

Why green “climate gentrification” threatens poor and vulnerable populations

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Cities in the Global North are increasingly adopting green interventions meant to enhance their climate resilience capacity. Plans include Philadelphia, PA’s Growing Stronger, Boston, MA’s Resilient Boston Harbor (Fig. 1), Malmö, Sweden’s Green and Blue Infrastructure Plan, and Barcelona, Spain’s Green Infrastructure and Biodiversity Plan. Such plans and interventions mark the emergence of a new type of climate planning: green climate resilience.

In today’s cities, however, low-income communities, people of color, and migrant communities face well-documented forms of climate injustice. Typically, these populations have contributed the least to climate change, have had the least access to environmental amenities such as green space, are the most exposed to climate hazards and effects (1), and have the fewest resources to adapt (2–4). We argue here that an emerging fifth type of climate injustice arises because these populations are among the social groups most likely to experience residential and social displacement—in the short and mid-term—from green climate infrastructure (5–7) and its associated gentrification risks. It’s what we call green “climate gentrification.”

As a group of social scientists who specialize in environmental justice, we thus call for climate researchers to demystify the supposed benefits of green climate interventions and identify inequities embedded in urban green resilience (8, 9), especially interventions related to green climate gentrification.

Benefits and Values

Green infrastructure and urban greening projects—green roofs, resilient parks and greenways, rain gardens, or detention basins and canals—are often hailed as ways to protect cities against climate change impacts.



Fig. 1. If not done right, green infrastructure, such as that shown here in East Boston, is potentially a source of climate injustice.

These measures include improved storm water management and mitigation of hazards such as flooding (10), the urban heat island effect, and landslides. As such, green infrastructure projects often require lower operating and repair costs than grey infrastructure projects (11). Hence, planners and elected officials often portray them as a “no-regrets solution,” (12) with win-win resilience, adaptation, and mitigation climate benefits.

In addition to serving as an adaptation measure, urban greening is portrayed as accruing economic and social value and benefits. For instance, new green spaces contribute to increased property values (13), economic growth, and business investment (14) while offering recreational access, environmental learning, tighter social ties, strengthened civic networks and social capital, and overall improved health (15).

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Fig. 2. Green strategies along Boston’s shoreline aim to increase access and open space along the waterfront while better protecting the city during a major flooding event. Image credit: ref. 23.

Yet, recent research suggests that green infrastructure planning for climate change is rooted in a green and resilient city orthodoxy (16, 17) that integrates nature-driven solutions into urban sustainability policy. This orthodoxy, as we have argued in previous research, either overlooks or minimizes negative impacts for socially vulnerable residents while selling a new urban brand of green and environmentally resilient 21st-century city to investors, real estate developers, and new sustainability-class residents (7, 18).

An Unexplored Research Nexus

Scholars of green gentrification examine the production of urban inequities through greening visions and interventions such as greenways, parks, or community gardens. Their work demonstrates that new green value cannot be harnessed without land cleanup and revaluation, dispossession and accumulation, and displacement of socially and racially vulnerable groups (19–21). In addition, emerging studies suggest that climate adaptation can produce new inequalities and climate gentrification (6).

In our view, studies of green gentrification, on the one hand, and of climate adaptation and gentrification pathways, on the other, are important. However, with a few exceptions (7, 17), work at the nexus is missing: This includes the analysis of inequities resulting from green resilient infrastructure—and the study of green climate gentrification as a new form of urban climate injustice.

Case Study: East Boston

To help highlight the risks of green climate gentrification, consider the case of East Boston, a historically working-class Latino and Italian neighborhood.

Estimates from the 2017 Climate Ready East Boston Plan* warn that half of the land could be flooded during a major storm in the next 50 years. Here, our research, together with recent media reports,† already points to the risks of green climate gentrification.

East Boston has recently benefited from green infrastructure projects, such as Piers Park and the East Boston Greenway, which are meant to buffer against sea level rise and flooding. East Boston is also part of the large-scale 2018 Resilient Boston Harbor plan,‡ which aims to deploy green infrastructure projects—elevated berm landscapes, resilient parks—along the 47 miles of the Boston shorelines, some of them already included in existing neighborhood resilient plans (Fig. 2).

