

THE POWER OF PARKS:
ENVIRONMENTAL JUSTICE IN THE
CONTEXT OF GREEN SPACE
ACCESSIBILITY AND DISTRIBUTION

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AUTHOR NOTE

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ABSTRACT

Urban green spaces are critical to the development and maintenance of urban ecosystems. The development and siting of urban green spaces impact a city and its residents. Urban green spaces promote physical activity and improve psychological wellbeing. These spaces also cultivate a myriad of social, cultural, and economic benefits. The issue that now faces municipalities and decision makers, is green space accessibility and distributional equity. The great migration, white flight, and the historical context of redlining segregated African Americans and other minority groups which in turn created urban environments that have pockets of “ghettos” whose residents are often socio-economically disadvantaged. These areas are often underfunded, overlooked and underserved. These communities tend to lack access to urban green spaces and therefore do not reap their many environmental, physiological, social, cultural, and economic benefits. This practicum is a comprehensive literature review that assesses relevant scholarly articles and analyzes the effect of inequity in accessibility and distribution of green spaces on marginalized populations from an environmental justice lens. Based on data and information gathered, it can be concluded that the residents of neighborhoods where urban green spaces are sparse or nonexistent, many of whom are African American and low income, are at a disadvantage because urban green spaces play an indispensable role in urban ecosystems, the mitigation of climate change, socialization, physiological health, and economic prosperity.

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The Power of Parks:
Environmental Justice in the Context of Green Space Accessibility and Distribution

I. INTRODUCTION

Urban green space provides a number of ecosystem services that can help communities mitigate the effects of climate change.

Urban green space also yields public health and economic benefits. Urban green space is a catalyst for innovation in how climate change mitigation and adaptation is approached at a community level. According to a 2017 brief by The World Health Organization's Regional Office for Europe, "Green spaces and other nature-based solutions offer innovative approaches to increase the quality of urban settings, enhance local resilience and promote sustainable lifestyles, improving both the health and the well-being of urban residents. Parks, playgrounds or vegetation in public and private places are a central component of these approaches and can help to ensure that; urban residents have adequate opportunities for exposure to nature; urban biodiversity is maintained and protected; environmental hazards such as air pollution or noise are reduced; the impacts of extreme weather events (heatwaves, extreme rainfall or flooding) are mitigated; the quality of urban living is enhanced; and the health and well-being of residents is improved."¹

Dr. Robert Bullard is considered the father of the environmental justice movement. Since its inception in 1979, the environmental justice movement has been championed primarily by African Americans, Latinos, Asians, Pacific Islanders, and Native Americans. Dr. Bullard is famously quoted as saying "Whether by conscious design or institutional neglect, communities of color in urban ghettos, in rural 'poverty pockets,' or on economically impoverished Native-American reservations face some of the worst environmental devastation in the nation."²

Executive Order 12898 *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, was signed into law in February of 1994. It directed federal agencies to develop environmental justice strategies to help federal agencies address disproportionately high and adverse human health or environmental effects of their programs on minority and low-income populations.³ The executive order established an *Interagency Working Group* on environmental justice (EJ IWG). The EJ IWG was chaired by the EPA administrator and made up of 11 department or agency heads and several executive branch members from the white house. It now includes 17 agencies and holds monthly meetings about working collaboratively to reach the EPA's environmental justice goals.²

Environmental justice can be framed in the context of green space distribution and accessibility equity. Communities of color and/or low income are disenfranchised of access to urban green spaces and their associated benefits as they are disproportionately located in affluent areas, and communities of color and/or low income.

II. METHODOLOGY

This report is a comprehensive literature review of urban green space benefits, and accessibility and distribution from an environmental justice lens. I methodically read and analyzed more than 60 scholarly articles whose contents included environmental, social, cultural, and economic urban green space benefits, the history of environmental justice, acts of environmental injustice throughout the United States, studies done on urban green space accessibility and its effects on communities, and environmental justice in the context of green space distribution.

I reviewed the content of all scholarly articles and synthesized data from research and studies. I shared the history of environmental justice in the United States, and then summarized the benefits of urban green space to expose how communities that lacked urban green spaces were being marginalized. I framed environmental justice in the context of urban green space accessibility and distribution through studies that provided data on the association between health and urban green space. Based on my understanding of all documents reviewed, I made recommendations on how to develop urban green spaces in communities without creating an issue of eco-gentrification.

