Greenspace access in the Denver metro region: historical housing policy impact on modern greenspace distribution

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Abstract

Access to urban greenspaces is often unequal, with disparities being linked to race, socio-economic status, age, and geography. In recent years, there has been an increase in interest in greenspace access in the environmental field, but much of that work has been done internationally. This paper examines greenspace access in the Denver Metro Region (DMR) with a particular focus on how historical housing policies are connected to modern inequities. With the City and County of Denver and surrounding areas serving as a case study, this paper uses mapping tools such as the Trust for Public Lands' ParkServe tool, U.S. Census Data, and redlining maps to examine where inequalities in park access exist and how those inequalities correlate with historically targeted minority communities. Although on its face the DMR has high levels of greenspace access, the areas without access are highly concentrated in minority, low-income, and elderly communities. These areas also align with historically redlined communities and areas that have had discriminatory housing policies and zoning. To improve access to greenspace for affected communities, municipalities can implement needbased greenspace planning and emphasize community-driven planning processes.

Keywords: environment, equity, justice, greenspace, access

1 INTRODUCTION

Scholars across the field have consistently shown that access to urban greenspace is unequal and often shaped by race, class, and geography. Studies in U.S., European, and South American cities have shown that people of color, specifically Black, Hispanic, and Indigenous communities, often face the greatest disparities in access to urban greenspaces[1,2,3,4,5]. At the same time, older adults have consistently less access to urban greenspaces. Evidence suggests that exposure to green spaces is particularly important for this group as the social, pchysical, and mental benefits can greatly improve their quality of life. More specifically, access to green spaces can reduce social isolation for older adults.

These inequalities are not only social, but also spatial. In studies of cities in Brazil and China, researchers found distributional inequalities between residents living in the center of cities and those on the peripheries. Residents in the center of the cities tended to have greater access to greenspace, and those on the peripheries, who were more likely to be racial minorities in the case of the Brazilian studies, tended to have less access.[1,6] Recent findings about social and spatial inequalities in greenspace access have challenged historical approaches to greenspace provision. The most common approach to greenspace distribution is a standards-based approach: this applies universal standards to entire areas without regard to geographic and demographic differences within cities.[7,8] Instead, scholars advocate for a transition to needs-based and community-input driven models. These models more intentionally bring in community perspectives and the individual needs of areas.[7]

In all, the field of study surrounding greenspace accessibility calls for a social justice approach to greenspace provision. Through the study of social and spatial disparities, government officials, community leaders, and researchers can better understand the realities of greenspace access in their communities. Governments and municipalities should engage meaningfully with community input and approach greenspace allocation with an environmental justice lens to more equitably distribute greenspace and increase its community utility. This study aims to bring this social justice approach to the Denver Metro Region and highlight the connection between historical housing policy and present greenspace realities.

