Where the Grass is Greener: Urban Green Spaces, Sustainability, Mental Health, and Social Inequity

Kamdin Gutierrez

Abstract

From meticulously groomed parks and yards to forgotten patches of untamed growth, Urban Green Spaces (UGS) exist on a spectrum. Curated landscapes have a long and complex history, reflecting societal ideals and embracing nature while, paradoxically, suppressing biodiversity and deepening socioeconomic divides. To maximize aesthetics and usage, chemical treatments and intensive fossil-fuel upkeep methods are frequently employed. This harms pollinators, disrupts ecosystems, and can introduce intended beneficiaries to dangerous contaminants and pollutants. In contrast, Informal Green Spaces (IGS) such as abandoned lots, small community gardens, and similar lightly tended spaces nurture greater ecological diversity by allowing native species to thrive. And yet, these spaces can face legal barriers and stigmatization, particularly in less affluent neighborhoods where IGS are more common. Socioeconomic disparities are further exacerbated when green initiatives increase property values and displace residents, a phenomenon known as eco-gentrification. To address this gap, this paper examines collaborative urban planning methods and science-based planting strategies that integrate community voices and environmental needs. Such a route emphasizes the potential for UGS to enhance physical and psychological health, mitigate climate effects, and strengthen community bonds.

Expansive manicured grasses divide different green space regions from the surrounding city in Central Park, NYC. Gutierrez, K. (2018).

Introduction

Turning off the main road, away from the bustling New York City traffic of both wheel and shoe, I'm not surprised to see lines of trees sharing the path of the much smaller avenue. The greenery of this side street, like so many others, is a picturesque combination of natural growth

and tooled stone. But a closer look strips away some of that instagrammable charm. Small squares of grass are abruptly edged to perfection and sectioned off by the angular corners of cement. Trees are locked in wrought iron fences, ranging from several inches to several feet high, while large cement planters stand guard on either side of nearby entryway, acting as their own faux pockets of bordered green. Each contained shrub is a reminder that nature here is as controlled as possible.

Even with an elevated gaze, there is still some nature breaking up the monotony of concrete. From beneath my feet to well above my head, a line of foliage imagines itself free in the space above the street. But when I drop my line of sight, the illusion is exposed by the harsh cement lines that ensnare every tree, shrub, and grass—stark reminders that this greenery is not in its natural state. I am reminded that the fences and planters are not so subtle replacements for signs requesting sternly, but politely, "Please Keep Off the Grass."

This controlled reintroduction of greenery has benefits and consequences that go largely unanalyzed by many of us. Indeed, these areas rarely even come to mind when one thinks of greenspaces. Rather, thoughts of greenspaces pull the imagination toward acres-wide parks and meticulously manicured lawns. But Urban Green Spaces (UGS) range widely in what they are, who they are for, and what their intended use is.

How we define UGS largely depends on what is being studied. UGS can include roadside medians, trees in sidewalk potters, public grasses that separate the walkway from the street, and, of course, our parks and playgrounds. These spaces have far-reaching implications—both positive and negative—for native flora and fauna, physical and mental societal health, local climate, and the associated inequities therefrom. Although it may seem strange to consider the negatives of green spaces, they undoubtedly exist and reach far more deeply than what first meets the eye. This is especially true when we further refine our definition. Analyzing a few of these types of spaces, the known benefits and downfalls, as well as what possible alternative solutions look like, are the first steps in addressing what future approaches to take.

FIGURE 1: Tree Lined Street, Greenwich Village NYC. (Rukhtina, E. 2021)

The Haves and Have-Nots

I remember mowing lawns as a pre-teen to earn money. Some folks appreciated the help cutting the grass, while others would scold for mowing in circles rather than diagonal lines or some other preferred pattern—a remnant of symbolized status for those wealthy enough to have owned some of the first mechanized grass cutters. Then, as now, whether I'm in a city or in the suburbs, there is always the well-groomed greenery operating as spotlighted giveaways to affluence. Everywhere I turn, I see the holdovers of status that have gone nearly or completely unchanged. There are those beacons of affluence that once shone in pre-electrified homes in the form of simultaneously burning candles in every room, now replaced by even larger quantities of superfluous electrical lighting edging yard islands and soffits that glow throughout the night. However, ideas of wealth and landscaping remain nearly identical to what they were hundreds of years ago.