III. ENVIRONMENTAL JUSTICE

The Environmental Protection Agency (EPA) defines environmental justice (EJ) as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.”² Often times, communities of color and/or low income bear a disproportionate share of negative environmental consequences. The EPA seeks to ensure that individuals have meaningful involvement in environmental decisions being made in or around their community, that can impact their physiological health, overall well-being, and quality of life. Meaningful involvement from the EPA’s perspective includes community concerns being weighed in the decision-making process, and decision makers seeking out and facilitating the involvement of those potentially affected.²

Unfortunately, there are countless examples of environmental injustice throughout American history; from Hurricane Katrina and Cancer Alley, to as recently as the Flint Water Crisis. The gulf south had a long history of racial segregation and poverty prior to the treacherous hurricane of 2005. This racial segregation established African American communities in poverty-stricken, less desirable, flood-prone areas.⁴ Hurricane Katrina exasperated these social and economic disparities, as people of color and/or low income living in those areas bore the brunt of the hurricane’s effects. *Cancer Alley* is a community in Louisiana along the lower Mississippi River that in the antebellum south, was made up mostly of plantations upkept by enslaved Africans. Today, the community is still made up mostly of low-income African Americans, and is home to nearly 150 oil refineries, plastic plants, and chemical facilities. These facilities release carcinogens and air and water pollutants that have put community members at disproportionate risk for cancer, respiratory diseases and other health problems.⁵ The Flint Water Crisis was an egregious act of environmental injustice and neglect. Government officials were incredibly slow to act, which resulted in the poisoning of the city’s water supply and the subsequent health issues that the city’s whose population is more than 54% African American faced.⁶

Outside of these specific acts of environmental injustice, there are everyday occurrences that are affecting communities. One of these occurrences is green space accessibility and distribution equity. Green spaces promote psychological and physical well-being, and provide social, cultural, and economic benefits to communities, and it is essential that communities of color and of various socio-economic backgrounds have equal access to these benefits.

IV. GREEN SPACE

Green space is land that is partially or completely covered with grass, trees, shrubs or other vegetation.⁷ *Urban green space* can be used to describe a myriad of places such as parks and reserves, community gardens, sporting fields, green roofs, urban forests and woodlands, riparian areas like streams, ponds and riverbanks, street trees, nature conservation areas, greenways and trails, green alleyways, cemeteries and green walls.⁸ Essentially, urban green space can be defined as urban land covered in vegetation and/or water features of any kind.

Urbanization refers to cities growing as a result of the shift in populations from rural to more urban areas. This results in an increase in the number of people living in cities, which can further exacerbate effects of climate change on cities and their residents.⁹ Urban living can increase exposure to environmental hazards such as air and noise pollution. Cities face increasing pressure to provide healthy, stable, and sustainable living environments, due to growing populations, limited resources, and effects of climate change. City living can often limit access to nature and all its inherent benefits, and urban green space is a solution to this problem.

Urban green space is a proponent of green infrastructure. The *Water Infrastructure Improvement Act* enacted by the United States Congress in 2019 defines green infrastructure as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters."¹⁰ Green infrastructure provides nature-based solutions to environmental issues. At a city-wide level, elements can be woven into urban communities, like a row of trees along a major city street or greening an alleyway. Neighborhood scale green infrastructure could include acres of open park space outside a city center, planting rain gardens or constructing a wetland near a residential housing complex.¹⁰

Green spaces have been proven to be incredibly beneficial to communities and community members across the United States. Urban green spaces can provide critical ecosystem services, public health benefits, and be of social/cultural, and economic value to the communities in which they are located.

BENEFITS

ENVIRONMENTAL

Urban green spaces play a critical role in green infrastructure and can improve air and water quality in several ways. *The Clean Air Act (CAA)*¹¹ was enacted in 1970. Due to the fact that it authorizes the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS), the CAA resulted in a major shift in the role that the government played in air pollution control. NAAQS help to regulate emissions of hazardous air pollutants which works to protect public health and welfare. There are seven air pollutants that The Clean Air Act identifies as harmful to human health – ground-level ozone, lead, carbon monoxide (CO), nitrous oxide (NO₂), sulfur dioxide (SO₂), volatile organic compounds (VOCs) and particulate matter.¹¹ Ground-level ozone is the most palpable pollutant and is incredibly pernicious to children and individuals that frequent outdoors. Ozone can aggravate the lungs and increase susceptibility of respiratory infections and diseases. Adverse health effects have been linked to ambient levels of ultrafine particles in the atmosphere, including inflammation and cardiovascular function.¹¹ Trees play a critical role in maintaining air quality in urban areas. There are four main ways that trees affect air quality; temperature reduction and other microclimatic effects, removal of air pollutants, emission of volatile organic compounds and tree maintenance emissions, and energy effects on buildings.¹²

