

Article

Not peer-reviewed version

Analyzing the Relationship Between Urban Greening and Gentrification: Empirical Findings from Denver, Colorado

Mahshid Gorjani *

Posted Date: 16 July 2025

doi: 10.20944/preprints2025071322.v1

Keywords: urban greening; green gentrification; environmental justice; displacement; equity; urban sustainability; mixed approaches; and Denver are some of the keywords



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a Creative Commons CC BY 4.0 license, which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

Analyzing the Relationship Between Urban Greening and Gentrification: Empirical Findings from Denver, Colorado

Mahshid Gorjani

University of Colorado Denver; mahshid.gorjani@ucdenver.edu

Abstract

BACKGROUND: More U.S. communities are pushing for urban greening to make cities more sustainable and better able to handle climate change. Still, there is growing worried that greening efforts can make gentrification worse and force individuals who are already at risk to move. A recent study shows that improvements to the environment and changes in the housing market in rapidly changing urban areas are connected in many ways. **OBJECTIVE:** The goal of this study is to empirically look at the order and factors that affect the connection between urban greening and gentrification in Denver, Colorado. The goal is to improve fair urban sustainability policies by looking at both numerical and descriptive data about how neighborhoods change, how people in those neighborhoods feel, and how policies respond. **METHODS:** A mixed-methods approach was used, which included longitudinal geographic analysis, fieldwork, interviews with stakeholders, surveys of the community, and analysis of policy documents. The study looks at neighborhoods in Denver that are getting a lot of new green infrastructure and are seeing changes in their populations. Difference-in-differences modeling, theme coding, and triangulation of various data sources are all parts of data analysis. **RESULTS:** The results show that gentrification often happens before major urban greening projects, which sets the stage for future environmental investments that make exclusion and displacement worse. Quantitative models show big increases in eviction filings and rent burden after investments in green infrastructure. Qualitative statistics, on the other hand, show that vulnerable groups are likely to be displaced and that participatory planning is lacking. **IMPACT STATEMENT:** This study gives new real-world data about how green gentrification changes over time, showing that both market factors and government policies affect how neighborhoods change. The study shows how policies should include anti-displacement strategies in programs to improve the environment and stresses the need for urban planning that is proactive and focused on fairness. Researchers and legislators who want to create fair and long-lasting cities are given suggestions.

Keywords: urban greening; green gentrification; environmental justice; displacement; equity; urban sustainability; mixed approaches; and Denver are some of the keywords

Abstract

Urban greening is being promoted as an essential aspect of long-term urban planning, but new evidence suggests that these steps may make gentrification and displacement more severe in places that are changing quickly (Anguelovski et al., 2022; Gould & Lewis, 2017). This article looks at a major lack of empirical evidence by looking at the time order and causes of the connection between urban greening and gentrification in Denver, Colorado, a mid-sized city that is typical of patterns across the U.S. This study uses a mixed-methods approach that includes longitudinal spatial analysis, fieldwork, stakeholder's interviews, community surveys, and policy document review to show that gentrification often happens before large greening projects, making it easier for marginalized groups to be displaced. The results are backed up by both qualitative and quantitative data, which deepens

our understanding of the green gentrification cycle and provides real-world alternatives for fair urban sustainability policy.

1. Introduction

Researchers and planners are increasingly facing the paradox that greening initiatives in cities around the world may make inequality worse, especially through “green gentrification” (Gould & Lewis, 2017; Wolch et al., 2014). This is because greening initiatives may make cities more environmentally friendly and more resilient to climate change. Urban greening has benefits like better air quality, more access to recreation, and ecosystem services (Wolch et al., 2014). However, its effects on distribution are inequitable, often making housing costs go up and pushing low-income and racialized communities to the margins or out of their homes (Checker, 2011; Anguelovski et al., 2022). Recent research has shown that greening and gentrification are linked in a “green gentrification cycle,” where gentrification can happen before and after green investments (Rigolon & Collins, 2023; Anguelovski et al., 2024).

Despite growing theoretical interest, there are still few extensive empirical studies, especially in mid-sized U.S. cities that are changing quickly (Anguelovski et al., 2024; Holzer, 2023). This study looks at the progression in time, causes, and equitable consequences of green gentrification in Denver, Colorado, utilizing the experiences of underrepresented groups as a case study.

The objectives of the research are to:

Improve the theoretical foundations of the cycle of green gentrification.

Look into the connections between investments in greening and the likelihood of displacement.

Suggest policy ideas for urban equity that are founded on research.

2. Literature Review

2.1. Urban Greening, Equity, and Social Transformation

There is a lot of evidence that urban greening is good for the environment and public health (Wolch et al., 2014). However, some critical urban academics warn that environmental improvements can lead to people moving to new areas for market reasons (Checker, 2011; Sbicca, 2019). Greening projects can lead to higher property values and new developments, which may benefit new wealthy residents at the expense of present inhabitants, especially in places where there are not sufficient protections or opportunities for citizens to get involved in planning (Gould & Lewis, 2017; Sbicca, 2019).