A campus or community highlights its status by adorning itself with manicured exotic plants, rows of geometrically perfect hedges, and varieties of trees planted in deliberate lines as though they are about to begin a game of chess. At the other end of this inequality, acres of concrete refuse to let any but the hardiest of plants encroach. Unclaimed patches of dejected growth exist merely by their stubborn refusal to be wholly removed. It is in these inequities that the delineation of Planned Green Space (PGS) and Informal Green Space (IGS) begins to broaden. Planned Green Spaces are just as they sound—structured, manicured, and meticulously designed spaces of greenery that are placed with some intention. Informal Green Spaces exist in the in-between. Typically only tended to by locals if at all, IGS are any unplanned space of greenery: abandoned lots, weedy roadsides, and any formally unrecognized or officially undesignated UGS (Rupprecht 2014). Importantly, the distance between these manicured markers and their counterparts exposes a social inequity far more pernicious than it may seem.

There are significant health benefits to frequenting PGS that are unattainable for those who do not have access to them. However, many urban areas with less access and means have taken measures into their own hands by capitalizing on IGS. By converting vacant lots into parks or community gardens or utilizing abandoned campuses as natural green spaces, visitors create and maintain access to a shared space. These IGS can be included in studies on the usage of green spaces. But such an inclusion would necessitate a look at the socioeconomic aspects of these spaces as well. These converted spaces are often a result of the efforts of local neighborhoods outside of official channels. This informality leaves area investors and city officials in an interesting position—on the one hand, these folks are trespassing and on the other they are maintaining a derelict area. Unfortunately, the former is the more common perspective, and those outside the neighborhoods tend to view these converted spaces as unsightly. This isn't surprising given the learned connection between hyper-manicured greenspaces and wealth. Preference then tends to be given to planned green spaces over informal green spaces.

Although there is some research on park usage by age, race, sex, income, and education, among other factors, developing a model encompassing the entirety of sociodemographic variables is an undertaking that has only been attempted at local levels. Even in these local level studies, the parameters chosen can yield contrary data sets and entirely different conclusions within the same areas. A particularly interesting example is from Lauren C. Abercrombie et al. in a study of selected urban areas of Maryland, including Baltimore. This study found that "Overall, the greatest number of parks was found in the block groups composed of ethnically mixed, middle-income residents," (p. 12, Abercrombie 2008) (figure 2) leading to their conclusion that "The expected deprivation of recreation facilities in low-income and high-minority areas was not

found in the present study for private or public facilities" (p. 12). It is notable that the age of construction is not listed among limitations of the Abercrombie study. This is significant due to the historical segregation of communities via redlining practices, discrimination, and violence.
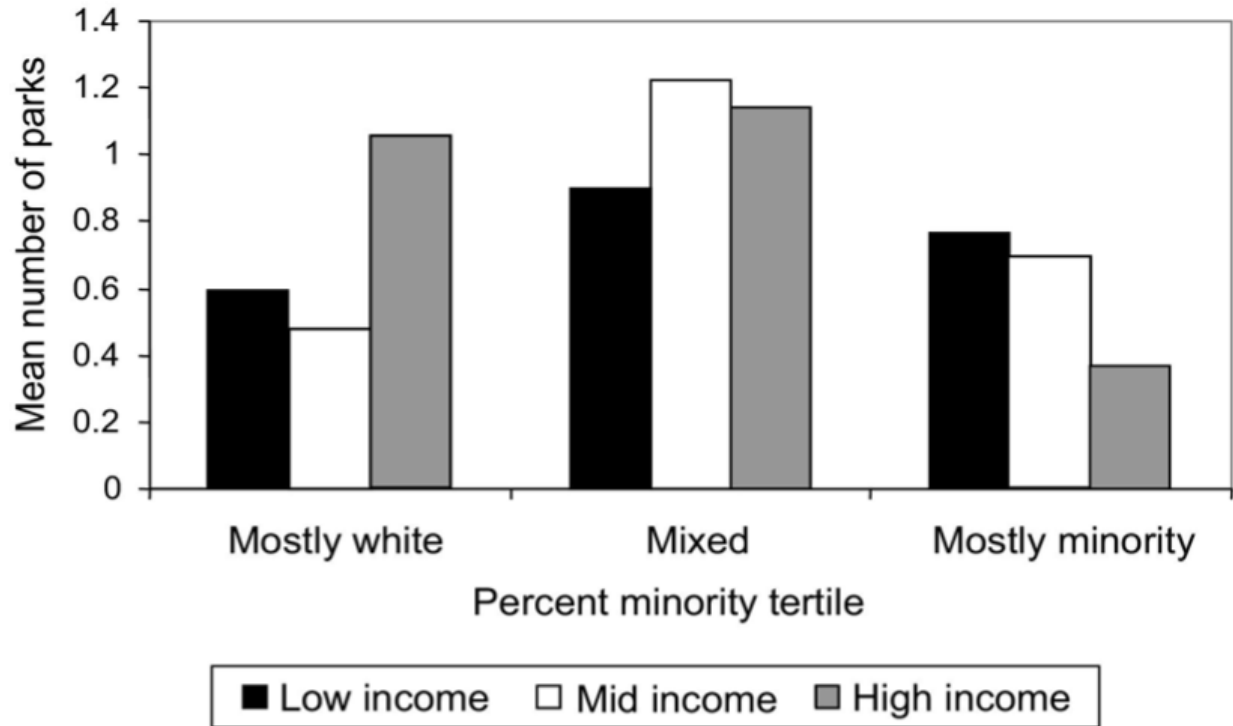