Afforestation and reforestation are the processes by which trees are planted or re-planted into an area where there either were not trees before, or where trees had been removed. Trees fix carbon during photosynthesis and store it as biomass. Trees in urban areas also store and sequester carbon as they grow. Urban trees influence local climate, carbon cycles, energy use, and in turn, carbon change.¹³ The table below represents the results from a field study done on urban forests across 28 cities and 6 states to determine carbon storage and sequestration estimates. This can be used to assess the actual and potential role of urban forests in reducing atmospheric CO₂.¹³ They first used photointerpretation of tree cover in urban areas to determine carbon densities per unit of tree cover, and statewide urban forest carbon values.¹³

Urban forest structure – tree species composition, and number of trees on all land uses has an impact on carbon storage and sequestration, so that was also taken into consideration. Data was collected through random sampling of .04 ha (1/10 ac) plots in cities, and .067 ha (four 1/24 ac sub-plots) plots in cities. The sampled plots were analyzed using the i-Tree Eco model.¹³ The data collected included tree species, stem diameter (at 1.37m above the ground (DBH)), tree and crown height, crown width, crown light exposure, and canopy condition. Carbon storage and annual sequestration for each tree were estimated using biomass and growth equations.¹³ Biomass for each measured tree (minimum tree size =2.54cm dbh) was calculated using allometric equations and conversion factors. These equations were used to calculate whole tree dry weight biomass and carbon. “To estimate monetary value associated with urban tree carbon storage and sequestration, carbon values are multiplied by \$78.5 per tonne of carbon (range 1/4 \$17.2e128.7 tC¹) based on the estimated social costs of carbon for 2010 with a 3% discount rate (Interagency Working Group, 2010).”¹³

“Average carbon storage per square meter of tree cover varies by sampled city and state (Figure 1). Overall carbon storage averaging 7.69 kg Cm⁻² (SE =1.36), gross carbon sequestration rate

averaging .277 kg Cm⁻² year⁻¹ (SE 1/4 0.045), and net carbon sequestration rate averaging 0.205 kg Cm⁻² year⁻¹ (SE 1/4 0.041). The net sequestration rate averages 74% of the gross sequestration rate. Total carbon storage and sequestration rates in urban and urban/community areas also varied among the United States (Table 3) with total urban tree carbon storage estimated as 643 million tonnes (SE 1/4 23.8 million; value 1/4 \$50.5 billion) and total urban/community tree carbon storage estimated as 1.36 billion tonnes (SE 1/4 57.0 million; value 1/4 \$106.9 billion). Annual gross carbon sequestration is 25.6 million tonnes year⁻¹ (SE 1/4 1.0 million; value 1/4 \$2.0 billion) in urban areas and 50.3 million tonnes year⁻¹ in urban/community areas (SE 1/4 1.8 million; value 1/4 \$4.0 billion). Annual net carbon sequestration is 18.9 million tonnes year⁻¹ (SE 1/4 862,000; value 1/4 \$1.5 billion) in urban and 37.2 million tonnes year⁻¹ in urban/community areas (SE 1/4 1.7 million; value 1/4 \$2.9 billion).”¹³

Based on the results in Figure 1 below, trees and forests in U.S. urban areas store 643 million tonnes of carbon.¹³ As there is a potential available space in urban areas of 74.5% or 17.7 million ha, carbon storage could increase in the United States if this space is allocated towards urban green spaces, specifically urban forests or parks or spaces that afforest.¹³ “However, given the limitations to tree growth and establishment in urban areas imposed by humans (e.g., mowing) and nature (e.g., lack of precipitation), increasing carbon storage in urban areas is not likely without a major effort to change current conditions (both social and physical). As tree cover in urban areas in the United States is on the decline (Nowak and Greenfield,

Table 2
Standardized carbon storage and sequestration estimates per unit of tree cover and percent tree cover in measured cities and states.