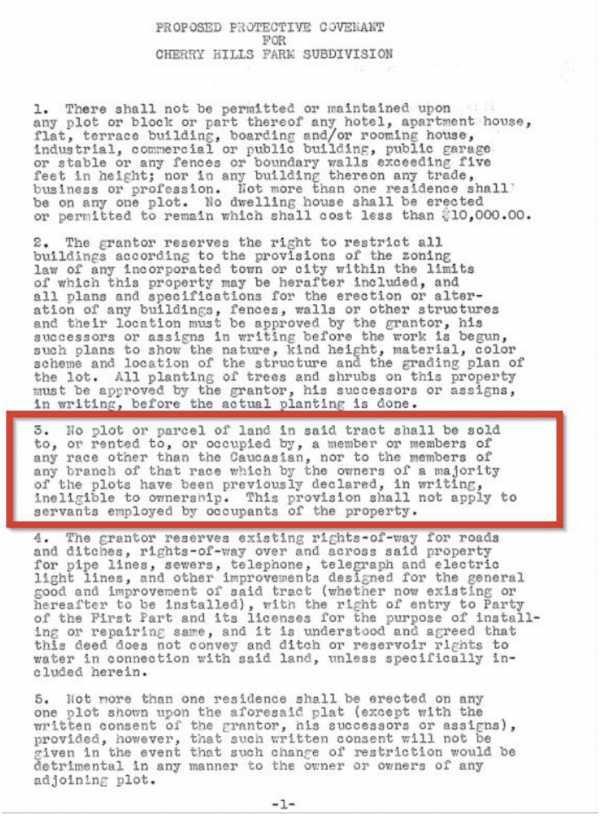
1.1 Historical Context

In the City of Denver, parks have historically been funded by property taxes. In the early years of the CCD's investment in parks, the city was divided into four districts, with more money being given to the areas that paid more in property taxes. These areas were most often made up of white and wealthy residents. Because of this, parks established in these areas tended to be bigger and better maintained. Furthermore, the housing practices around those parks tended to exclude non-white citizens. In the period from around 1902 to 1945, CCD's parks were tax-funded. Zoning policies around parks, such as "Residential A" zoning classifications, required large, single-family homes to be built on large lots. Often, these zoning classifications were highly centered around parks. And created areas with high density of expensive and large homes.[5] Because of zoning practices such as "Residential A" zoning, people of color were often priced out of the areas surrounding the biggest and highest quality parks.

In the Post-War-Era, from around 1945 to 1982, white residents started to leave Denver proper in favor of newly emerging suburbs. This, in turn, lowered property tax revenues, and encouraged disinvestment in public parks.[5] As "white flight" continued, more people of color gained access to parks, but the parks became increasingly underfunded. In this era, the lowest income communities and many communities of color remained in areas of the city that were heavily industrialized and lacking in greenspaces. Additionally, the suburbs that were largely zoned using covenants often prevented white homeowners from selling to people of color. Some of these covenants even date back to the 1920s.

For example, Cherry Hills Village proposed one such covenant (Figure 1) in 1922 aimed to prevent people of color from moving into the area.[9] These practices had lasting effects, with people of color still often being underrepresented in areas such as Cherry Hills Village, with the area being made up of around 87% white residents according to the 2020 census.[10]

In the modern era, 1983 to present, some demographic change occurred, however the largest and best quality parks tended to be inaccessible for people of color, older populations, and low-income communities. Additionally, the CCD has created modern investments in parks, which are often meant to be "urban marketing tools" that aim to drive up property taxes and attract new, often wealthy, residents. Modern development and greening projects, aimed at driving up property tax revenue, have further pushed vulnerable groups out of their communities.[5] These projects mirror those in other cities studied by other scholars. In Shanghai, practices like "green gentrification" and bad faith greening have been found to increase the cost of living in previously inexpensive areas, pushing people out in favor of more wealthy residents.[6] Additionally, shifts in funding sources for parks from property taxes to bonds and grants have introduced new issues of access and equity. Because of the organizing and consistent engagement it takes to get a community bond issue passed and to apply for and receive grants, under-resourced communities may have less access to these funding sources. This has the potential to greatly impact the greenspace development of these communities.



PROPOSED PROTECTIVE COVENANT
FOR
CHERRY HILLS PARK SUBDIVISION

1. There shall not be permitted or maintained upon any plot or block or part thereof any hotel, apartment house, flat, terrace building, boarding and/or rooming house, industrial, commercial or public building, public garage or stable or any fences or boundary walls exceeding five feet in height; nor in any building thereon any trade, business or profession. Not more than one residence shall be on any one plot. No dwelling house shall be erected or permitted to remain which shall cost less than $10,000.00.

2. The grantor reserves the right to restrict all buildings according to the provisions of the zoning law of any incorporated town or city within the limits of which this property may be herafter included, and all plans and specifications for the erection or alteration of any buildings, fences, walls or other structures and their location must be approved by the grantor, his successors or assigns in writing before the work is begun, such plans to show the nature, kind height, material, color scheme and location of the structure and the grading plan of the lot. All planting of trees and shrubs on this property must be approved by the grantor, his successors or assigns, in writing, before the actual planting is done.