Part of the Harbor plan focuses on inclusivity through community-led planning that addresses lower-income and minority residents’ needs and priorities. Yet, although the plan includes efforts to preserve some existing affordable housing and create some key mixed-used redevelopment projects, overlooked are issues of green climate gentrification and short- or mid-term displacement risks.

First, the Boston Harbor plan does not consider an important political reality: As the city turns to new, private financing resources and tools to execute the ambitious and costly green adaptation measures,§ the

*<https://www.boston.gov/departments/environment/climate-ready-east-boston>.

†<https://www.wbur.org/earthwhile/2019/05/02/moakley-park-east-boston-climate-resiliency>.

‡<https://www.boston.gov/news/transformation-plan-create-resilient-open-boston-harbor-unveiled>.

§https://www.boston.gov/sites/default/files/document-file-07-2017/resilient_boston.pdf.

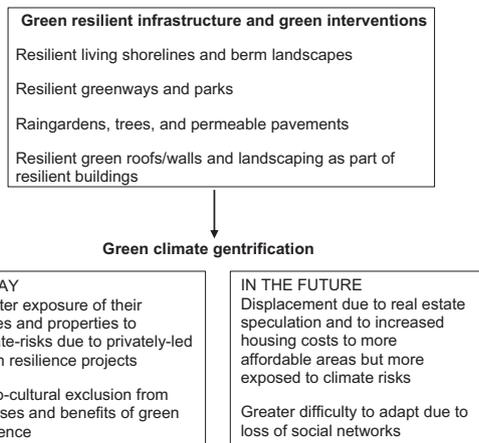


Fig. 3. Green climate gentrification represents a new type of urban climate injustice.

interests of socially vulnerable groups of class and racial/ethnic minorities quickly become lower priorities.

The Boston real estate industry is building resilient properties for elites and displacing lower-income residents in the process, while at the same time advocating for the City of Boston to create new protection zones for future investments. Here, Boston neighborhoods designated for green infrastructure—South Boston, Charlestown, and East Boston—are recognized by real estate developers as worth investing in, greening, and protecting, as our ongoing field work reveals.[¶] In this context, East Boston already demonstrates instances of green, resilient, exclusive, and speculative luxury real estate developments. Clippership Wharf (inaugurated in June 2019) (see Fig. 1) is a luxury “resilient” residential project with the first floors of its 478 condo or apartment units set at 24 feet above Boston’s baseline.[#] With rents starting at \$2,300 per month, Clippership’s exclusive sustainability-class residents (7) can also enjoy four acres of open space, including a harborwalk and a living shoreline.

Second, as local experts and activists have highlighted during our fieldwork, some of the landscapes, terrains, and older housing stock located directly behind (and beyond the protective range of) green resilient infrastructure projects and luxury resilient housing buildings on the East Boston waterfront are at greater risk of flooding. The risks stem from a lack of broader neighborhood-based resilient planning. They’re also the result of early individual building permits granted without considering the environmental risks that were posed by the size, elevation, and other design features of the buildings.

[¶]Our qualitative field data consists of 35 semistructured interviews conducted in 2018 and 2019 with relevant key public, private, and nonprofit stakeholders involved in green planning, real estate development, and community activism in Boston, and East Boston in particular. We identified respondents through snowball sampling. We complemented this data with a review of primary planning documents, of real estate data, and with observation of public community and municipal meetings.

[#]<https://www.bdcnetwork.com/rebuild-retreat-or-resist>.

Third, from a sociocultural displacement standpoint, our interviews reveal that many long-term residents feel socially and culturally excluded from some of the new green spaces built along the East Boston waterway. Many existing green resilient developments are designed for higher-income residents, and resilient parks and shorelines are, after all, next to or within the land of luxury condo developments.

Lastly, many instances of civic participation for adaptation planning reveal that facilitators or designers of new green infrastructure or climate adaptation interventions often do not allow for inclusion of and interventions by people who have experienced past violence, insecurity, or crime within a specific area (6). Thus green resilient infrastructure might exacerbate racial injustices. Our fieldwork also reveals that recent top-down green planning processes in East Boston, rather than community-driven green alternatives, can lead to such exclusionary results. To avoid what some call “colorblind adaptation planning” (22), it is essential to examine testimonies of the racial formation of insecure landscapes and respond to the concerns of both environmental/climate justice advocates and gentrification activists.

