

# Urban Greening: An Alternative Mechanism to Address Public Health and Safety in Underserved Communities

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**Executive Summary:** Community safety is increasingly understood to be intertwined with public health and quality of life. However, health and safety are often appraised and budgeted independently, impeding the ability of local governments to identify efficient interventions to benefit communities. Urban greening is widely acknowledged to improve public health but is also a cost-effective public safety measure associated with reductions in aggression, violence, and crime. Current research suggests that the physiological and psychosocial factors that mediate the benefits of green spaces fall at the intersection of health and safety. Critically, historically marginalized, low-income, and over-policed neighborhoods are also typically those that most acutely lack urban greenery, exacerbating substandard health and safety outcomes. Investing in green spaces is therefore a promising solution to mitigate existing disparities across both public health and safety sectors. We propose that Los Angeles prioritize urban greenery in underserved neighborhoods as a public safety measure and reallocate funding from law enforcement and incarceration budgets to small-scale changes in green spaces (e.g., sidewalk planting and park maintenance). Green spaces are a promising alternative to traditional public safety methods and would improve the health and safety of disadvantaged neighborhoods, mitigate the harms of heat and pollution, and begin to counteract a history of structurally racist neighborhood policies.

## I. Statement of issue

Green spaces refer to a range of media that incorporate nature into urban settings, from constructed parks to plantings along sidewalks. While green spaces are most readily recognized for adding aesthetic value to a neighborhood, accumulating research reports that they can improve public safety (Shepley et al. 2019) and health outcomes (van den Berg et al. 2015; James et al. 2015). Whiter, wealthier neighborhoods have historically benefited from investment in trees, parks, and other green spaces, while a lack of accessibility to

nature is most apparent in low-income and non-white communities (TPL 2020). In addition to lower prevalence, these neighborhoods have lower quality and usability of green spaces (Wen et al. 2013; Schwarz et al. 2015). Studies demonstrate that the quality, more than the quantity, of green spaces determines time spent in nature; a park without sufficient upkeep, walkability, or appealing features (e.g., trails, benches, and fountains) deters use (Rigolon, Browning, and Jennings 2018; Yessoufou, Sithole, and Elansary 2020). Reduced access and use of parks prevent disadvantaged populations from

reaping the full benefits that urban green spaces can provide to health and safety, many of which are independent of sociodemographic variables (Schertz et al. 2021; Jimenez et al. 2021).

Public safety and health are each intertwined with social determinants of health that describe the conditions in which one is born, lives, works, and learns. These conditions ultimately determine quality-of-life measures like educational attainment, income, and incarceration rates (Marmot 2005; Caruso 2017). Fewer and lower quality green spaces are characteristic of underserved communities, which also suffer from an increased prevalence of chronic illness, including asthma (Nardone et al. 2020), cardiovascular disease (Kershaw Kiarri et al. 2015), and depression (Lorant et al. 2003). Concomitantly, these communities tend to be less safe despite more policing (Edwards, Lee, and Esposito 2019; Feldman et al. 2019). These issues were highlighted and magnified by the COVID-19 pandemic, during which inequalities in access to nature were experienced by those in underserved neighborhoods (Burrowes 2020). While reconciling racial and socioeconomic disparities is increasingly a focus of local legislators and policymakers, the incorporation of relevant science on efficient but unconventional solutions, such as urban green spaces, remains a challenge.

## **II. Green spaces can improve public health and safety**

Access to greenery is associated with various health benefits: reductions in obesity (Dadvand et al. 2014), mental illness (Gascon et al. 2018), cardiovascular disease (Pereira et al. 2012), and all-cause mortality (Mitchell and Popham 2008); better pregnancy (Sun et al. 2020) and mental health (Ward Thompson et al. 2012; Wood et al. 2017) outcomes; and amelioration of pathologies like dementia (Whall et al. 1997) and attention deficit hyperactivity disorder (ADHD) (Faber Taylor and Kuo 2011; Faber Taylor, Kuo, and Sullivan 2001). Beyond direct health benefits, vegetation near residences, including small-scale changes like greening vacant lots and community gardens, reduces aggression (Kuo and Sullivan 2001; Schusler et al. 2018) and property and violent crime, including gun assaults (Garvin, Cannuscio, and Branas 2013; Kuo and Sullivan 2001). The benefits of urban greening have the greatest impact in low socioeconomic areas that suffer from disparities in

community safety and health. For instance, increasing greenery decreased preterm birth rates more in areas of high pollution or low socioeconomic status than in areas with little pollution or high socioeconomic status (Sun et al. 2020; Banay et al. 2017).