3. No plot or parcel of land in said tract shall be sold to, or rented to, or occupied by, a member or members of any race other than the Caucasian, nor to the members of any branch of that race which by the owners of a majority of the plots have been previously declared, in writing, ineligible to ownership. This provision shall not apply to servants employed by occupants of the property.

4. The grantor reserves existing rights-of-way for roads and ditches, rights-of-way over and across said property for pipe lines, sewers, telephone, telegraph and electric light lines, and other improvements designed for the general good and improvement of said tract (whether now existing or hereafter to be installed), with the right of entry to Party of the First Part and its licenses for the purpose of installing or repairing same, and it is understood and agreed that this deed does not convey and ditch or reservoir rights to water in connection with said land, unless specifically included herein.

5. Not more than one residence shall be erected on any one plot shown upon the aforesaid plat (except with the written consent of the grantor, his successors or assigns), provided, however, that such written consent will not be given in the event that such change of restriction would be detrimental in any manner to the owner or owners of any adjoining plot.

-1-

Figure 1. Covenant proposed in Cherry Hills Village in 1922 featuring racial restrictions on property ownership.

The City of Denver's historical policies continue to affect taxation and park funding, and therefore the racial and socio-economic makeup of the city. When compared to the "Mapping Inequality" map of the CCD's historic redlining practices (Figure 3) with ParkServe's greenspace map (Figure 2), similarities show through. Denver's redlining practices designated many sections of the city as "Definitely Declining" and "Hazardous." These designations were deeply harmful and largely based on the racial and ethnic makeup of the city. More specifically, these harmful practices targeted people from the Black, Jewish, and Latino communities. Areas in the central, eastern, northern, and southeastern parts of the city were the most extremely redlined, preventing the residents of these communities from accessing things like home loans and insurance, perpetuating

racial and economic inequality. On the ParkServe map, these are also the areas that most consistently have poor access to public green spaces.

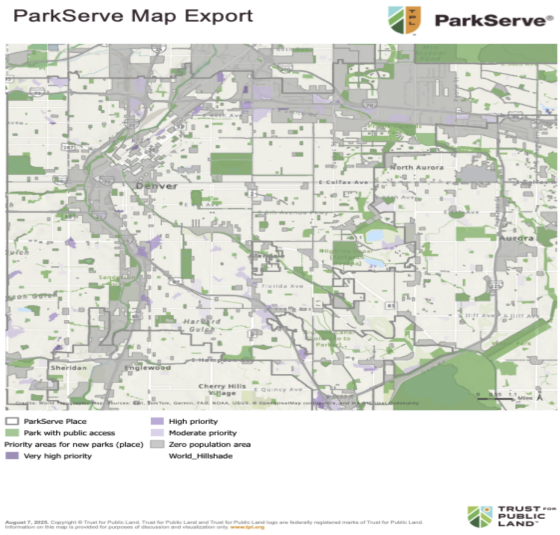


Figure 2. Map showing both the existing parks in Denver and the areas without access to greenspace.

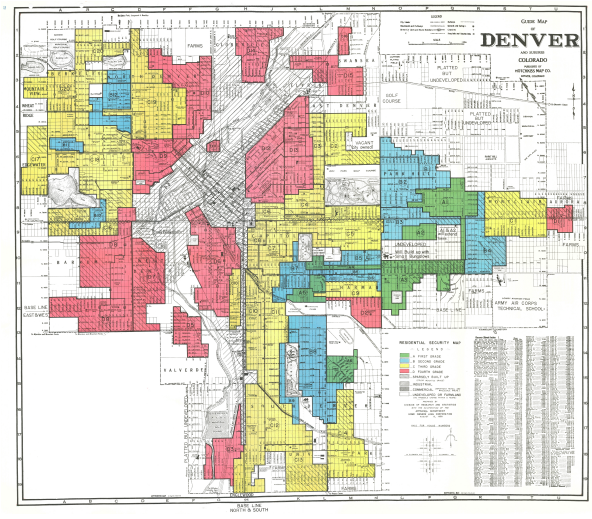


Figure 3. A Mapping Inequality map showing the areas that were historically racially redlined.

