

Getting soaked? Climate Crisis, Adaptation Finance, and Racialized Austerity

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Abstract:

As the effects of austerity continue to ravage cities and the impacts of climate change become more pronounced, municipal officials around the world are struggling to pay for climate adaptation. Some cities have already begun to anticipate the new infrastructures that climate change will require, while others have been forced to adapt in real time as climate crises have arrived in spectacular ways. Two of the most emblematic events are Superstorm Sandy, which drenched New York City in October 2012, and the drought-induced crisis of water scarcity in Cape Town, South Africa, which was most visible between 2016 and 2018. In both cases, the cities turned to green bonds, a form of municipal finance that foregrounds environmental ambitions. In this paper, we track the forms of adaptation projects that green borrowing are earmarked to fund. Drawing from scholarship on the financialization of nature alongside recent work on racial capitalism and austerity, we find that rather than transformative municipal change each city is largely carrying on with projects that reinscribe existing inequalities in the city. In addition to reflecting inequalities already present in the two cities, however, the use of municipal debt for adaptation intensifies risks, both financial and environmental, borne primarily by the poor or working class people of color. Building on qualitative fieldwork in Cape Town, New York, and across the green bond investment chain, we argue that the risks posed by climate change in the city cannot be financialized away. Ultimately, we call for the end of municipal austerity driven by national and supranational budgeting choices in favor of increasing national funding of municipal adaptation by rescaling borrowing to higher political scales that can more progressively distribute risks.

Key words:

Financialization of nature; green bonds; racial capitalism; climate adaptation; urban political ecology

Highlights:

1. Cities are increasingly facing challenges posed by climate change in addition to austerity and legacies of racialized development.
2. Some cities are turning to green bonds to finance critical climate adaptation measures.
3. The use of green debt signals more business as usual than transformational change.
4. The use of debt to fund adaptation can make cities more, rather than less, risky for its most vulnerable inhabitants
5. Urban political ecology can benefit from blending race, austerity, and financialization as topics of inquiry.

Introduction

Cities built for the 20th Century are increasingly reckoning with 21st Century realities. These realities cut across social, economic and environmental registers, and a critical confluence lies in the question of how to pay for the infrastructure needed to adapt to changing socio-environmental conditions precipitated by climate change. Municipalities must come to grips not only with sea level rise, less predictable weather, and growing urban populations, but also the complicated legacies of uneven, often racialized, development in and between cities. The funding requirements to adapt to new environmental realities are astronomical, running into the hundreds of billions per year globally (UNEP 2016).

Some cities have begun to anticipate the new infrastructure that climate change will require, but others have been forced to adapt in real time as climate crises have arrived in spectacular ways. Two of the most emblematic events are Superstorm Sandy that drenched New York City in October 2012 and the drought-induced crisis of water scarcity in Cape Town, South Africa that was most visible between 2016 and 2018. While both cities managed to weather these crises at the time, the question of when, not if, the next emergency will arrive stalks municipal officials. Further, impacts are still being felt in each city. The New York transit system continues to creak through a deepening maintenance crisis exacerbated by storm damage, coupled with a deteriorating fiscal outlook. 12,500 kilometers away in Cape Town, the drought and resulting water shortages created budgetary shortfalls that need to be made up in the months and years to come, complicating an already uneven infrastructural landscape.

In this paper we are interested in how municipal governments in each city have responded, both in infrastructure planning and financially, to socio-environmental disaster. When prompted to reshape critical infrastructure in the city, leaders largely carried on with existing plans, and opted in part to finance those plans using green bonds, a type of debt specifically designated for environmental ends. The New York Metropolitan Transit Authority (MTA, which manages most public transportation¹) and the city of Cape Town have been pioneers in the municipal green bond market. The bonds issued by MTA and Cape Town are certified to the Climate Bonds Standard, which requires the identification of the use of proceeds and an external verification by an auditor of those green bonafides. It does not, however, guarantee that any greater environmental benefits will accrue than what would have otherwise happened, nor does it necessarily impact the cost of capital for borrowers.