City/State	Storage		Gross sequestration		Net sequestration		Tree cover	
	kg C m ⁻²	SE	kg C m ⁻² year ⁻¹	SE	kg C m ⁻² year ⁻¹	SE	%	SE
Arlington, TX	6.37	0.73	0.288	0.028	0.262	0.025	22.5	0.3
Atlanta, GA	6.63	0.54	0.229	0.017	0.175	0.025	53.9	1.6
Baltimore, MD	8.76	1.09	0.282	0.036	0.168	0.032	28.5	1.0
Boston, MA	7.02	0.96	0.231	0.025	0.168	0.023	28.9	1.5
Casper, WY	6.97	1.50	0.221	0.039	0.119	0.038	8.9	1.0
Chicago, IL	6.03	0.64	0.212	0.021	0.149	0.018	18.0	1.2
Freehold, NJ	11.50	1.78	0.314	0.045	0.201	0.050	31.2	3.3
Gainesville, FL	6.33	0.99	0.220	0.032	0.160	0.025	50.6	3.1
Golden, CO	5.88	1.33	0.228	0.045	0.181	0.038	11.4	1.5
Hartford, CT	10.89	1.62	0.329	0.046	0.186	0.051	26.2	2.0
Jersey City, NJ	4.37	0.88	0.183	0.034	0.132	0.035	11.5	1.7
Lincoln, NE	10.64	1.74	0.409	0.063	0.351	0.055	14.4	1.6
Los Angeles, CA	4.59	0.51	0.176	0.017	0.107	0.015	20.6	1.3
Milwaukee, WI	7.26	1.18	0.260	0.033	0.178	0.027	21.6	1.6
Minneapolis, MN	4.41	0.74	0.157	0.023	0.081	0.045	34.1	1.6
Moorestown, NJ	9.95	0.93	0.320	0.030	0.241	0.028	28.0	1.6
Morgantown, WV	9.52	1.16	0.297	0.037	0.231	0.026	39.6	2.2
New York, NY	7.33	1.01	0.230	0.029	0.124	0.028	20.9	1.3
Oakland, CA	5.24	0.19	na	na	na	na	21.0	0.2
Omaha, NE	14.14	2.29	0.513	0.081	0.401	0.066	14.8	1.6
Philadelphia, PA	6.77	0.90	0.206	0.027	0.151	0.023	20.8	1.8
Roanoke, VA	9.20	1.33	0.399	0.058	0.268	0.053	31.7	3.3
Sacramento, CA	7.82	1.57	0.377	0.064	0.327	0.055	13.2	1.7
San Francisco, CA	9.18	2.25	0.241	0.050	0.221	0.046	16.0	2.6
Scranton, PA	9.24	1.28	0.399	0.052	0.296	0.043	22.0	1.9
Syracuse, NY	8.59	1.04	0.285	0.030	0.202	0.039	26.9	1.3
Washington, DC ^a	8.52	1.04	0.263	0.030	0.209	0.026	35.0	2.0
Woodbridge, NJ	8.19	0.82	0.285	0.028	0.208	0.029	29.5	1.7
Indiana	8.80	2.68	0.292	0.077	0.270	0.071	20.1	3.2
Kansas	7.42	1.30	0.284	0.048	0.221	0.040	14.0	1.6
Nebraska	6.67	1.86	0.269	0.074	0.227	0.063	15.0	3.6
North Dakota	7.78	2.47	0.282	0.079	0.134	0.079	2.7	0.6
South Dakota	3.14	0.66	0.128	0.026	0.111	0.022	16.5	2.2
Tennessee	6.47	0.50	0.340	0.021	0.304	0.020	37.7	0.8

na – not analyzed.

^a Tree cover estimated based on high resolution tree cover map of city with an estimated standard error of 2 percent.

FIGURE 1

2012a), carbon storage in urban areas are also likely on the decline. Long-term monitoring of urban forests is needed to better understand rates of changes in urban areas and provide better estimates of long-term carbon trends.”¹³

Afforestation and reforestation are essential in the creation and development of urban green spaces. Vacant lots, and other unused or underutilized spaces in cities make great candidates for urban green space development. Because trees and vegetation play such important roles in the ecosystem services that urban green spaces provide, it is essential that they are considered and

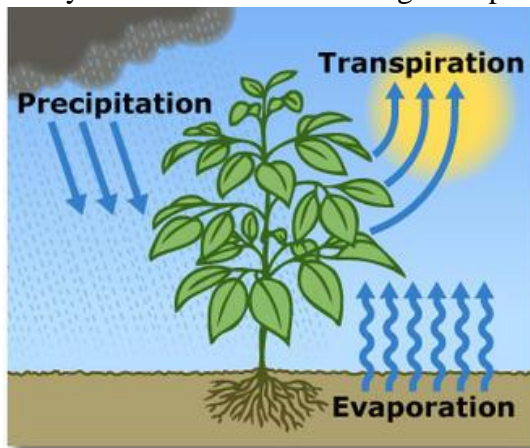


FIGURE 2

Figure 2 above, shows the entire evapotranspiration process. Some water that is absorbed by plants is eventually released into the atmosphere as water vapor through the plant’s *stomata*. The stomata are structures that are tiny and pore-like, located on the surfaces of leaves. Figure 3 provides even more real-life evidence of this, as the plastic bag collects the water vapor that would normally be released into the atmosphere.¹⁴ Transpiration helps to improve air quality because plants circulate air and through stomata, can pull airborne toxins into their leaves and roots while simultaneously releasing water vapor.¹⁴

By providing shade, and through evapotranspiration, trees and vegetation lower air and surface temperatures. According to the Environmental Protection Agency, “Shaded surfaces may be 20–45°F (11–25°C) cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (1–5°C).”¹⁵ Trees and vegetation are a valuable mitigation strategy against *urban heat islands* especially when planted strategically around buildings or to shade parking lots. Urban heat islands are urban areas that experience higher temperatures than outlying areas.¹⁶ Parks can be up to 2°F cooler than the surrounding urban area. Materials such as asphalt, steel, and



FIGURE 3

included when urban green spaces are being developed. Most development in urban areas required the removal of trees at some point, so reforestation can increase and return biodiversity to an area and create or bring back ecosystems for plant and animal species that existed in a space prior to industrial development.