FIGURE 2: Mean number of parks per neighborhood by racial composition and income level. Predominantly white and mixed neighborhoods consistently have more parks than predominantly minority neighborhoods, with high-income areas benefiting most. (Abercrombie . 2008).

Older parks presumably would have been built for the residents of a specific neighborhood, leading to questions about the quality of the space and the intended user. Similarly, the conditions of the parks were not considered. Given that poor maintenance or park conditions might deter usage in lower income areas, this is one significant consideration when analyzing park use overall. As a result, perceptions of racial acceptance within these PGS would surely play a part in park usage data, regardless of geographic access.

Conversely, studies that have included perceptions of inclusion by race and ethnicity routinely find non-whites traveling further for access to Urban Green Space (UGS) (Byrne and Wolch 2009). Even though geographic access alone does not fully explain inequity among PGS, it is one useful metric that leads to the prevalence of IGS in less affluent areas. The findings of Christopher G. Boone et al. (Boone 2009) add context to the Abercrombie, L. et al. study by demonstrating inequities in UGS acreage between white and black populations as well as by income. Utilizing metrics of UGS quantity alone, the inclusion of reclaimed informal green spaces (IGS) add to the quantity of total UGS in minority areas; this gives the appearance of equality of UGS distribution. However, when analyzing accessible UGS acreage by income and race, as done by Boone et al, (figure 3) an entirely different picture is seen in the same region studied by Abercrombie et al. Upon adding this parameter, it becomes clear that income

distribution trends upwards as the percentage of the white population rises, and accessible park acreage follows in kind. An exception to the trend appears at the highest income levels where a fall-off of accessible acreage occurs. This fall-off is presumably due both to private green space access and the distance of the wealthiest individuals' homes to the central urban areas, where parks tend to be concentrated. Clearly, a multitude of factors must be considered when analyzing the true inequality of access to green space.
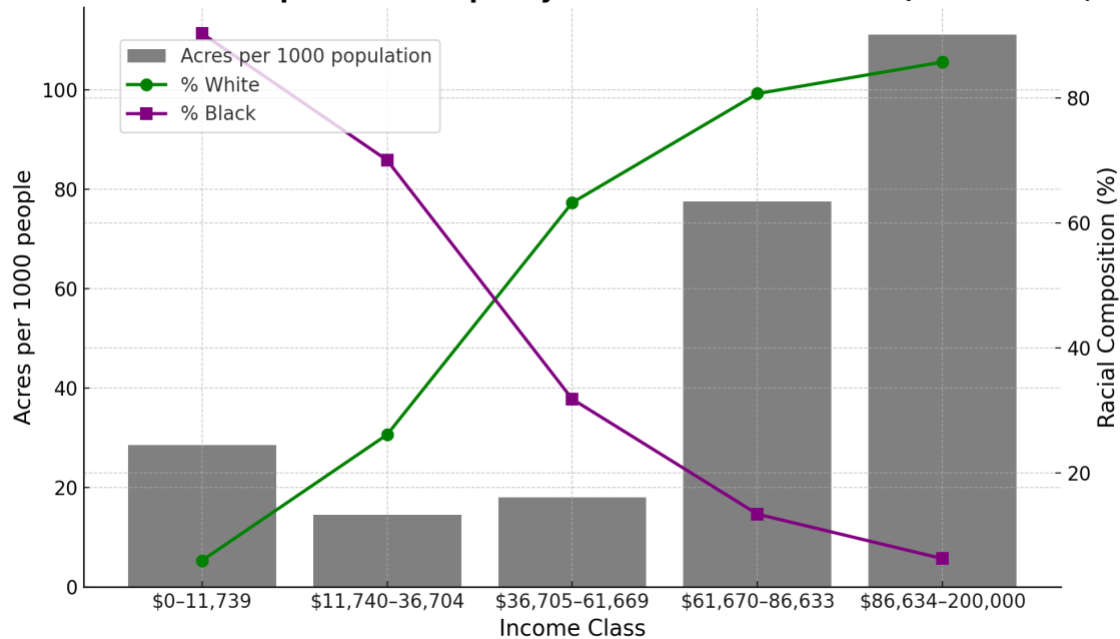
FIGURE 3: Accessible park acreage per 1,000 residents by income class in Baltimore. High-income areas have dramatically more accessible park space, while also disproportionately white. Conversely, low-income, majority-Black neighborhoods have significantly less park acreage. Data from Boone et al. (2009).