In this paper, we argue that the use of green debt for climate change adaptation in cities that are already feeling its impact threatens to deepen racialized geographies of financial and environmental risk. While Cape Town is perhaps the prototypical case of racialized inequality given enduring apartheid spatialities, we note that the constitution and distribution of environmental and financial risk play out in broadly similar ways in both cities due to the histories and processes through which racial capitalism materializes in specific sites (Fredrickson, 1981). Finance does not alter existing geographies and dynamics despite its framing as a vehicle for building more resilient cities. As a representative of the Western Cape

¹ Somewhat confusingly, the MTA is not a city agency, but a New York state agency whose funding is derived from state, local, and federal appropriations in addition to fares and tolls. Nonetheless, it is a useful example as it operates at the municipal scale and is capable of issuing its own debt.

provincial government told us in reference for the need to have functioning infrastructures in place before (green) financing can be secured, “if you don’t need the money, you can get it. If you need it, you can’t (Interview, October 2018).”

While flippant, this quote gives voice to the central tensions of climate finance across scales, as those least responsible for emissions are facing the brunt of the climate crisis. Cape Town’s hydroscape is defined not simply by an absolute water shortage but reflects enduring inequalities that bifurcates the population into over and under consumers of water (See Rodina, 2016; Scheba & Millington, 2018; Yates & Harris, 2018). The inequalities of public transportation provision in New York are similarly indexed against historical and contemporary social difference, as the poor, women, and communities of color disproportionately bear the risks of poor transportation access and reliability.

Undoing inequities of service provision that have built up over decades and centuries is not the aim of green bonds. Nevertheless, we argue that the turn to capital markets for adaptation finance narrows the possibilities for radical changes needed for a just transition. By piling on additional debts in which investors generally have senior claims on future revenues, municipal borrowing to fund projects that are already in process forecloses more fundamental actions in the present and future. While all forms of debt financing inherently constitute and distribute risk, we are concerned that the ‘greening’ of municipal debt may occlude retrograde social processes that heap addition risks onto those least able to bear them. By this, we mean that the ‘green halo’ (Sörqvist *et al*, 2015) of environmental finance may distract observers not attuned to day-to-day realities of people who are indelibly dependent on public infrastructure - for example, New Yorkers who have few choices for transportation except subways and buses, or Capetonians without the means to afford new water tariffs levied in response to the city’s crisis. In both cases, crisis response mediated through green debt can leave these communities in more, rather than less, risky positions.

At the same time, we stress that these cities, like most, have few good options when it comes to paying for adaptation. Decades of austerity, galloping inequality, the spatialization of explicitly racist policies, and the costs associated with disaster recovery all impose financial burdens on top of already spiraling costs for infrastructure maintenance and provision. As Farnsworth and Irving (2012) note, just as there are varieties of capitalism, there are varieties of austerity. While marginalized communities in both cities have long suffered infrastructural deprivation in comparison to favored parts of each city, the contemporary expression of municipalized austerity has distinctly different origins despite outcomes that bear key similarities². In short, many of the effects of austerity and the growing power of financiers in the global economy have left city bureaucrats with little recourse to institutions other than capital markets if they are to make the best of an impossible situation within existing political-economic arrangements.

Through engagements with scholarship on the financialization of nature and infrastructure, sharpened with recent work on racial capitalism, we contribute to discussions about green

² Indeed, the austerity imposed on New York in 1975 offered key lessons for the Bretton Woods institutions that would impose structural adjustment on South Africa in the early 1990s (Sonti, 2018)

finance and municipal adaptation by exploring how the use of municipal debt for adaptation displaces environmental and financial risk onto poor and racialized urbanites. Debt laden responses to climate change are amenable to reproducing the conditions that led to crises in the first place, maintaining the spatialities of environmental risk already present in the city, but with added layers of financial risk. As Prasch (2004) presciently noted regarding financial risks, “we have seen, and can expect to continue to see, the systematic shifting of risks toward those who cannot afford them, cannot control them, and do not want them” (405, in Christophers *et al*, 2019). In societies that are dedicated to responding to climate change under the auspices of ‘how to change so that nothing really has to change’ (Swyngedouw, 2013), Prasch’s observation is as true for environmental risk as it is for financial risk.