Transpiration describes the process by which water is released from plant leaves. Plants’ roots draw nutrients and water from the soil into the stems and leaves. The process of transpiration returns some of this water to the air.¹⁴

brick are often dark colors which absorb all wavelengths of light and convert them to heat. This results in the object getting warm, which is what creates urban heat islands.¹⁷ Rooftop gardens are an example of urban green spaces that can help lower temperatures in a city. Transpiration acts as nature's air conditioner, which is why urban green spaces help mitigate the effects of urban heat islands. Trees and vegetation reduce energy use by shading buildings which in turn decreases the demand for air conditioning. Because energy demands are reduced, associated air pollution and greenhouse gas emissions are also reduced. Trees and vegetation also remove air pollutants and store and sequester carbon dioxide.¹⁸

Trees and other form of vegetation act as natural filters for particulate matter and gases in urban environments.¹² Particulate matter settles on leaves.¹² There was a study done on the effects of urban trees on fine particulate matter in 10 U.S. cities, and total annual particulate matter ranged from 5.2 tons in Syracuse to 71.1 tons in Atlanta.¹² Trees and vegetation also enhance stormwater management and water quality. They reduce runoff and absorb and filter rainwater.¹²

PUBLIC HEALTH

Urban green spaces have been proven to promote exercise, physical activity, and psychological well-being.

From 1980 to 2000, childhood asthma has increased by 50% in the United States.¹⁹ Asthma has been more prevalent in poor urban communities, where there is significant racial, ethnic and socio-economic disparities.^{20, 21, 22} Studies have suggested the drastic increase in asthma occurrences might be associated with both environmental changes and lifestyle changes.^{22, 23, 24} Environmental changes include increased air pollution as a result of urbanization. The increased exposure to air pollution can be a contributing factor to increased asthma cases in urban areas.^{24, 25, 26} In a study that assessed the relationship between street tree density and asthma in New York City, the results showed that street trees were associated with lower asthma rates.²⁷ An increase of 132 trees/mi² was associated with a 29% lower early childhood prevalence of asthma.²⁷

There are many contributing factors to the upsurge in obesity rates, and inactivity is one of these of them.²⁸ According to the CDC, obesity can lead to hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, many types of cancers, body pain and difficulty with mobility, physical functioning and breathing.²⁸ Healthy behaviors like regular physical activity and healthy eating can help combat obesity and its effects. It is recommended that adults do at least 150 minutes per week of moderate exercise. Examples of this form of activity are brisk walks and bike rides.²⁹ Families often makes choices based on their community or environment. Many times, peoples' diet choices and their ability to exercise, can be impacted by their community or environment. Easily accessible, appealing urban green spaces can help to motivate and encourage exercise and physical activity.³⁰ Results of a study done in Seattle, Washington on the influence of destinations within walking distance of a residence and vegetation on walking trips and body mass index (BMI) showed that BMI was lower in areas with more greenspace. This same study also showed the association between green space and motivations and perceptions about exercise and physical activity. It was found that walking distances in less vegetated areas were seen as farther than they actually were, and therefore residents engaged in fewer walking trips.³¹ Another study was conducted on the association of well-designed public green spaces and how they encourage physical activity and

are a community asset that contribute to the health of local residents. This study's results yielded that people that use parks and other urban green spaces were three times more likely to be physically active than those that did not.³² A European study on neighborhoods showed that residents of communities with more urban green spaces were three times more likely to be physically active, and their likelihood of being obese or overweight was reduced by 40%.³²