The Birds and the Bees

Sitting on a bench at a public park in Southern Idaho, I watched my kids playing with their new "Jr. Explorers Kit." The magnifying glass honed in on blades of grass, the ribbed bark of maple trees, and cracked jungle gym paint while the binoculars scanned branches for squirrels or birds. This focus left the butterfly net and insect box sitting completely unused at my side. Together we looked around the groomed grassy space for insects. The surrounding trees were trimmed high above my head to discourage any climbing. The grass was devoid of any natural debris that might house bugs and the shrubbery was cut square and surrounded by shredded rubber to discourage any "pests." There wasn't a butterfly, beetle, spider, or grasshopper to be found. The heavy sprays and decidedly anthropocentric design of this UGS ensured humans would not be bothered by "pests" of any kind. Such planning and heavy-handed protection against any undesirable fallen leaves or crawling critters had ensured a limited presence of any flying visitors as well. This space had been cleansed of utilizable habitat to provide an aesthetically pleasing UGS, unperturbed by any uncontrolled nature.

Planned green spaces (PGS) include the trees lining streets, hedges that are planted in

medians, parks—both large and small—flower planters punctuating walkways, floral roundabouts, and can include private green spaces as well—lawns, corporate campuses, and trellis walls. The specific species chosen to be planted in PGS may seem to be of little consequence. However, invasive species can be detrimental to the biodiversity of native plants and animals alike. Plant species that are commonly chosen for their ability to naturally deter native wildlife, such as the New Zealand cabbage tree (Cordyline australis, figure 4) are low maintenance thus, less costly to plant and maintain. However, this comes with the cost of unsustainability for the wildlife that relies on these areas (Tosh 2019). Concerns of introducing ornamental, non-native, plants that have evolved separately from their native pollinators range from inefficient flora pollination to native plant species die-offs. Something as seemingly innocuous as choosing a hardier tree or a prettier flower species without broader considerations can be detrimental to the native flowering species (Masters 2015).

Paradoxically, some PGS incorporating non-native species have seen favorable results for pollination patterns. While in some cases chosen flora can pose threats to biodiversity, in other cases more showy invasive plants attract a larger range of pollinators. These magnet species can increase visitation and, when growing in unanimity with native species, encourage seed spread of the native and non-native species alike . It is clear that great care needs to be taken when selecting what species to plant in PGS.

FIGURE 4: Cordyline australis on the Stanford University Campus. (Gutierrez, K.)

Given the potential benefits PGS can have for the pollinator populations, the more aggressive attention being called towards the significant losses of pollinators and insect populations over the last several years is a welcome trend. This has been an opportunity for the more methodical approaches of ecologists and biologists to increasingly become part of the larger conversation during PGS planning and development. However, planned green spaces, albeit wide-ranging, are only one type of UGS.

Since Informal Green Spaces can include places like abandoned lots, natural growth medians, wastelands, and woody overgrowth areas, these places often have a unique biodiversity that favors sensitive species. IGS also tend to have richer levels of bird, invertebrate, and plant varieties (Muller 2018). The difficulty posed by these spaces is identifying a balance between wild growth and light maintenance. Whereas PGS tend to have leaves cleared away before their nutrients can be returned to the soil or insects can capitalize on the favorable conditions for mating, IGS are largely left unspoiled, and nature is allowed to proceed mostly unperturbed.