Current research suggests that green spaces mediate improvements to health and safety through various psychosocial mechanisms that extend beyond socioeconomic variables. Adding trails to parks encourages exercise, which produces serotonin, enhances mental acuity, and promotes resilience (Ruegsegger and Booth 2018). Surrounding greenery mitigates noise pollution, reduces stress and inattention, and improves cognitive development and mental health (Stansfeld and Clark 2015). Improvements in cognitive functions, such as mental acuity and attention, that stem from urban greenery can reduce aggression (Kuo and Sullivan 2001), and greater street activity due to use of urban green spaces can reduce crime and promote a sense of collective efficacy, social cohesion, and ownership over communities (Jennings and Bamkole 2019; de Vries et al. 2013; Kazmierczak and James 2007). Since factors such as stress reduction, cognitive health, and social cohesion contribute to inequalities in public health and safety, improving urban greenery can ultimately address disparities in wellbeing, quality of life, and economic prospects.

Access to nature may be particularly beneficial for healthy child and adolescent development. High school students attending schools in greener settings have higher test scores, graduation rates, and more plans to apply to college, as well as fewer criminal behaviors, even when accounting for socioeconomic status and enrollment size (Matsuoka 2010; Wu et al. 2014). Outdoor playtime improves mental well-being through social connection and physical connectivity (Grigsby-Toussaint et al. 2011), and children with ADHD experience reduced symptoms and concentrate better in natural environments (Faber Taylor and Kuo 2011; Faber Taylor, Kuo, and Sullivan 2001). Encouraging outdoor activities is also important for adolescent mental health, as increases in screen (e.g., social media) compared to non-screen (e.g., social interaction and sports/exercise) activities (Oswald et al. 2020) are hypothesized to have contributed to accelerations in the rate of youth suicide (31% increase) and depression (33%)

between 2010 and 2015 (Twenge et al. 2017). Thus, the contributions that urban greening can provide to improve mental acuity, resilience, and social cohesion may lay the foundation for long-term health benefits and reduced criminal behavior.

### III. Heat and air pollution as growing concerns

Increases in temperature and air pollution are associated with dangerous outcomes, including heightened rates of violent crime (Burkhardt et al. 2020; Herrnstadt et al. 2016; Heilmann and Kahn 2019), mortality and morbidity, negative mood, interpersonal conflict, and mental illness and suicide rate (Burke et al. 2018; Chong and Castle 2004; Hsiang, Burke, and Miguel 2013). Urban green spaces provide shade and cooling, even in microclimates like parking lots (Scott, Simpson, and McPherson 1999), and eliminate pollutants from the air (Nowak, Crane, and Stevens 2006). Relief from heat and pollution can promote cognitive restoration to ameliorate aggression and improve judgement, effectively reducing violent (e.g., battery, assault, robbery) and narcotics crime (Kuo and Sullivan 2001; Schusler et al. 2018). Furthermore, lack of green spaces and increased heat burden decreases productivity and family income, since the physiological response to heat stress is to slow down work, take more frequent breaks, and reduce working hours (Kjellstrom et al. 2019). That warmer temperatures and heightened air pollution damage cognition in both adults (Simmons et al. 2008; Lavy, Ebenstein, and Roth 2014) and children (Dadvand et al. 2015; Sunyer et al. 2015) can harm academic achievement and economic prospects. In fact, an analysis of student test scores demonstrated that every additional degree of heat translates to 1% less learning, a trend that disproportionately affects minority students and accounts for 5% of the racial achievement gap (Park et al. 2020).

Cooling via green space allocation is projected to have the greatest impact in historically marginalized neighborhoods, which often lack other mitigators like air conditioning (Beesley 2020) in addition to green spaces. Deaths attributed to heat- and pollution-related causes are disproportionately reported for low-income and non-white Americans, who tend to live in urban areas with the lowest quality air and the most “urban heat islands,” where heat is trapped in heavily concreted areas without counteraction from tree cover (Schwarz et al. 2015). These disparities in

heat- and pollution-related deaths largely stem from racially motivated policies like redlining, which denied mortgages, loans, and government services to marginalize predominantly Black neighborhoods, resulting in underdevelopment. Formerly redlined districts are still majority non-white, have more pollution (Bravo et al. 2016), and are hotter (Hoffman, Shandas, and Pendleton 2020) than non-redlined neighborhoods by up to 7°C, a number which is projected to increase. In eight California cities, residents of formerly redlined districts were 2.4 times more likely to visit the emergency room for asthma than those in non-formerly redlined districts (Nardone et al. 2020). In Los Angeles (L.A.) County, majority white neighborhoods have three times the tree canopy and half the heat absorbing surfaces of Black (>80%) communities (Morello-Frosch 2007). During heat waves, Black Angelenos were twice as likely to die than other residents (Morello-Frosch 2007), and emergency room visits by Black and Latino Californians rose by more than double that of white Californians (TPL 2020).