2 DENVER CASE STUDY

Urban green spaces are much more than neighborhood beautification projects, often serving as vital 3rd spaces for youths and older populations, offering areas for exercise and recreation, and increasing environmental resilience.[11] Yet, across U.S. cities, access to these urban amenities is often unequal, shaped by complex histories of racially discriminatory policies, economic disparities, and uneven development. The Denver Metro Region (DMR), a rapidly growing and diversifying metroplex, primarily made up of the City and County of Denver (CCD), and Arapahoe, Jefferson, Adams, Douglas, and Broomfield counties, presents a compelling case to study these dynamics.

How are green spaces distributed in the DMR? How do factors such as race, socioeconomic status, age, historical context, and geographical location impact this distribution and access? This paper explores the social, historical, and geographic realities of DMR greenspace provision. Using academic sources and publicly available maps, including historical and contemporary maps related to greenspace provision and discriminatory housing policies, the paper identifies patterns of inequality, areas of policy success, and opportunities for improvement. Through this, it offers a nuanced review of how past and present policies across policy areas continue to affect greenspace access in the region.

3 METHODOLOGY

How are green spaces distributed in the DMR? How do factors such as race, socioeconomic status, age, historical context, and geographical location impact this distribution and access? This paper explores the social, historical, and geographic realities of DMR greenspace provision. Using academic sources and publicly available maps, including historical and contemporary maps related to greenspace provision and discriminatory housing policies, the paper identifies patterns of inequality, areas of policy success, and opportunities for improvement. Through this, it offers a nuanced review of how past and present policies across policy areas continue to affect greenspace access in the region.

Spatial data were sourced from the Trust for Public Lands' (TPL) ParkServe tool. Redlining information and maps were pulled from the University of Richmond's "Mapping Inequality" tool. Textual sources were collected from various peer-reviewed academic journals, informing the approach to spatial data and mapping resource collection. Finally, demographic data was gathered from the U.S. Census Bureau's 2020 census.

While the data used in this paper are pulled from various sources, the recency and reliability of each of the sources support the credibility of the findings. Data from the ParkServe database, created from the Environmental Systems Research Institute's (ESRI) software, highlight areas of need in the DMR, and demographic data of the people who live in those areas. Park amenity data and climate data were pulled from the Open Street Map and the EPA, respectively.[12] Further information on the origins of ParkServe data can be found on the TPL website. U.S. Census data used in this paper was from the 2020 census. Finally, the historical maps from "Mapping Inequality" were compiled in the summer of 2023 but span from different years. The CCD maps were

created in the 1930s by the Home Owners'Loan Corporation.[13] Because of limited availability of zoning maps and early policy realities of other DMR municipalities, "Mapping Inequality" only featured a map of the cities of Boulder and Denver. This limits the ability to connect historical housing and zoning policies to greenspace access in suburban areas. Additionally, some areas with low population density were marked as high-priority areas on ParkServe. To ensure that areas with little to no population were not used as data for this paper, the "Population Density" and "Zero Population Zone" filters were used on all areas of high priority.

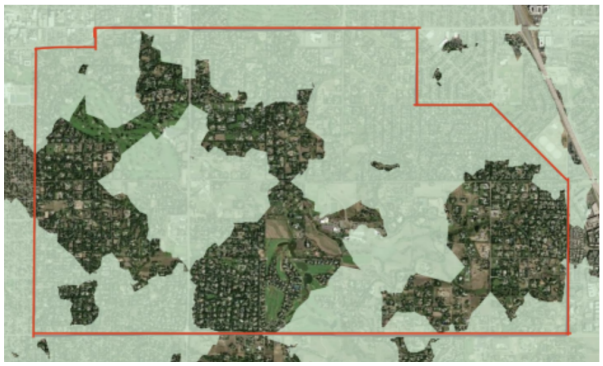


Figure 4. *ParkServe* map of Cherry Hills Village, Colorado. All non-highlighted areas have limited access to public green spaces, yet satellite imagery shows they are largely green and include a golf course and the High Line Canal Trail.