In the next section we review literatures in urban political ecology and the financialization of nature to help us understand how the use of green municipal finance produces spatialities of risk that are intensely localized, produced through difference, and are deepening inequities. Following brief discussions of methodology and green bonds, the main sections of the paper examine the financial and environmental dynamics of infrastructure and adaptation in Cape Town and New York. We focus specifically on the relevant municipal services and their relationship to vulnerable and marginalized communities. We describe the role played by debt in refashioning the socio-spatialities of risks constituted through historical city-building, austerity, climate change, and municipal borrowing. We conclude by reflecting on the implausibility of financializing away climate risks, as well as the way that twinned financial and environmental risk serve to magnify the risks unwillingly borne by the poor, women, people of color, and immigrants. We argue that better solutions lie in reversing national and supranational austerity and shifting the scales of financing adaptation upward. Political scales capable of enacting more progressive taxation and borrowing on more favorable terms should raise the funding, which would be distributed to cities for democratic adaptation planning and implementation.

We aim to make two contributions with this paper. First, with inspiration from recent critiques of neoliberal natures (see Lave, 2018), we document the impacts of green bonds, which have been understudied despite their growing prominence and widespread effects (for exceptions, see Bracking, 2015, Christophers *et al*, 2019). Second, we bring austerity into view alongside both the financialization of nature and racial capitalism. Austerity has barely featured in the neoliberal natures literature, and racial capitalism has only recently featured in an otherwise vibrant research community (Bigger and Dempsey, 2018). Urban political ecology has made a more sustained investigation of racialized natures, but it has had less to say about financialization (Christophers, 2018). Our intent is to facilitate dialogue between these evolving literatures.

Austerity, finance, race, nature

To make sense of convergent outcomes in apparently divergent spaces, our analysis builds on work about contemporary dynamics of the financialization of nature (Ouma *et al*, 2018) and urban infrastructure (Langley, 2018). We read financialization alongside studies of racial capitalism (Bledsoe and Wright, 2019) and urban governance, particularly a nascent literature

around municipal austerity, race, and the environment (Ranganathan, 2016; Pulido, 2016), as well as work in urban political ecology that reflects the raced dynamics in the production of urban natures more broadly (Dillon, 2014; Heynen, 2016; Katz, 2008; Pulido, 2000). Our work through the raced and classed³ risks that structure and are reflected in Cape Town and New York's use of green bonds contributes to lively conversations about the financialization of nature, urban climate adaptation, and the articulation of environmental injustices under racial capitalism.

From the outset of the 2007 financial crisis (e.g. Smith, 2007), critics have warned that new financial interventions in environmental management may represent techno-natural fixes for capitalism (Swyngedouw, 2013). The fix of rendering environments investable is meant to solve capital's twin crises of overaccumulation (Bond, 2012) and the increasingly urgent second contradiction of capital wherein capital destroys its own capacity to reproduce the conditions of its reproduction (O'Connor 1996, Moore 2015). This narrative has faced increasing push-back in recent years, with authors like Dempsey and Suarez (2016), Christophers (2015), and Ouma (2015), questioning the extent to which nature is meaningfully 'financialized', or indeed the transformative potential of green finance in general.

Lave (2018) argues that many scholars have been seduced by the complexity and apparent novelty of environmental finance while overlooking innumerable instances of less exotic, but more damaging, environmental injustices. We are sympathetic to Lave's concerns, and in many ways this paper confirms them. But we also think that green bonds are quantitatively distinct from the types of investigations Lave identifies as having served the purpose of demonstrating that, "there is very little 'neo' in neoliberal natures" (2018, 55). Global green bond issuance grew to around US\$160 billion in 2018 (CBI, 2019). While other forms of environmental finance are decidedly marginal (Dempsey & Suarez, 2016; Bigger & Dempsey, 2018), both in dollar terms and environmental impact⁴, green bonds are poised to become a mainstream asset class, reflecting the types of responses to climate change that capital, capitalist states, and supranational lenders identify as most investable, and therefore, actionable.

We find that finance thrives not only on homogenization or the erasure of difference, as has been the argument in much of the neoliberal natures literature (e.g. Robertson, 2006; MacKenzie, 2009), but also on differentiation. We could start as far back as the production of race as a modern category in the birth of not only Anglo-American financial capital (Baucom, 2005), but capitalist world ecology more broadly (Patel & Moore, 2017). The *longue durée* of financial capital accumulation, from the slave trade to the securitization bonanza in mortgage backed securities that helped precipitate the subprime crisis (Ashton 2012), was achieved, at

³ Risk embedded in urban service provision and infrastructure is also intrinsically gendered. Women, and women of color in particular, are more reliant on public transportation for wage and reproductive labor, so both financial and environmental risks are experienced more acutely by women, who comprise around 60% of subway trips (Saska, 2015). Water access in Cape Town is acutely gendered as well (see Harris *et al*, 2017; Sultana, 2018).