### IV. Funding mechanisms and proposed policy for urban greening remain unclear

Green spaces are primarily funded by variable local sources, making it difficult to secure long-term funding (Joassart-Marcelli 2010). As part of a trend of fiscal austerity over the past five decades, green spaces have been among the first costs cut from city budgets. Low-income areas face additional funding challenges, especially when greenery costs are covered by property taxes. Grants may counteract budget cuts, but are often awarded to wealthier cities with more resources for competitive grant-writing (Joassart-Marcelli, Wolch, and Salim 2011). While grants from the federal Land and Water Conservation Fund have funded a large proportion of projects, they require matching by state and local contributions (Rigolon, Browning, and Jennings 2018), further excluding communities with limited means.

The L.A. Green New Deal was adopted in 2019 and includes proposals to increase tree canopy and park construction in low-income and heat-impacted communities by 50% by 2028 and increase the proportion of Angelenos living within half a mile of a park or open space to 100% by 2050. The short-term goal of planting and maintaining 90,000 trees by 2021 has faced setbacks, partly due to the COVID-19 pandemic. The plan does not include details

surrounding specific budgets, funding mechanisms, or timelines for development.

## V. Policy options

In light of the growing understanding that urban greening can reduce crime, improve the physiological and psychological well-being of residents, and mitigate the consequences of climate change, we offer recommendations to improve urban green spaces in disadvantaged L.A. communities. To avoid gentrification and displacement, all options outlined below require a firm focus on environmental justice and community involvement—local organizations, activists, and residents can have a direct influence on the locations and types of initiatives, which would prioritize residents' quality of life over increasing economic activity. For instance, community benefit agreements may be used to legally dictate fair benefits and accountability to honor concerns of residents.

### *i. Option 1: Maintain status quo with a focus on longitudinal assessment*

L.A. would continue its current trajectory in trying to meet the goals of the L.A. Green New Deal, with individual municipalities continuing to implement their own urban greening strategies. Data on the successes and failures of the L.A. Green New Deal can be tracked and used to inform future policies in L.A., as well as provide a framework for similar measures across California.

#### *Advantages*

Overall, the components of the L.A. Green New Deal related to urban greening are ambitious and well-considered. The city has partnered with local organizations and researchers to pursue best practices and to have the widest reach in underserved communities. CalEnviroScreen is being used to map environmental and socioeconomic information and identify areas most affected by lack of greenery. A survey of urban forestry is being undertaken to inventory the city's greenery, which is a crucial first step in ameliorating neighborhood disparities.

#### *Disadvantages*

Critics maintain that while the city has partnered with local organizations and stakeholders, they were brought in at later stages of decision-making. The L.A. Green New Deal also faces criticisms over a lack of

details surrounding implementation and budget. Some argue that L.A. has a history of sweeping climate legislation that falls short of goals, such as the Million Tree Initiative, where only 33.6% of trees planted from 2006 to 2010 were estimated to survive (McPherson and Kendall 2014). While the city is undertaking an inventory of trees, it is unclear whether the inventory includes other types of greenery and whether the health of trees will be monitored. In addition, the publicly available plan discusses what will be accomplished and how much funding will be allocated, but does not detail the methods through which this development will occur, including questions related to how marginalized communities can provide ongoing input or what steps are being taken to avoid the effects of gentrification. This lack of transparency can erode public trust and support, as well as leave room for the negative effects of gentrification. While the plan is long-term in that some goals and their budgets extend to 2050, it does not include mechanisms for continued maintenance—a crucial component of increasing equity in the quality, not just the quantity, of green spaces. Another concern is that ambitious plans that stretch over decades are often left unfinished, as over time, the priorities of the public and of administrations can change. It is possible that smaller-scale, more efficient plans may create greater positive impact.