In sum, in East Boston and elsewhere, the reality of multiple injustices occurs precisely because the risks prioritized by socially vulnerable groups (displacement, physical insecurity) are deprioritized in the name of addressing identified climate risks through green infrastructure.

Research Priorities

Research needs to uncover the pathways by which the impacts and risks of green resilient infrastructure might be worsening the security and vulnerability of long-term residents and creating green climate gentrification (Fig. 3).

First, quantitative/spatial analyses need to establish who is moving to new greened and protected areas and who is being displaced to neighborhoods that have few environmental and social safeguards. Also, researchers need to examine the extent to which resilient green infrastructure might create greater vulnerability for future gentrification. Neighborhoods with a high proportion of green resilient infrastructure might indeed also be more exposed to gentrification in the future (e.g., if they are close to waterfronts or have lower rents) and demonstrate greater sensitivity to climate impacts (e.g., if they have a higher proportion of elderly residents or residents who are not native speakers).

Second, further spatial and qualitative analyses should identify which neighborhoods are targeted for green resilient infrastructure and the reasons for these investments. It might be that these projects are frequently placed in neighborhoods where the types of risk do not call for green infrastructure, and that managed retreat might, in some cases, be a more environmentally and socially sound answer. Researchers should also parse the types of green resilience investments responsible for the most and the least disruptive displacements. That is, which green resilience

projects are likely to provide broadly shared versus privatized benefits.

Third, ethnographic research would help explain what social vulnerability means in the context of green climate gentrification. We need improved understanding of how people respond to climate threats and to the displacement that adaptation responses might cause and how community groups support them.

Fourth, qualitative research on policy and planning processes will help move from understanding risk (and resilience) as the exclusive domain of experts to approaches that integrate citizen science and vernacular knowledge (22), especially the traditionally overlooked knowledge of racial minorities and immigrants. This would allow residents to recognize themselves in green infrastructure planning while fostering individual and local community identity. Doing so would ensure greater inclusion and participation to address green climate gentrification risks.

Such research is particularly needed as residents' perceptions of climate risks—especially those of disenfranchised social groups—tend to clash with dominant visions, discourses, and practices of municipal greening and resilience. Here, we call for specific community-based participatory research processes—in which researchers partner with respondents—to uncover local spatial knowledge and perceptions, through which residents can share and map their own notions of risks, adaptation capacity and resources, and overall ecological street knowledge.

Policy Takeaways

All in all, green infrastructure planning for climate adaptation needs to incorporate financing schemes that will ensure the protection of social and public housing stocks and build new permanent affordable

housing for different income ranges in the vicinity of climate-resilience infrastructure. Rental subsidies, well-devised forms of rent control, and community land trusts—specifically designed in the context of climate adaptation planning—are also important antidisplacement tools.

Investments in green infrastructure should also build the adaptive capacity of vulnerable residents to both climate impacts and displacement. An excellent community-driven example of this work is the Living Cully^{ll} network in the Latino neighborhood of Cully in Portland, OR. Verde, its nonprofit organization, aims to train and hire local residents in projects that improve social and environmental resilience. Similar laudable efforts in Boston are being led by groups such as GreenRoots and Boston Harborkeepers.

We applaud efforts to mitigate the risks from impending climate change and to build climate-resilient cities. But our research reveals problematic and unintended risks and impacts associated with green infrastructure—especially private sector projects that neither prioritize nor address vulnerable communities. To what extent are some resilient green infrastructure investments simply a means of allowing residents (most often the wealthiest residents) to keep living near (inhabitable) waterfronts?

Vulnerable populations—many of whom have already been exposed to hazardous conditions in their neighborhoods—now stand to benefit least from greening initiatives. The tragic irony here is that improvement of those neighborhoods through green infrastructure may cause these vulnerable populations to lose their neighborhoods altogether.

^{ll}<https://nextcity.org/features/view/when-green-infrastructure-is-an-anti-poverty-strategy>.