It is difficult to know what unkempt really means, or to envision IGS as microcosms of biodiversity. Given cultural influence, it is far simpler to see derelict plots with potential for development—places where neglect has allowed a concatenation of disarray to consume larger possibilities of human constructed beauty. This desire for neatness is a common sentiment attested to by the human predilection to patterns and symmetry. This preference is partially vindicated by examples of micro-interventions that, if done methodically, minimize habitat degradation while maximizing biodiversity and the overall health of the ecosystem (Sikorski 2021).

FIGURE 5: Unkempt UGS (fenced for purchase) on University Ave. and Runnymede St. East Palo Alto, CA. (GutierrezK).

The lack of formality in IGS doesn't necessarily mean an abandoned area consumed by nature. An informal green space can also apply to previously derelict areas converted into parks or community gardens by the surrounding neighborhoods (figure 5). These reclaimed areas are among the most favorable environmentally and economically. These spaces also have the benefit of larger sustainability and higher ranges of species diversity, as well as potential for greater overall species quantity when compared to PGS. Minimally tended IGS tend to have better soil conditions through natural decomposition processes over time, and their production capacity is naturally limited by space and location. This special limitation means species chosen to reclaim the area must already conform to local conditions, thus benefiting natural pollinators. Further, since these spaces are spread throughout cities, in-between buildings, alleyways, and street corners, they offer birds and insects access to areas otherwise devoid of practical habitats and can function as waypoints for migrating species.

FIGURE 6: Reclaimed lot area by community group in NYC (GrowNYC 2022).

Good for You and Good for Me

There is something calming about stepping from the pavement and onto an earthen path. I can feel my mood change almost immediately. Even maintained stone paths, bending in and out of blossoms and bushes, offer a feeling of separation from whatever weight the city's lofty buildings might impose. But this is decidedly more than sentiment. In fact, it is biology.

The availability of outdoor exercise and the positive climatological effects associated with most UGS, both planned and informal, offer positive markers for overall physical health that are well documented. The significance of UGS on mental health has long been primarily anecdotal. However, the isolation and hesitancy to utilize UGS during the COVID-19 pandemic has led to new data and a new focus on mental health. This data has demonstrated that usage of UGS can ameliorate depression and stress, improve short-term cognitive function, reduce chronic illness, improve sleep cycles, and restore the neurological fatigue of prolonged attention (Jennings 2019). These findings, and others like it, have led to a resurgence in popularity of UGS among researchers and city-dwellers alike. But it is important to consider where UGS fail to provide such benefits to climate or health. A prime example is the aforementioned hyper-manicured PGS. A large employ of thirsty plant species, such as fields of short grasses, negatively impact a city's water consumption and when frequently mowed, raked, and fertilized, can emit more carbon dioxide than they take in, as well as the much more potent Nitrous oxide (Hostetler 2019). These concerns of emissions from leaf-blowers, edgers, trimmers, mowers, and more apply to hyper-manicured spaces of numerous types primarily found in urban areas. In these instances, positive health effects can be largely negated by pollutants inhaled during frequent park usage.

However, in UGS that are less enthusiastically groomed, studies show clear benefits for mental health through direct use and direct correlations between proximity to and number of UGS on mental and physical health (Wood 2017). Such research has led to swift action in some urban areas previously overrun by urbanization. In many Chinese cities, public green space construction has ramped up since the pandemic. The latest five-year plan calls for more science-based planning of "green rings, green corridors, green wedges, and green passages," with 1000 large parks planned nationally (Bradsher 2021). This is in addition to the potentially thousands of smaller parks being built by Chinese cities independently. These efforts have been seen by many as a method of increasing health equity through access to urban green spaces. However, planned green spaces intended to help underserved, minority, or low-income communities can have unintended consequences. for the same people these PGS are intended to help.

Building Green Demands More Green

As I worked towards selling my home, I was reminded again and again by my realtor to keep the lawn and hedges trimmed. When they came for pictures, it was further suggested that I plant some trees along the drive. At $30 each from the local nursery for the smallest of growing poplars, I was assured that spending more and planting something bigger would return more favorable results. I meticulously prepared the spacing and areas for my new trees and put them in the ground. There was no question that this improved the photo quality of my home, making it feel more inviting. The shadows stretched across the driveway, leaving slow-ticking, leafy stripes behind. Dark silhouettes waved back and forth and were almost as relaxing to watch sway as their progenitors. This purchase had indeed improved my curb appeal, thus increasing the estimated value of my home. But this suburban example exposes the potential of the urban

contrast.