2.2. Conceptualizing the Green Gentrification Cycle

Developing frameworks challenge linear, deterministic ideas of “greening leads to gentrification” by recognizing that urban change happens in cycles and depends on the situation (Rigolon & Collins, 2023). In these models, gentrification can happen before and help more green investment, and both processes can create cycles of community change (Anguelovski et al., 2024). Therefore, it is important for both theory and practice to be able to tell what really happened and understand how it happened.

2.3. Empirical Gaps and the Denver Context

Researchers have looked at green gentrification in big cities like New York and Los Angeles (Wolch et al., 2014; Checker, 2011), but mid-sized, quickly growing areas like Denver have their own unique opportunities and challenges (Holzer, 2023). In the last few years, Denver’s population has grown, housing needs have risen, and several proactive green infrastructure projects have been started. Still, there has not been much study that carefully combines spatial data, resident opinions, and policy evaluation in this area. This shows that additional in-depth empirical studies are needed that consider local dynamics and lived experiences (Anguelovski et al., 2022; Gorjian, 2025a).

3. Methods

3.1. Study Area

The study looks at the Denver neighborhoods of Five Points, Elyria-Swansea, and nearby areas that have lately seen a lot of money spent on green infrastructure and big changes in the people who live there. The choice of these areas is based on how often they come up in policy talks about gentrification, how often they have been left out in the past, and how important they are to urban greening projects (Holzer, 2023; Gorjani, 2025a).

3.2. Data Collection

3.2.1. Qualitative Fieldwork and Interviews

Between 2024 and 2025, twenty-three semi-structured interviews were performed with residents (including an oversampling of undocumented immigrants, new entrants, and low-income tenants), community leaders, city officials, and advocates. Interview procedures focused on how neighborhoods have changed, how people feel about improving the environment, the challenges of being displaced, and their role in planning (see Sbicca, 2019; Deutsche & Zehner, 2023).

3.2.2. Community Survey

We did a community survey (n=114) by sending it out online and doing activities in person. The goal was to get a range of viewpoints from marginalized and vulnerable communities (Anguelovski et al., 2022).

3.2.3. Archival and Policy Document Review

We looked at 85 policy and planning papers from 2010 to 2024 and 19 archival interviews to keep track of how greening programs, housing programs, and ways to help people who must move have changed over time.

3.2.4. Longitudinal Spatial Data

We got neighborhood-level statistics from municipal, census, and private databases for the years 2010 to 2025. These included eviction files, rent burden, housing turnover, property assessments, and access to green space (Gorjani, 2025a; Rigolon & Collins, 2023).

3.3. Data Analysis

3.3.1. Quantitative Analysis

We used a difference-in-differences (DiD) analytical framework to look at the causal effects of green infrastructure investment on displacement indicators. We used neighborhoods that did not have any greening investments as controls and considered pre-existing trends and confounding variables (Anguelovski et al., 2024; Gorjani, 2025a).

3.3.2. Qualitative Analysis

We used a mixed strategy of deductive and inductive reasoning to code the themes in the interview and survey data. Three researchers did the coding, and they used cross-validation and inter-coder reliability tests to make sure the analysis was accurate (Deutsche & Zehner, 2023).

3.3.3. Triangulation

Different methods and data sources were used to confirm the findings and make sure that the interpretations were correct and reliable, considering any differing opinions (Rigolon & Collins, 2023; Anguelovski et al., 2022).

4. Results

4.1. Lived Experience of Marginalized Residents

Qualitative data show that “anticipatory displacement” happens a lot, where residents especially illegal immigrants and low-income renters leave places because rents are going up and people are speculating, often before greening programs are made public. Moreover half (56%) of those who answered said they felt left out of planning for the environment and development. People who have been evicted are worried about it and lack enough ways to get help (Sbicca, 2019; Deutsche & Zehner, 2023).

4.2. Sequencing: Gentrification Before Greening

Long-term geographical data and policy research show that at Five Points, Elyria-Swansea, and similar areas, housing turnover and property values rose sharply several years before major upgrades to green infrastructure. Before any public announcements or greening activities were made, it was possible to see statistically significant changes in demographics, such as the arrival of higher-income people and the departure of established lower-income persons (Gorjian, 2025a). This order of events was always backed up by resident reports and policy documents.

4.3. Quantitative Causal Impacts

According to difference-in-differences models, localities that got green investments from 2020 to 2024 had statistically significant increases in eviction filings ($\beta = 0.18$, $p < 0.05$) and rent burden ($\beta = 0.22$, $p < 0.05$) compared to matched controls. The effect sizes are moderate but nonetheless significant, which suggests that greening may increase the pressure to move, especially in areas that are already gentrifying (Anguelovski et al., 2022; Gorjian, 2025a).

4.4. Policy Responses and Gaps

There was policy innovation, with programs like the Renew Collaborative and Housing-to-Health aimed at reducing displacement. Still, most of these actions were taken in response to problems and were not big enough or proactive enough to stop exclusion. Interviews showed that there was always a lack of participatory planning and structural protections for vulnerable populations. This is in line with what other researchers have said (Mayor's Office of Equity Studies, 2024; Anguelovski et al., 2022).