⁴ Though these interventions often have detrimental social outcomes for impacted communities regardless of their economic or environmental failures (see Asiyanbi, 2018; Chomba *et al*, 2016; Beymer-Ferris & Basset, 2012).

least in part, through racial differentiation and exploitation. These practices of accumulation shot through with racialized dispossession have been so successful that there now exists a 'wall of money' seeking profitable investment. Meanwhile, municipal, national, and international inequality has reach staggering new depths; green bonds are promoted as a way for the wall of money to mitigate the environmental consequences of previous rounds of accumulation (see also Rosenman, 2019 for other asset classes that turn on this logic).

At the same time, neighborhoods, cities, and nation states are starved of capital for day-to-day maintenance or the expansion of vital services, never mind transformative infrastructural retrofits that could produce inclusive communities less exposed to environmental and economic risks. In cities, this starvation has been produced through racially-explicit infrastructural deprivation and municipal austerity that forces cities to make difficult choices. These processes are further complicated by environmental change. Adaptation needs impose additional costs on cities and drives them to increased borrowing and service charges, fueling a cycle of indebtedness and intensifying spatialities of risk. While other studies of financialization have linked state austerity across juridical scales to the introduction of financial practices and logics in governance (Peck, 2012), links between austerity and the financialization of nature have been notable in their absence (Bigger & Dempsey, 2018; but see Calvário *et al*, 2017).

As urban climate policy becomes increasingly interwoven with finance capital, the forms through which those policies are articulated are globally significant (Long & Rice, 2019). Attention to the specific forms of those changes is critical if we are to contest looming eco-apartheid prefigured by the constitution and distribution of environmental/economic risk (Cohen, 2017). This interest, in turn, leads us back to recent work on racial capitalism, and how the meteoric growth of financial markets and deployments of financial logics (in 'nature' and otherwise) are not simply an economic phenomenon, but are intensely social-spatial processes to which racism and white supremacy, historical and contemporary, are inextricably bound (Kish & Leroy, 2015). If urban austerity in and through nature is marked by a bio/necro-politics of abandonment articulated through race (McIntyre and Nast, 2011; Ranganathan 2016) while the extent and intensification of financialization also operates through race (Arestis *et al*, 2013), it stands to reason that financial responses to urban climate crises will be shot through with racialized dynamics of risk.

Paying attention to dynamics of 'green' finance has implications not just for work in political ecology but also for understanding contemporary urban governance in an era of deepening austerity, climate crisis, and what Long and Rice (2019) call "climate urbanism." Climate finance offers unique insight into contemporary governance challenges facing cities and municipalities (Buckley, 2010). While Lave (2018) is right that much of the focus on environmental finance has prioritized novelty over effect, the degree to which cities are positioned as the primary actors within climate change adaptation and mitigation is increasingly hard to overstate and suggests the need for critical inquiry into the everyday dynamics of municipal budgeting in multi-scalar contexts of austerity (Long & Rice, 2019). Therefore, our arguments are pointed as much towards contemporary articulations of urban governance as they are towards work on neoliberal natures.

Ultimately, our interest is in the role of debt for urban adaptation to unfolding crises. In both New York and Cape Town, we find that the ability to manage environmental risks is increasingly mediated by financial logics, for both municipal officials and urbanites. However, we are dubious that the designation of debt as 'green' meaningfully alters this dynamic, though labeling can help us see how these practices play out. Cities are facing serious challenges prompted by environmental change and absent significant political change no amount of earmarked debt for adaptation will fundamentally reshape broader urban riskscapes in egalitarian ways. Instead we argue that adaptation in the city cannot be reduced to questions of municipal fiscal management and requires sustained investment from other fiscal scales coupled with systemic changes to how risks, environmental and economic, are produced and distributed.

Methodology

This paper builds on fieldwork in Cape Town and New York. Drawing from Hart's model of relational comparison and intersectional understandings of the differentiated effects of socio-environmental crisis, we begin not from bounded geographical units but instead "vantage points" where "critical ethnography and spatio-historical analysis of conjunctures and interconnections" (389) can shed light on shared processes and practices (Hart, 2006, 2016). Differentiating her approach from existing tendencies in Southern Urbanism through its dialectical approach, Hart describes a conjunctural move that involves "bringing key forces at play in South Africa and other regions of the world into the same frame of analysis, as connected yet distinctively different nodes in globally interconnected historical geographies – and as sites in the production of global processes in specific spatio-historical conjunctures, rather than as just recipients of them," (373). As such, our interest is not in comparative urbanism *per se*, but rather is oriented around specific processes that both materialize in, and are constituted by, specific places.