Urban Green Spaces have a similar effect on property values and curb appeal. This is seemingly a net positive. However, in urban areas where rent prices fluctuate with area desirability, a low-income area can see unsustainable price increases as urban green spaces are developed. This eco-gentrification is a puzzling challenge to contend with. Areas most susceptible to eco-gentrification are most-often those lacking PGS. A recent example of this is the High-Line Park in NYC. Originally an abandoned railway line, this successful example of environmental remediation came with the unintended increase of nearby property values of up to 103% (Wolch 2014).

This increase can price-out entire neighborhoods that have spent generations in a previously low-cost area. Along with the reclamation success of projects like the High-Line for birds, insects, and other small animals, these efforts have also attracted attention from tourists. Millions of people each year further expose the older, low-income areas the High-Line runs through to rounds of gentrification cycles and an influx of tourists.
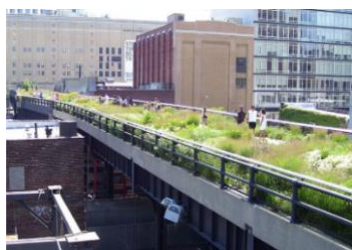
Figure 7: High-Line Park NYC built on unkempt railways (Ken 2020).

Greening can itself result in larger segregation due to mandatory sustainability standards. Greener building standards often come with the expectation of perceivable green spaces. As these standards are implemented in new and updated buildings, price increases follow, thereby forcing lower income individuals to move out or look elsewhere for affordable options (Mehdizadeh 2013). These combined results of building-greening and eco-gentrification have become an increasingly common phenomenon. As these UGS move deeper into the cities' urban cores, represented disproportionately by people of color and lower income individuals, wealthier households and developers look to these same areas for their new investment opportunities. Analogous results have been seen in numerous areas around the world, including Barcelona where Anguelovski I. et al. tracked population redistribution and demographics as UGS have progressed. The Barcelona study found shifts among "residents' instruction level, residents' nationality, and household income level" (p. 458, Anguelovski 2017) all correlating to green space revitalization projects. This trend is prevalent throughout the area and is strikingly similar to those found in numerous cities around the world (Anguelovski 2017) (Shenjing 2007).

Where To Turn

Walking through the city, I look down each street and silently categorize the natural green spaces. I see those that are heavily contained, over-groomed, unkempt growth, converted spaces, and everything else I can imagine. But I am also acutely aware of the homes just a few paces further from the streets—these too I catalogue by estimated price. As I do so, I wonder how they might prefer the cut of their lawn. Can this preference indicate the likelihood of an area's inequitable share of green space?

Given the benefits to mental and physical health green spaces provide, lack of access to

such space is clearly deleterious to social equity. And yet, implementing new UGS in the areas lacking them can have unjust repercussions far more severe. The question is then: what avenue should be turned down? A rising concept is that of "Just Green Enough (JGE)" (Wolch 2014). Proponents of this JGE concept argue that it is up to the willingness of local planners and stakeholders to shape UGS projects, by the community and for the community. The JGE approach aims to explicitly conform to community concerns and needs. The hope is that by making neighborhoods just green enough, the effects of eco-gentrification can be mitigated (Curran 2012). Through this type of community directed and formally planned design, the over-manicuring, invasive species, and other negative aspects of traditional PGS can be avoided. Similarly, the extremes of the unkempt IGS that receive especially heavy push-back from officials or the eyeing from investors can be mitigated as well. Additionally, the JGE model would ensure that the community has the type of space most likely to be utilized regularly, thereby maximizing the health benefits of the UGS overall. Although there is concern of whether community engagement would be favorable enough to achieve significant results, this is still among the more favorable concepts both environmentally and socially. Perhaps a larger concern is that the JGE model will inevitably rely on financiers acting on the needs and expressed desires of the communities. This returns the conversation to the potential disconnect that can exist between converted informal green spaces and the perceptions of those outside the community.

However, as a clear inequity exists among access to urban green space in cities around the world, it is important to recognize that it is highly unlikely that a universal model exists. Regardless of the fluidity of the JGE model, any progress of the urban green spaces for our cities, for our health, and for our climate will continue to require innovation, insight, and diverse input to achieve a balance between cutting in diagonals and cutting in circles.