Noise pollution is also a stressor that urban residents face. Quiet can be difficult to find in urban environments. According to the results from a study done by the United Kingdom's MORI Institute, 63% of people experience noise from neighbors, and half of them reported said noise as annoying.³³ Sound levels can cause increased blood pressure, risk of heart attacks, decrease quality of life, and feelings of disturbance, stress reactions and insomnia.³⁴ "A long-term study of 18,973 individuals in the Netherlands found that individuals who experienced a cardiovascular health event during a 13 year period had on average higher exposure to road traffic day and night and exposure to air pollution at home."³⁵ Sounds can have an impact on mental health and overall quality of life. It has been proven that people with access to quiet, away from loud, disruptive noises or traffic, had lower psychological symptoms related to stress, and improved sleep.³⁶ Difficulty learning and applying cognitive thinking skills can be linked to noise.³⁷ Trees and vegetation can help create a barrier between residents and surrounding noise pollution. Not only does vegetation create a noise buffer, it can also soften sharp, and piercing tones.³⁸ There are various factors that impact the effectiveness of trees and vegetation, these include; biomass distribution, plant spacing, plant size, leaf shape and size, and the ability of the plant material to absorb or obstruct noise.³⁹ Research shows that planting strips over 10m wide can effectively buffer noise by 3-8 decibels.⁴⁰ Vegetation planted densely that reach from the ground with no gaps have the ability to reduce noise up to 15 decibels.⁴⁰

There is proven correlation between nature and human wellness. People in urban environments are often at a higher risk for stress and its harmful effects. People in urban areas tend to be overloaded with stimuli including noise and movement.⁴¹ Work demands, familial issues, financial strain, and other persistent situations are all everyday stress factors, many of which are exacerbated in urban environments.⁴² A 1991 experiment lead by Roger Ulrich was seeking to discover the relation between stress recovery and nature vs. the built environment.⁴³ The data collected was formatted in a way in which stress was self-reported, and assessed using physiological indicators including muscle tension, skin conductance, systolic blood pressure and heart period. The results of the experiment indicate that people who viewed nature vs. built settings underwent

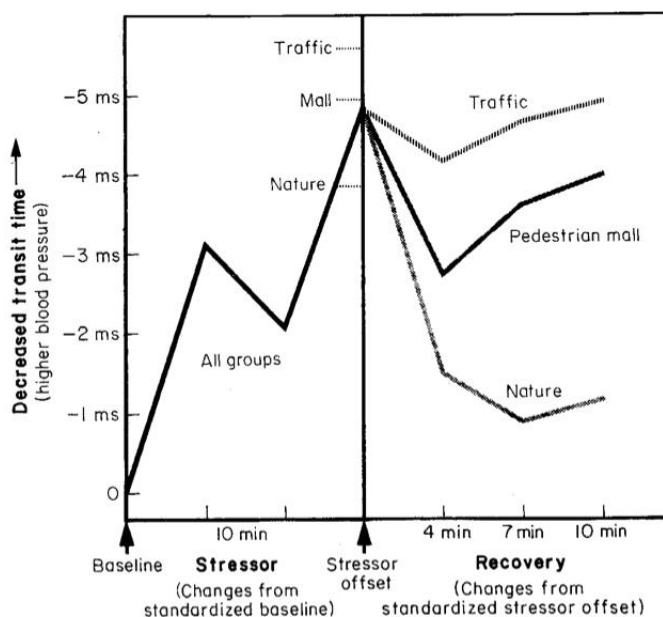


FIGURE 4

more rapid and complete stress recovery.⁴³ As Figure 4 above displays, people who viewed nature recovered from stress much quicker – in about 4 minutes.

Community gardens are also a form of urban green spaces. The act of gardening for those that maintain these spaces has been studied and is associated with reduced stress levels, a sense of relaxation and calming, and feelings of euphoria.⁴⁴ Perceived and physical stress levels in individuals ages 50-88 who maintained community garden plots showed significant decrease. Outside of the benefits associated with maintaining a garden, community members are able reap the benefits of the garden as well.⁴⁴ Vegetable gardens' harvested crops can provide access to fresh produce at very minimal cost. This can help community members consume a potentially healthier, more balanced diet which can help lower the risks of obesity and related illnesses. Flower gardens yield beautiful vegetation whose presence and aesthetics help to reduce stress and provide calming and relaxation.

SOCIAL, CULTURAL & ECONOMIC

Urban green spaces encourage community residents to spend more time outdoors and provide them places to do so. This can lead to interaction and the development of relationships Urban green spaces create aesthetically pleasing social gathering spaces for community members and are catalysts for community engagement and interaction. Social capital can be used to describe networks of relationships amongst people in a particular society. It can be considered the glue that holds people who live and work in a community together.⁴⁵ The more social capital a community has, the more effectively it functions. Urban green spaces can help people to connect and create more social capital in a community. These spaces bring people of community together that may come from different backgrounds.⁴⁶ “Some cultural theorists argue that interactions in public spaces are too informal to form a sense of shared values; others assert that such interactions can and do lead to social cohesion.”⁴⁷ There are several benefits of social capital and community cohesion including lower mortality rates, higher self-rated health, lower prevalence of sexually transmitted disease, lower prevalence of smoking, less frequent teenage pregnancy, more social support, lower incidence of crime including violent crime, lower incidence of burglary, more trust in neighbors, lower levels of neighborhood violence, neighborly interactions, and positive impact on children's well-being.⁴⁴