From this perspective, we understand Cape Town and New York as nodes that both respond to, but also produce, specific processes and outcomes. These processes include experiences of austerity and climate crisis, ongoing dynamics of racialized dispossession, and the use of new financial instruments to fund climate change adaptation. Our choice to narrate green finance from cities that cut across north-south binaries draws from the convergence of two ongoing research projects and is oriented toward a conjunctural method that looks for patterns and overlapping processes across north/south binaries rather than sees southern cities as failed models of northern examples (Chattopadhyay, 2012; Lawhon *et al*, 2016; Millington & Lawhon, 2018; Robinson, 2016; Roy, 2005, 2009, 2017).

In Cape Town, interviews were conducted with representatives of municipal and provincial governments knowledgeable about the city's budget, climate finance, and climate change adaptation strategy as well as private sector representatives with knowledge about green finance in South Africa. Additional interviews were conducted with both private sector and national government representatives in Gauteng province, with specific emphasis on climate finance and the green economy more broadly. All interviews were conducted in person, with one exception that was conducted over Skype. The second author was based in Cape Town from January 2017 until August 2018, working primarily on a project about water and waste

infrastructure in Cape Town. In New York, interviews were conducted in October 2018 via phone with municipal transportation officials and bankers. These interviews were informed by 12 in-person interviews with key actors in the global green bond market in London, Copenhagen, and Brussels between December 2016 and January 2018 during the first author's research on the global green bonds market. Though we do not draw extensively from interviews for direct quotations in our analysis here, we use them to contextualize and verify extensive primary document and newspaper archival analysis. Where we do draw on information learned from interviews we include the place and date of the interview, along with the informant's professional position.

Green debts?

Labeled green debt was the domain of development banks until 2014, when municipalities and corporations began borrowing for less carbon intensive projects. By the end of 2017, annual green bond issuance exceeded US\$160 billion, nearly topping all other types of finance explicitly designated to mitigate or adapt to climate change combined. For example, global carbon market allowances value across all compliance markets stood around US\$40 billion in 2016, while much hyped mechanisms like REDD+ carbon offsets or multilateral pools of capital like the Green Climate Fund appear as drops in the bucket of climate finance, never mind financial markets more broadly (Bigger & Dempsey, 2018). Green bonds increasingly form a component of mainstream investment portfolios and help define what kinds of climate change related projects get funded (Bracking, 2015). There are many reasons for the growth of any financial asset class, but here we identify three factors that contribute to the growth of green bonds before discussing their shortcomings.

First, bonds are boring. In the wake of a financial crisis perceived to have been fomented by complex financial engineering, boring is good. Boring is doubly good in climate finance where other mechanisms, like carbon allowances, are viewed as beholden to regulatory fiat and without benchmarks, making them difficult to assess as an investment product (Verifier interview, London, August 2017). In comparison, green bonds are exactly like normal bonds, so big institutional investors like pension funds already have mountains of data for assessment (Bigger, 2017). Proponents of green bonds claim that if even a sliver of all bonds were 'greened', the funding gaps for the provision of urban infrastructure designed for the rigors of climate change could be filled overnight (CBI, n.d.). These proponents are the second reason for the growth of green bonds. Groups like the Climate Bonds Initiative have played a critical role in convincing issuers to label their debt, for institutional purchasers to seek out labeled debt, and for intermediaries to develop market devices like indices for measuring green bonds (Tripathy 2017).