- 1 R. Leichenko, K. O'Brien, *Environmental Change and Globalization: Double Exposures* (Oxford University Press, Oxford, 2008).
- 2 D. Ciplek, J. T. Roberts, M. R. Khan, *Power in a Warming World: The New Global Politics of Climate Change and the Remaking of Environmental Inequality* (MIT Press, Cambridge, MA, 2015).
- 3 M. Checker, Stop FEMA Now: Social media, activism and the sacrificed citizen. *Geoforum* **79**, 124–133 (2017).
- 4 J. Maantay, A. Maroko, Mapping urban risk: Flood hazards, race, & environmental justice in New York. *Appl. Geogr.* **29**, 111–124 (2009).
- 5 G. Shokry, J. J. Connolly, I. Anguelovski, Understanding climate gentrification and shifting landscapes of protection and vulnerability in green resilient Philadelphia. *Urban Clim.* **31**, 100539 (2019).
- 6 I. Anguelovski et al., Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the Global North and South. *J. Plann. Educ. Res.* **36**, 333–348 (2016).
- 7 K. A. Gould, T. L. Lewis, From green gentrification to resilience gentrification: An example from Brooklyn. *City Community* **17**, 12–15 (2018).
- 8 H. Eakin et al., Opinion: Urban resilience efforts must consider social and political forces. *Proc. Natl. Acad. Sci. U.S.A.* **114**, 186–189 (2017).
- 9 R. W. Kates, W. R. Travis, T. J. Wilbanks, Transformational adaptation when incremental adaptations to climate change are insufficient. *Proc. Natl. Acad. Sci. U.S.A.* **109**, 7156–7161 (2012).
- 10 M. H. Finewood, A. M. Matsler, J. Zivkovich, Green infrastructure and the hidden politics of urban stormwater governance in a postindustrial city. *Ann. Assoc. Am. Geogr.* **109**, 909–925 (2019).
- 11 J. Ahern, Urban landscape sustainability and resilience: The promise and challenges of integrating ecology with urban planning and design. *Landsc. Ecol.* **28**, 1203–1212 (2013).
- 12 Mees H-LP, Driessen PP Adaptation to climate change in urban areas: Climate-greening London, Rotterdam, and Toronto. *Climate Law* **2**, 251–280 (2011)
- 13 D. Immergluck, T. Balan, Sustainable for whom? Green urban development, environmental gentrification, and the Atlanta Beltline. *Urban Geogr.* **39**, 546–562 (2018).
- 14 K. Loughran, Parks for profit: The high line, growth machines, and the uneven development of urban public spaces. *City Community* **13**, 49–68 (2014).
- 15 M. Gascon et al., Residential green spaces and mortality: A systematic review. *Environ. Int.* **86**, 60–67 (2016).
- 16 J. J. Connolly, From Jacobs to the Just City: A foundation for challenging the green planning orthodoxy. *Cities* **91**, 64–70 (2018).

- 17 I. Anguelovski, J. Connolly, A. L. Brand, From landscapes of utopia to the margins of the green urban life: For whom is the new green city? *City* **22**, 417–436 (2018).
- 18 M. Checker, Wiped out by the “greenwave”: Environmental gentrification and the paradoxical politics of urban sustainability. *City Soc.* **23**, 210–229 (2011).
- 19 H. Pearsall, Moving out or moving in? Resilience to environmental gentrification in New York City. *Local Environ.* **17**, 1013–1026 (2012).
- 20 J. A. Maantay, A. R. Maroko, Brownfields to greenfields: Environmental justice versus environmental gentrification. *Int. J. Environ. Res. Public Health* **15**, 2233 (2018).
- 21 K. A. Gould, T. L. Lewis, *Green Gentrification: Urban Sustainability and the Struggle for Environmental Justice* (Routledge, 2017).
- 22 R. D. Hardy, R. A. Milligan, N. Heynen, Racial coastal formation: The environmental injustice of colorblind adaptation planning for sea-level rise. *Geoforum* **87**, 62–72 (2017).
- 23 City of Boston, Transformative plan to create resilient, open Boston Harbor unveiled. <https://www.boston.gov/news/transformational-plan-create-resilient-open-boston-harbor-unveiled>. Accessed 27 November 2019.