Strong community connections can help curate mentorship through adult guidance and role models for community youth.⁴⁴ This can help youth avoid risky behaviors like smoking, drinking, gang involvement, or drug use.⁴⁴ Neighborhoods with strong social ties also create community amongst elders in a society. Elderly individuals with a strong sense of community have lower rates of early mortality, less fear of crime, reduced suicide rates, and better physical health.⁴⁴ Strong community relationships can create crucial collaboration amongst community members that can result in important, progressive changes in the community like the creation of clean and safe public spaces, and valuable information exchange.⁴⁴

Urban green spaces increase social interaction, and communities with higher rates of interaction have higher mutual trust and social reciprocity. These things have been linked to lower homicide rates and less crime.⁴⁸ Stronger societal ties also lead to better neighborhood policing, as neighbors trust each other more and feel a stronger sense of community and belonging amongst one another.

Economists have devised reliable valuation to natural assets like urban green spaces in cities.⁴⁴ Larger trees in yards and on streets can raise home values between 3% and 15%.⁴⁹ A study on the average market effect of street trees on all house values across Portland, OR showed that street trees that increase property value can lead to an increase annual property tax revenues by \$15.3 million.⁵⁰ Homes that are adjacent to parks and other urban green spaces are valued at 8-20% higher than comparable properties.⁵¹ Several studies that assessed the presence of trees in relation to residential property values have determined that trees are preferred to comparable properties without trees. The average price increase was about 7%. Mature yard trees (greater than 9-inch dbh) yielded a 2% price increase, larger street trees yielded a 3% price increase, trees in front yard

landscaping yielded a 3-5% increase, good tree cover in a neighborhood yielded a 6-9% increase, and mature trees in high income neighborhoods yielded a 10-15% increase.⁴⁴ Beyond the economics of residential home ownership and value, urban green spaces also help to spur local

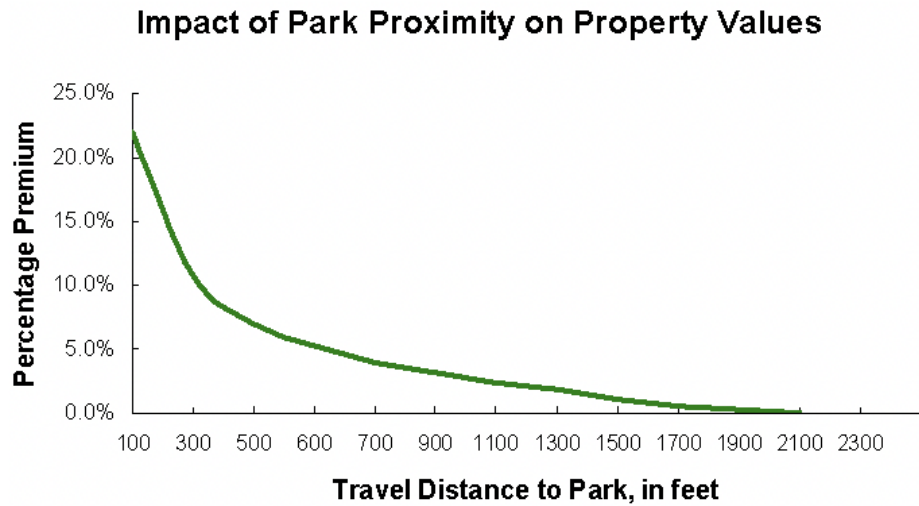


FIGURE 5

economies. Cities with urban green spaces are more desirable to live in and raise property value which leads to businesses wanting to set up shop in those cities. Local businesses that open within a city's epicenter can increase local spending and a city's GDP.⁵² Urban green spaces can also create outdoor recreation that can promote tourism to a city. Parks, trails, gardens and greenways make communities more desirable places to visit. As tourism increases, this can increase local spending as visitors shop at local businesses and pay possible usage fees.⁵²

DRAWBACKS

ACCESSIBILITY & DISTRIBUTION

Green spaces can provide critical ecosystem services. They can also promote exercise and physical activity, psychological well-being, and they can benefit the overall public health of the communities in which they are located. City living can limit access to nature and all of its inherent benefits. Green spaces are often located disproportionately in predominantly white and affluent communities. This means that these areas also disproportionately reap the benefits of the positive impacts that green spaces have on communities. This makes access to green space an environmental justice issue.