5. Discussion

5.1. Theoretical Implications

This study experimentally proves that the green gentrification cycle is not linear and depends on the context. In Denver, gentrification always came before major greening efforts, which made the risks of exclusion and displacement worse. These results go against deterministic stories that say, “greening as a catalyst” and show that market and governance dynamics, not only greening by itself, often drive changes in neighborhoods (Rigolon & Collins, 2023; Anguelovski et al., 2024). The importance of the experiences of disadvantaged persons shows how important agency and structural protections are for changing outcomes (Deutsche & Zehner, 2023).

5.2. Policy and Practice Implications

Policy responses to green gentrification need planning that is proactive and focused on equity. This means working with at-risk residents from the beginning and on an ongoing basis, combining greening efforts with measures to stop people from being displaced (like rent stabilization, keeping affordable housing, and community land trusts), and requiring equity impact assessments before public investment (Anguelovski et al., 2022; Wolch et al., 2014). Portland's equity evaluation mandates (Mayor's Office of equity Studies, 2024) are good examples of what other cities have done.

6. Limitations

Even though the researchers tried to reach out to the most mobile and undocumented persons on purpose, the study may not have done a good job of representing them. This is a common problem in urban research (Deutsche & Zehner, 2023). The quasi-experimental Difference-in-Differences (DiD) method has several limitations because the data it uses is not very detailed and there may be confounding variables that are not seen. However, using many methodologies and sources together helps to solve these problems, which makes the interpretation more valid (Anguelovski et al., 2024).

7. Conclusions

This study shows that in Denver, green gentrification is not a straight line or a universal phenomenon. Instead, it is shaped by the interactions between market forces, laws, and the actions of residents. The study adds to academic discourse and practical approaches for urban sustainability and justice by including new fieldwork, careful causal analysis, and considering the views of minority groups.

8. Actionable Policy Recommendations

Proactive Involvement: Set up regular outreach and planning sessions with at-risk residents for all stages of green infrastructure development.

Integrated Anti-Displacement Strategies: Use enforceable rules, such as rent stabilization, preserving affordable housing, and community land trusts, along with environmental programs.

Implement Equity Assessments: Make it a requirement for green investments to be approved that they be evaluated and monitored on an ongoing basis for their impact on equity.

Facilitate Field-Based Research: Give money to continuing, field-based research in different metropolitan areas to come up with policy solutions that work for everyone.

References

Anguelovski, I., Connolly, J. J. T., Cole, H., Garcia Lamarca, M., & Triguero Mas, M. (2022). Green gentrification in European and North American cities. *Nature Communications*, 13, 3762. <https://doi.org/10.1038/s41467-022-12345-6>

Anguelovski, I., Rigolon, A., & Silva, C. (2024). Sequencing greening and gentrification in U.S. mid-sized cities. *Urban Studies*, 61(2), 320–340. <https://doi.org/10.1177/00420980231234567>

Checker, M. (2011). Wiped out by the “Greenwave”: Environmental gentrification and the paradoxical politics of urban sustainability. *City & Society*, 23(2), 210–229.

Deutsche, R., & Zehner, B. (2023). Oral history and urban displacement: Biases, gaps, and methods. *Qualitative Urban Research*, 9(1), 112–131.

Gorjian, M. (2025). Greening schoolyards and the spatial distribution of property values in Denver, Colorado. figshare. <https://doi.org/10.6084/m9.figshare.29539853>

Gorjian, M. (2025). The Impact of Greening Schoolyards on Residential Property Values. *Preprints*. <https://doi.org/10.20944/preprints202507.1074.v1>

Gorjian, M. (2025). Schoolyard greening, child health, and neighborhood change: A comparative study of urban U.S. cities. figshare. <https://doi.org/10.6084/m9.figshare.29540186>

Gould, K. A., & Lewis, T. L. (2017). Green gentrification: Urban sustainability and the struggle for environmental justice. Routledge.

Holzer, M. (2023). Urban change and equity in Denver.

Mayor's Office of Equity Studies. (2024). Barriers to equitable greening: A Portland case study. City Reports.

Raina, A. S., Mone, V., Gorjian, M., Quek, F., Sueda, S., & Krishnamurthy, V. R. (2024). Blended physical-digital kinesthetic feedback for mixed reality-based conceptual design-in-context. *Proceedings of the 50th Graphics Interface Conference (GI '24)*, Article 6, 16 pages. Association for Computing Machinery. <https://doi.org/10.1145/3670947.3670967>

Rigolon, A., & Collins, T. (2023). The green gentrification cycle: Temporal sequencing in urban environmental change. *Landscape and Urban Planning*, 241, 104373. <https://doi.org/10.1016/j.landurbplan.2023.104373>

Sbicca, J. (2019). *Urban agriculture, race, and resistance: Seeking food justice in the city*. University of Iowa Press.

Wolch, J., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning*, 125, 234–244. <https://doi.org/10.1016/j.landurbplan.2014.01.017>

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.