compared to the gentrification and migration map in Figure 4, a majority of vulnerable tracts were also identified as probable tracts that have seen a migration of displaced populations. Meaning that if redevelopment were to push into North Portland and into the eastern suburbs towards Gresham, that populace would be at risk. Also, many of the vulnerable tracts abut already gentrified ones, increasing the likeliness that those bordering areas will face gentrification in the future.

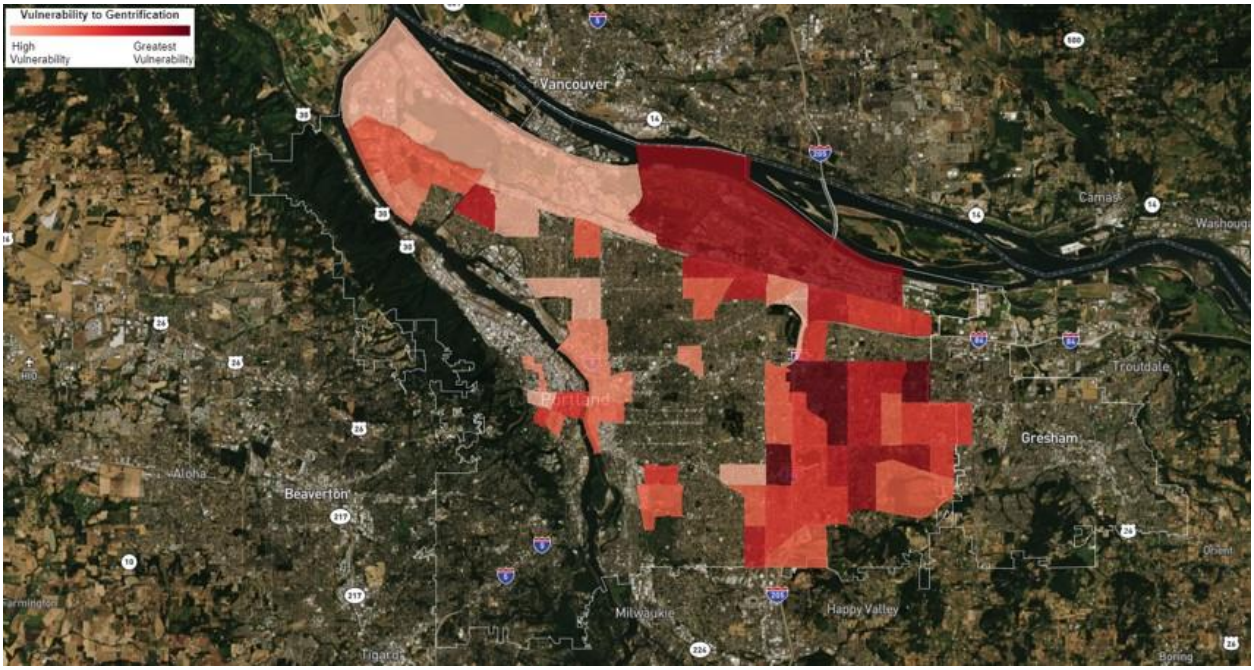

Figure 7. Overall Vulnerability to Gentrification.

5.4 Cartograms

Thematic maps, in this instance cartograms, were created in order to accentuate the vulnerability factors and the overall risk neighborhoods face to gentrification. These cartograms show proportionally show areas of 3s and 4s or 10s-16s as being larger in area than the lower end scores, also they emphasize clustering of those high scores.

Most of the area cartograms created show that those with the highest vulnerability score live in areas that match minority and calculated displacement migration. For 3 out of the 4 factors and the overall score all bulge eastwards and northwards. A great example of this is the bachelor's attainment rates.

The area within and surrounding the CBD have high levels of 4-year degree attainment. While the areas north and east do not. The choropleth does show this; however, the cartogram conveys the differences in attainment in a much more defined way (Figure 8). With the eastern edge prominently bulging towards Gresham and the northern limit crossing the Columbia River into Washington state towards Vancouver. While the central and western sections of Portland shrink towards almost not being visible.