“Park-poor” neighborhoods are neighborhoods in which there are a lower number of parks, and usually a higher rate of crime and poverty. Usually, low-income, minority neighborhoods are “park-poor”, and have the least amount of green space. Los Angeles County’s urban park system has a long history of inequitable investment and racialized land-use decisions. There is public disinvestment in non-white neighborhoods, with more than half of Los Angeles county being considered park poor, with 82% of these areas being located in communities of color.⁵³ Even communities of color that do have green spaces, have to make do with smaller, more overcrowded urban green spaces compared with white Americans.⁵⁴ Research by the Trust for Public Land determined that urban green space in majority black and brown neighborhoods are half the size and almost five times as crowded.⁵⁴

A study done in Atlanta, Georgia aimed to evaluate the racial/ethnic and socioeconomic disparities in green space access. There were 890 urban green spaces as determined by the Atlanta Regional Commission, and the results of the study showed that neighborhoods with a higher concentration of African Americans had significantly poorer access to green spaces.⁵⁵ Creating new green spaces in these communities could address the environmental justice aspect associated with park-poor neighborhoods, but it could also lead to gentrification, as neighborhoods with considerable amounts of green spaces are highly sought after.⁵⁶

ECO-GENTRIFICATION

Gentrification can be defined as “a process of neighborhood change that includes economic change in a historically disinvested neighborhood —by means of real estate investment and new higher-income residents moving in - as well as demographic change - not only in terms of income level, but also in terms of changes in the education level or racial make-up of residents.”⁵⁷ Gentrification can happen through a series of events, expensive retailers replacing more affordable mom and pop shops and making it impossible for people living in that community to afford groceries and other essentials. Higher end retailers and new businesses entering a neighborhood can raise property value in neighborhoods which result in landlords raising rent. This makes housing no longer affordable to residents who originally lived in the neighborhood and they are displaced by white, affluent residents. Eco-gentrification, otherwise known as green gentrification, is when property values rise to the point of displacement due to urban greening projects.⁵⁸ Creating green spaces in communities makes the community more desirable to live in and attracts wealthier residents to previously polluted and often disenfranchised neighborhoods, causing the displacement of its original residents. Although there are copious health and ecological benefits to increasing urban green space, it is paradoxical because it can also lead to green gentrification.

V. CONCLUSION & RECOMMENDATIONS

The benefits of green spaces should be able to be enjoyed by all regardless of race, creed, color, or socioeconomic status. Green spaces offer a myriad of social, cultural, ecological, and health-related benefits. Urban communities of color and low-income should be able to reap the benefits of green spaces in their communities without running the risk of being displaced due to the appeal that their communities would gain through new green space development. There are strategies that planners, community members, and local policymakers can implement in order to mitigate the effects of green-gentrification in urban areas. These strategies include but are not limited to; community-specific green spaces, inclusionary zoning, and construction jobs for current residents.

Community-specific green space would have planners and policymakers to consider the needs of the community in which the green space would be created. Instead of creating generic green spaces that would draw in the masses, and eventually lead to eco-gentrification, community-specific green spaces would meet the specific and individual needs of that particular community. This could be done in a plethora of ways. Planners could hold community meetings to hear the concerns of community members and base the amenities of the green space on community needs. These community-specific green spaces would be “just green enough,” their purpose would be to meet the needs of the community, and the hope would be that they could do that without being too appealing to suburbanites and gentrifiers. “...working-class residents and gentrifiers collaborated to demand environmental cleanup strategies that allowed for continued industrial uses and preservation of blue-collar work, and explicitly avoided what they term the ‘parks, cafes, and a riverwalk’ model of a green city (p. 1028). The ‘just green enough’ strategy targeted toxic creek cleanup and green space development along the creek near the existing working-class population and industrial land users, to address both environmental and social justice, and to avoid new rounds of speculative development” (Wolch, Byrne, & Newell, 2014). It is important that community needs, and desires are met rather than just conventional urban design.

Inclusionary zoning is a policy that developed in the 1970’s in response to exclusionary, racially-based segregated zoning. Inclusionary zoning can encourage the private market to subsidize affordable housing. “Inclusionary zoning requires or incentivizes private developers to designate a certain percentage of the units in a given project as below market rate (BMR)—cheaper than their value on the market, and often less than the price of producing them” (Schneider, 2018). Inclusionary zoning will help to combat green-gentrification because even if new green space development causes gentrifiers to move into urban areas, it will allot a certain amount of affordable housing units in any new development created surrounding the new green space.

Lastly, priority should be given to current, low-income, residents of color for green space development construction jobs, as well as construction jobs associated with new housing developments as a result of green gentrification. This will allow community members to join in and become invested in developments made in their neighborhood. It will also be a source of income that could potentially help them keep their homes if prices started to rise. This will also give community members hands-on say in developments taking place in their community. This could help to mitigate the effects of green gentrification in urban areas.

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