4 RESULTS

Based on maps from ParkServe and "Mapping Inequality," this section delves into the demographic, geographic, and accessibility trends for green spaces in the DMR. Through analysis of the CCD's ParkServe map, several of these trends became clear. The ParkServe tool has three base filters meant to highlight the overall quality of a given city's parks. These filters are "Park with Public Access," "10-Minute Walk Service Area," and "Priority Areas for New Parks." Together, these three filters provide a surface-level understanding of where parks are, how easily community members can access them, and where areas of growth are. On this surface level, the CCD appears to have been relatively successful at providing parks for the majority of its residents. According to the ParkServe tool, 96% of Denverites have a park within a 10-minute walk of their homes. Areas in southern and northern CCD tend to have the highest number of "priority areas," while areas in central, eastern, and western CCD tend to have the lowest needand highest access to parks. Importantly, these areas of high need are not always void of greenspace. As the TPL requires an area to "be located outdoors, be a named destination (e.g. not an unnamed median or drainageway), encourage informal public use (e.g., the public is encouraged to walk through and stay awhile), and encourage at least one 'park-like' activity such as socializing, enjoying nature, or play/exercise," some green areas are not included in their analysis of DMR greenspace access. Some areas identified on the TPL map as having a need for greenspaces are private areas with plentiful greenspace. This includes areas near golf courses, private developments with large lots, etc. This trend of private greenspace is particularly present in suburban areas around the CCD. One example of these areas is Cherry Hills Village (Figure 4). On the ParkServe map, the suburb is marked as having a high need for greenspace. However, this is misleading because Cherry Hills Village, the area outlined in red, has ample greenspace, large lots, and generally has its greenspace needs met through private areas. The areas not highlighted in light green are areas marked as in need of green spaces. Through satellite mapping those areas are clearly green, and the town has a lot of large open greenspaces.[12]

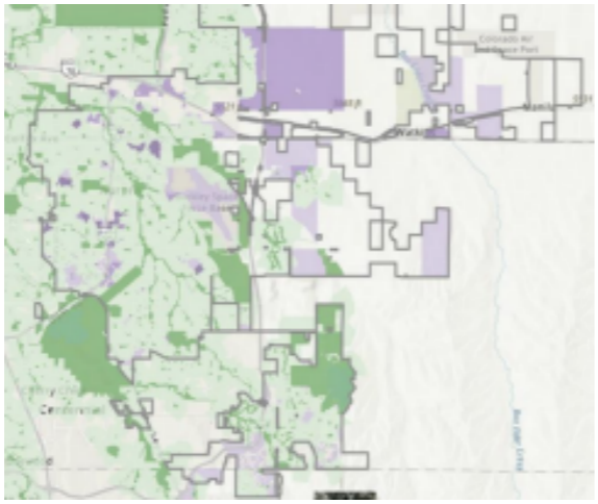


Figure 5. *ParkServe* map of greenspace access in Aurora, Colorado.

5 DISCUSSION

Through detailed analysis of the ParkServe map, it is clear greenspace in the Denver Metro Region is unequal. Members of minority and marginalized groups often live in the areas with the least access to public greenspaces. These findings suggest that, while the DMR has relatively good access to public green space, areas with high populations of racial and economic minorities tended to have the least access. This means these groups are likely to have less access to the physical, emotional, and social benefits associated with park access.