References

Abercrombie, L. C., et al. (2008). Income and racial disparities in access to public parks and private recreation facilities. *American Journal of Preventive Medicine, 34*, 9–15.

Anguelovski, I., et al. (2017). Assessing green gentrification in historically disenfranchised neighborhoods: A longitudinal and spatial analysis of Barcelona. *Urban Geography, 39*(3), 458–491. https://doi.org/10.1080/02723638.2017.1349987

Boone, C. G., et al. (2009). Parks and people: An environmental injustice inquiry in Baltimore, Maryland. *Annals of the Association of American Geographers, 99*, 767–787.

Bradsher, K. (2021). *China's concrete jungles make room for green space. The New York Times*. Retrieved March 3, 2022, from https://www.nytimes.com/2021/06/01/business/china-parks-green-space.html

Byrne, J., & Wolch, J. (2009). Nature, race, and parks: Past research and future directions for geographic research. *Progress in Human Geography, 33*, 743–765.

Curran, W., & Hamilton, T. (2012). Just green enough: Contesting environmental gentrification in Greenpoint, Brooklyn. *Local Environment, 17*(8), 1027–1042. https://doi.org/10.1080/13549839.2012.729569

GrowNYC. (2022). *2022 GrowNYC corporate volunteer projects*. Retrieved March 5, 2022, from https://www.grownyc.org

Hostetler, M., & Escobedo, F. (2019). *What types of urban greenspace are better for carbon dioxide sequestration?* Department of Wildlife Ecology and Conservation. Retrieved February 24, 2019.

Jennings, V., et al. (2019). *Urban green spaces: Public health and sustainability in the United*

States. Springer.

Masters, J. A., & Emery, S. M. (2015). The showy invasive plant *Ranunculus ficaria* facilitates pollinator activity, pollen deposition, but not always seed production for two native spring ephemeral plants. *Biological Invasions, 17*, 2329–2337. https://doi.org/10.1007/s10530-015-0878-3

Mehdizadeh, R., & Fischer, M. (2013). *The unintended consequences of greening America: An examination of how implementing green building policy may impact the dynamic between local, state & federal regulatory systems & the possible exacerbation of class segregation*. Center for Integrated Facility Engineering, Stanford University. Retrieved June 2013.

Muller, A., et al. (2018). "Wild" in the city context: Do relative wild areas offer opportunities for urban biodiversity? *Landscape and Urban Planning, 170*, 256–265.

Rukhtina, E. (2021). *Cars Parked on a Quiet Residential Street* Retrieved June 16, 2021, from Cars Parked on a Quiet Residential Street. Free Stock Photo

Rupprecht, C. D. D., & Byrne, J. A. (2014). Informal urban greenspace: A typology and trilingual systematic review of its role for urban residents and trends in the literature. *Urban Forestry & Urban Greening, 13*(4), 597–611. https://doi.org/10.1016/j.ufug.2014.09.002

Shenjing, H. (2007). State-sponsored gentrification under market transition: The case of Shanghai. *Urban Affairs Review, 43*(2), 171–198. https://doi.org/10.1177/1078087407305175

Sikorski, P., et al. (2021). The value of doing nothing: How informal green spaces can provide comparable ecosystem services to cultivated urban parks. *Ecosystem Services, 50*, 101339. https://doi.org/10.1016/j.ecoser.2021.101339

Tosh, C. (2019). *How hyper-manicured public spaces hurt urban wildlife*. Retrieved January 23, 2019, from https://phys.org/pdf467455915.pdf

Wikimedia. (2010). *The High Line at West 20th Street, looking downtown*. Retrieved March 27, 2022, from https://commons.wikimedia.org/wiki/File:High_Line_20th_Street_looking_downtown.jpg

Wolch, J. R., et al. (2014). Urban green space, public health, and environmental justice: The challenge of making cities "just green enough". *Landscape and Urban Planning, 125*, 234–244.

Wood, L., et al. (2017). Public green spaces and positive mental health: Investigating the relationship between access, quantity, and types of parks and mental wellbeing. *Health & Place, 48*, 63–71.

Zimmer, L. (2022). *596 Acres helps NYC communities reclaim vacant lots and transform them into gardens*. Retrieved March 27, 2022, from https://inhabitat.com