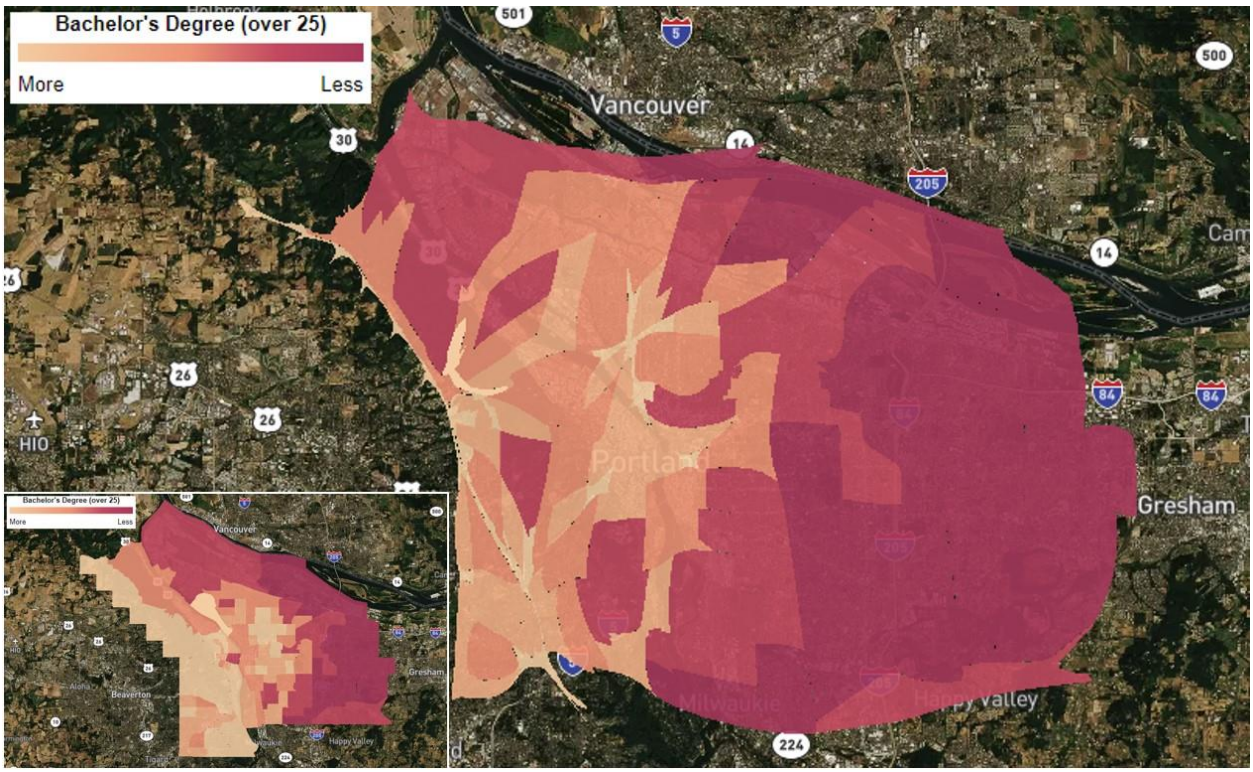

Figure 8. Bachelor's Degree Attainment for Those over 25 Cartogram (inset: Choropleth).

5.5 The Anomaly

When looking at individual demographics, it becomes clear that using one marker itself can lead to false narratives. While most of the demographics follow the same east and north line, the percentage of renters do not. There are more of the population that rents in eastern Portland than west, however solely looking at where the most renters live, it is just south of the CBD with a high concentration of level 4 risk (Figure 9).

This area, in general, does not have a high vulnerability to gentrification. Most of the residents that live there are white, high-income earners with college degrees. In fact, the region south of downtown Portland is home to many new high-rise apartments with rent that is significantly higher at a dollar or more per square foot than the eastside of Portland into Gresham (RentHub 2019).