These trends largely align with those found in other studies of other cities. Rigolon et al. Found in their 2018 study that many U.S. cities face similar challenges when

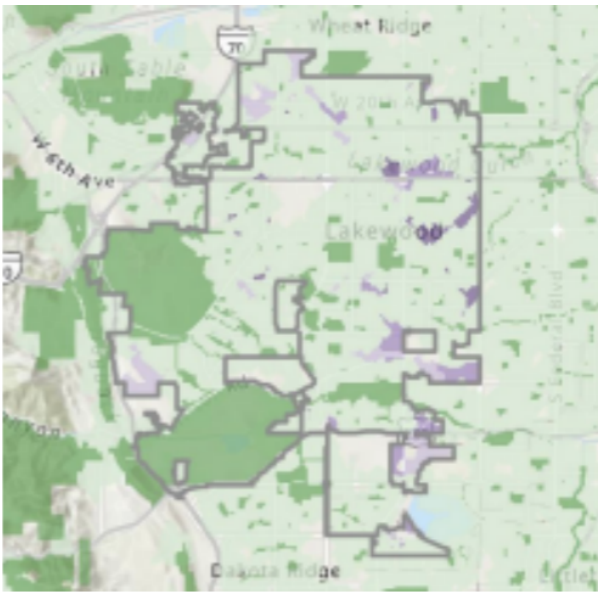


Figure 6. *ParkServe* map of greenspace access in Lakewood, Colorado.

Figure 7. *ParkServe* map of greenspace access in Sherrelwood, Colorado.

it comes to greenspace provision. They cited changes in funding mechanisms as a main factor contributing to these trends.[4] A case study of Miami found non-Hispanic White to be the group with the most access to greenspace. Moreover, they found that Hispanics, non-Hispanic Blacks, and Indigenous populations had the least access.[2] These trends are also not just contained to a U.S. context. In studies conducted in China and Brazil, researchers found patterns similar to those present in the ParkServe map. They found the peripheries of cities to have the most scarcity of public greenspaces. Within these areas, they also found thatracial and ethnic minorities, low-income communities, and older populations commonly had the least access.[1,6] Chen also found that urban greening practices and green gentrification were leading to vulnerable populations being pushed from their communities in favor of wealthier populations.

There are various possible roots for these issues. In the context of the City of Denver, one possible root is the city's history of discriminatory housing policy. As previously noted, redlining policies significantly affected minority communities in Denver. These policies often prevented marginalized groups living in redlined communities from accessing things like home loans and insurance, greatly reducing economic mobility for years to come. Studies have found connections between redlining policies and household income, poverty levels, incarceration rates, and even family structure.[14] These effects reproduce harmful cycles in historically redlined communities. Because of these economic realities, many communities in these redlined areas are unable to move to greener, more environmentally resilient neighborhoods, which have already been established as whiter and wealthier. Another possible reason for these trends are historical zoning laws, such as "Residence A" zoning. In Denver, this zoning term and others like it were intended to prevent smaller, cheaper housing from being built on the peripherals of parks. Exclusionary zones were established around many of Denver's largest parks in the 1940s. For example, much of the land around Washington Park and City Park, two large parks in CCD, was zoned with exclusionary subdivision policies, greatly limiting the type of housing that could be built in those areas.[5]

Outside of historical policies, various authors point to modern policy and incentive causes for unequal greenspace distribution. One modern cause is the approach officials take when determining where parks should be located. Many cities use standards-based approaches, which enact rigid benchmarks for greenspace provision and distribution. Often the rigidity of these standards prevents community-level nuances from being taken into account during the planning and construction of parks. Other approaches to greenspace provision take a needs-based approach. This helps to mitigate the negative effects of the standards-based approach by highlighting the different needs of each community. While this addresses the needs of individual communities, it can fail to recognize the competing and intersectional interests of community members.[7] To minimize these effects, a community input approach may be implemented after the initial needs assessment. In the City of Englewood, Colorado, a parks bond was recently approved by voters. This bond not only featured community input for its initial passage, but also community meetings, city surveys, and other public participation measures. These measures are aimed at ensuring both equitable distribution of public funds, and that community needs are met.[15] This project is