### *ii. Option 2: Increase L.A. budget allocations for urban greening in underserved neighborhoods*

Greater portions of the L.A. budget would be allocated towards increasing greenery in low income and non-white neighborhoods. The focus could be on small-scale and low-cost changes, such as greening walkways, planting along sidewalks, or maintaining existing greenery, that have been proven effective. For instance, overgrowth of tree canopy from decades of disinvestment can be easily restored to transform an environmental detriment into an amenity. Cleaning and improving parks and community gardens are also cost-effective mechanisms of increasing usability. Local organizations and stakeholders could be brought in from the ground level to guide choices that would most benefit their communities.

#### *Advantages*

Focusing on discrete and manageable goals may be more efficient in producing actionable change as

opposed to broad plans that include a wide range of goals aside from urban greening. Small-scale changes demonstrate widespread reproducibility, cost-effectiveness, and easy implementation and maintenance (Branas et al. 2016), which may allow for quicker impact compared to the goals of the L.A. Green New Deal that are planned for 2050. Giving local groups decision-making power from the earliest stages makes it more likely that changes provide tangible outcomes for the communities most in need. Developing community gardens, walkway vegetation, and smaller parks also avoids property development around a centralized location and can reduce practices that can cause gentrification (Wolch, Byrne, and Newell 2014).

#### *Disadvantages*

Budget allocation to urban greenery may lack support in light of the L.A. Green New Deal and would decrease funds for other projects. Development of urban greenery, even when distributed, can bring gentrification and displacement. Research on the impacts of urban greening on biodiversity is limited, but some negative effects have been reported (Lepczyk et al. 2017). The expertise of local ecologists should therefore be leveraged in urban greening efforts.

#### *iii. Option 3: Allocate public safety funding to urban greenery in underserved communities*

Since urban greening can reduce crime and help alleviate socioeconomic and racial disparities in community safety, funding for programs as outlined in Option 2 could be prioritized as a public safety measure and taken from law enforcement and incarceration budgets. The Fiscal Year 2020-21 L.A. city budget includes \$1.86 billion in funding for the police department, comprising 17.7% of total funding, with 15.7% proposed for 2021-22. However, no association between increased police budgeting and crime reductions has been detected over the last sixty years (Bump 2020), and less than 1% of the crime drop since 1990 is explained by incarceration (Roeder et al. 2015). Since spending on law-enforcement and incarceration has evidently reached a point of diminishing returns, funds could be reallocated to more efficient, community-centered means of improving public safety.

#### *Advantages*

Traditional public safety measures like surveillance or incarceration are often reported to exacerbate the issues that they are designed to manage, e.g., recidivism (Cullen, Jonson, and Nagin 2011; Spohn and Holleran 2002), and over-policing can create public mistrust in the criminal justice system, leading to increases in crime and victimization (La Vigne, Fontaine, and Dwivedi 2017). Over-policed neighborhoods tend to be historically marginalized or economically vulnerable, and cross-disciplinary literature reports that the presence of law enforcement in these communities has profound health consequences for its residents (Ang 2020; Bor et al. 2018; Del Toro et al. 2019; Geller et al. 2014; Massoglia and Pridemore 2015; APHA 2018). As public opinion moves towards alternative mechanisms of public safety, urban greenery could be prioritized as an unconventional but data-driven solution. Moreover, reallocating funding from law enforcement and incarceration budgets towards urban greening would not reduce spending on other community development or public health projects.

#### *Disadvantages*

Increases in certain types of crime over the last year in L.A. may cause some to be reticent to divert funds from traditional public safety measures, including police. Opposition is expected from police unions, who have a history of notable lobbying activities in L.A., including higher spending on local campaigns than police unions in other major cities (three times more than those in New York City and twenty-five times more than those in Chicago) (Perkins 2020).

## **VI. Policy recommendation**

We recommend **allocating public safety funding to urban greening in underserved communities (Option 3)**. While the L.A. Green New Deal is a step in the right direction, relying solely on a sweeping proposal that lacks budgetary and implementation details risks postponing greening projects in favor of other short-term concerns that arise over time. Increases in urban greening are needed now to help address socioeconomic and racial disparities in community health and safety. Concurrently, a robust body of evidence demonstrates that the budgeting disparity between public safety departments and other community-investment measures does not proportionally improve safety relative to its detrimental cost to public health. Because inequities

in green spaces are partly due to a history of structural inequalities inherent to housing and neighborhood development, reappropriating city funds would help restore trust and counter historic injustices while helping to address the root causes of disparities in public health and safety.

It has long been evident that the canonical approach to public safety has come at an enormous cost to the well-being of marginalized communities. Alternative solutions that are driven by scientific evidence, designed to address historic inequities, and motivated to promote public health are long overdue.

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