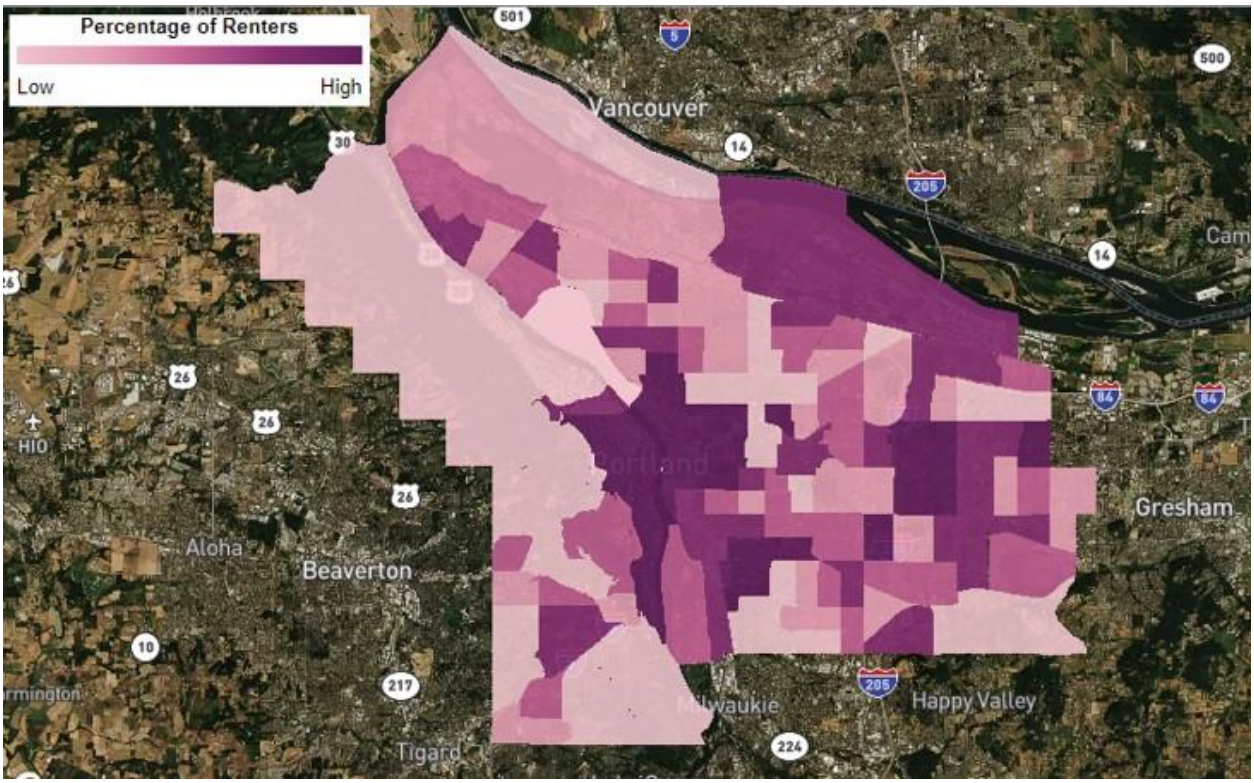

Figure 9. Renters by Risk Score.

6. Conclusion

Urban renewal, redevelopment, gentrification, whatever term it is called by happens. Blighted and rundown sections of cities are seeing a resurgence of investment and revitalization. Cities need this and cannot have stagnant growth. However, when an area is made attractive in order to attract new residents, those that are currently living there are at risk of being priced or pushed out. To maintain a sense of community and culture, cities need to focus on redevelopment that is mixed-use, mixed-density, and mixed-income. This would help to build smarter cities, that preserve a sense of belonging on a neighborhood level.

This study set out to answer three questions. First, where do displaced populations go within a city following gentrification. Second, was to see if there is a quantifiable drop in socioeconomic demographics in for the surrounding non-gentrified areas. Third, was to analyze if there is a quantifiable, shift in socioeconomic demographics adjacent to a gentrified area in order to see migration patterns because of and vulnerability to further gentrification following redevelopment.