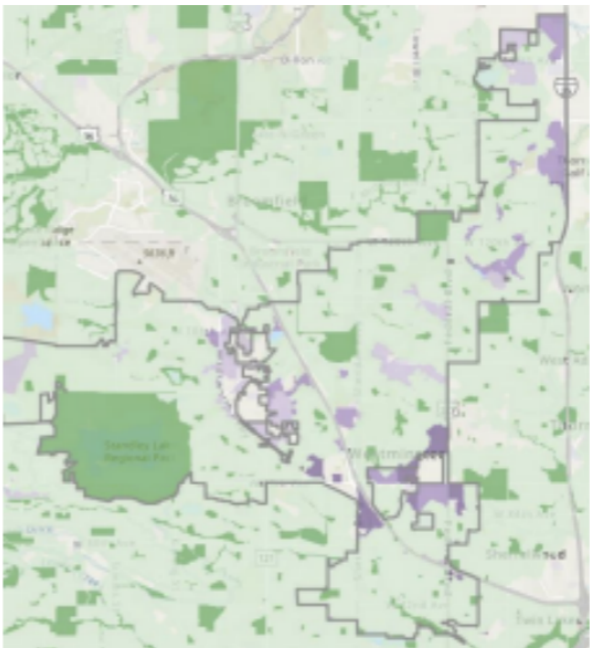


Figure 8. *Parkserve* map of greenspace access in Westminster, Colorado.

an example of a synthesis of a needs assessment and community-engaged approach to park planning and distribution. While this approach is largely more equitable, for communities with high numbers of low-income residents, community participation may not be as viable a solution.

6 CONCLUSION

Historical housing policies, as well as the approaches taken by cities when planning and funding greenspaces, have lasting impacts on the accessibility of said greenspaces for underrepresented communities. As found by a variety of other researchers in cities around the world, funding mechanisms and approaches to planning further gaps between various marginalized groups. In the DMR, racial and socio-economic factors played a significant role in one's access to greenspace. Additionally, geographic and age-based patterns of greenspace access held true in the CCD. Through analysis of maps highlighting areas that are lacking in greenspace and historically redlined areas, a connection became apparent. These divisions were furthered by the mechanisms governments used to determine where greenspaces were needed and the ways they funded them. In a broader sense, these findings show a clear trend of people of color and those of a low socio-economic status having less access to greenspaces, and therefore less access to the benefits they provide. These communities are less able to have essential third spaces and experience the social, mental, and physical benefits of greenspaces. Through the implementation of social justice-based and community input-driven approaches, communities in the DMR and elsewhere may be able to better accommodate communities of color and low-income residents. In the future, more work can be done to determine the realities of these approaches and the overall access and utility of spaces planned using these methods.

7 LIMITATIONS

Given the large area of the DMR, a deeper analysis of the area's park distribution andequity may be needed. ParkServe, a helpful tool for understanding urban green spaces, is not perfect. As already acknowledged, ParkServe tends to highlight little or no population areas as in need of greenspace. It also does not take into account private green spaces and the accessibility of those areas. Both issues can be addressed using other park serve tools. On the map, there is a "Zero Population" filter that can be applied to account for those areas. The satellite view may be useful in determining when private green spaces may be located in high-priority areas, however more research is needed to determine the accessibility of these areas. Additionally, the mere presence of green space does not guarantee accessibility. Factors such as physical and mental disability accommodations and public access points can determine the actual accessibility of these areas. Additionally, park amenities are important to encourage use of public greenspaces. Often, these areas act as third spaces for community groups. Because of this, community-specificamenities should be installed in parks. An area of further study could be the actual use of parks, the presence of amenities in said parks, and the community's impressions of those amenities. Finally, "Mapping Inequality" as a limited selection of zoning maps. Many of the suburban areas around the CCD relied on covenants to establish building practices. While some covenants were located and discussed, further research into these documents is needed to understand their effects on marginalized communities as they relate to greenspace access.

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9 EDITOR'S NOTES

This article was peer-reviewed.

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