6.1 Data

Portland was selected for its known gentrification and for the studies and literature available for that region. US Census data from 2000-2017 was gathered for census tract boundaries and demographics information. The demographic information was prepared and analyzed based on current literature. A vulnerability score was given to each of the four identified risk factors and then each tract was given an overall total vulnerability score. The last step was to attach the spreadsheet demographic data to the corresponding tract boundary file.

Finding the Gentrified areas of Portland came directly from the City of Portland, while the displacement migration was made by performing a calculation on the previously made census data to find drops in key demographic aspects from 2000-2017. Tracts that had experienced any 3 of the 4 or experienced only a certain 2 out of the 4, were labeled as a tract that experienced displacement migration. Again, these calculations and factors came from current studies.

6.2 Visual Analysis and Mapping

After all the data was processed and had analysis perform on it, it could be visualized so patterns could be ascertained. A peculiarity emerged with almost all the data, east and north. Most of the tracts that had negative demographic changes, were high risk or saw population migrations happened either north towards the Washington state border or eastward to Gresham.

Over the past 2 decades, Portland has seen a shift of a centrally located African American population, to a population that is now at the northernmost limits of the city and spilling in Gresham. Both regions were predominantly white at the start of the century. While the area north of the CBD that was Afrocentric in 1999, is now majority white as of 2017.

Of the four susceptibility markers to gentrification used in this study, 3 out of the 4 distinctly show the north and east phenomenon. This is especially clear when the maps are viewed as cartograms. All but the renters' map bugle in the direction of Gresham and the Columbia River.

Those at the greatest vulnerability to gentrification live along the borders of already gentrified areas or within parts of the region where those displaced by urban renewal have already migrated to.

6.3 Pressure

Displacement can take different forms: either racial/ethnic or by class and culture. Whichever way it happens, it places pressure on that neighborhood and on the suburbs and cities where those displaced migrated too.

Within the neighborhoods that have experienced or are experiencing gentrification, there is pressure from current residents to maintain a cultural status quo. This causes conflict between them, the city, and the residents that are moving into the changing neighborhood (McDougall 1982). There is also a want to stay and not to be pushed out due to rising housing costs.

Low-income residents that moved to a different neighborhood due to being displaced by gentrification were found to move into areas that had a lower median income than the one they previously lived (Ding *et al* 2016 & Florida 2019). These areas may not be equipped to handle the influx of low-income and/or minority residents. Social and public services may not be established in that neighborhood, placing undo travel times as residents in need travel back towards the city center where these amenities may have been historically located. Also, smaller edge cities, such as Gresham, may not have the infrastructure to handle an increase of those in need. Both budgets and in-place systems are strained beyond capacity to expand or build facilities to accommodate those of lower socioeconomic standing that have migrated from the more centrally located city.

6.4 Future Research

A limitation that this study ran into was the lack of scholarly articles on how surrounding communities, cities, and suburbs are directly affected by the gentrification of an area within a central city. There is a lack of data looking at the full effect of gentrification, including where

people move to after gentrification. Future research could include how travel times to access services have changed following displacement.

While this study looked at gentrified displacement and vulnerability by examining literature and performing quantitative analysis on census demographics, follow up studies could go to the Portland-Gresham-Vancouver area and ground-truth what is happening thereby gathering qualitative data from residents.

A "boots on the ground" qualitative approach would provide in-sight into neighborhood cultures not captured through census spreadsheets and be able to find out how residents have felt and seen changes. Not only for those living in gentrified tracts, but also for those that were displaced and to see how those neighborhoods have changed since the displacement migration. This would similarly provide data in whether the calculated areas of displacement migration, in fact, had in-migration of those from gentrified tracts.

Other research should be performed on what roles public investment, transit-oriented development, public universities schools, and parks, along with private investment contribute to gentrification and displacement. Future research contributions ought to look to see if overhauling federal housing and urban development policy can meet the needs of this era of rapid re-urbanization without further harming those in our society that are already socially and economically vulnerable.

Accompaniment

https://ryanjmitchell.github.io/capstone

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