Third, there is legitimate interest among some debt buyers for investment grade bonds that have a credible claim to creating environmental benefits. Big buyers like California's public pensions have engaged issuers to encourage offerings that conform to the buyers' preferred financial risk profiles. (Interview, pension fund ESG officer, Copenhagen, September 2017) Officials in Cape Town and New York reported that labelling increased orders for debt as new

investors are attracted to bonds they might not have previously considered (Issuer interviews, October 2018). That increasing interest by new buyers will 'crowd in' green finance is one of the animating hypothesis of green bond advocates; when **labelled green debt outperforms unlabeled debt, green bonds will create a pricing premium. In turn, this would lower the cost of environmentally-conscious projects and create a 'virtuous cycle' of more and more green projects (Reichelt and Keenan 2017). While there is preliminary evidence that this 'greenium' may be starting to emerge (Partridge and Medda, 2018) research participants in Cape Town's municipal finance division, in New York directly involved with the MTA's green borrowing, and other market interlocutors in Copenhagen and London expressed skepticism that any such discount existed. Indeed, with added costs of verifying the environmental criteria of a bond, issuance may be more, rather than less, expensive. This echoes Christophers' (2018) observation that the use of exotic green financial mechanisms in Washington D.C. actually increased borrowing costs for utilities, and hence for ratepayers.**

These added expenses with no guaranteed price premium are just two of the shortcomings we might attribute to green bonds. Additionally, while some green bonds are certified to comply with standards that have developed, there are no legal definitions of 'green' in green bonds. The failure to achieve stated environmental goals in any issuance is legally unpunishable. Further, and more directly relevant to the story we want to tell, green labeling does not entail any promise that funding raised will be more environmentally beneficial than what would have happened otherwise; in the language of carbon markets, there is not necessarily any additionality. This means that green debt can be, and frequently is, used to pay for projects that have already been completed by refinancing bank debt, or pay for projects that are already planned. This is the case in both New York and Cape Town, where green bonds have largely refinanced existing debt.

Debtor utilities, vulnerable communities

The situations in New York and Cape Town are broadly similar, but the details vary significantly. In this section we will discuss the conditions that led to the issuance of green debt as a response to twinned environmental and fiscal crises, and the risks they are constituting and distributing.

We locate moments of highly visible crisis--Superstorm Sandy and Cape Town's water crisis--within longer crisis genealogies. This perspective has ramifications for how we might think of adaptation's entwining with financial management. Herein lies a distinction between Cape Town and New York, but also reflects the generalizability of our observations. New York's mass transit system was 'financialized' from its genesis, as the various subway lines were built by the city and then leased to private operators (Hood, 2004). The system was subsequently brought under state ownership in the 1940s, but by the early 1980s was taking on ever increasing debt while government appropriations waned. Meanwhile in South Africa, a deteriorating fiscal situation due to economic downturn and ongoing political uncertainty means that municipalities are increasingly encouraged to find new sources of funding, especially for new projects (SACN 2018). Debt finance, including green bonds, is one such revenue source.

The similarities between Cape Town and New York include legacies of explicit segregation and inequitable provision of urban services, the need to (re)produce infrastructure that can respond to the rigors of a changed climate, and tight budgets exacerbated by decades of racialized austerity for some parts of each city, followed by more generalized austerity. Our analysis is aimed at discerning the regimes of risks that are produced and magnified through the use of municipal debt for adaptation. Here, we build on insights from Christopher's (2018)⁵ analysis of bonds that financed Washington D.C.'s sewage system refurbishment. Christopher argues that, "the crystallization of these [environmental and financial] risks is likely to have deleterious consequences particularly for local residents, who are the ultimate social bearers of those risks both as inhabitants of the environment and, through the payment of... fees and charges, as the principal funders of the latter's debt servicing obligations," (146). We extend this argument by demonstrating the socio-spatial differentiation of risk bearing produced using green bonds for climate adaptation. 'Inhabitants of the environment' do not bear environmental and financial risks equally, and the distribution of those risks breaks down on well-worn raced and classed lines.

New York: Managing austerity with debt

In the summer of 2017, New York Governor Andrew Cuomo announced that the New York subway system was in a state of emergency (Fitzsimmons 2017). Given the magnitude of the damage to the subway system created by Superstorm Sandy in 2012, estimated at around \$5 billion dollars, one might suppose the storm was the proximate cause of a lingering crisis (Hinds, 2012). Sandy certainly contributed to reliability problems that saw on-time performance slip to 58% in early 2018 (Hu, 2018), but the roots of the transportation crisis can be traced back to New York's fiscal crisis of the 1970s (Harvey 2005). Since the early 1970's, MTA has saw-sawed between financial famine and comparative feast. Each successive renaissance, however, has come with the burden of more debt as relative state appropriations fell, fares rose, antiquated signaling degraded, and the system was rendered unprepared - both physically and financially - for an external shock like Sandy. Further, no matter which way the scales tipped, critical parts of the infrastructure continued to age, and inequalities of provision and access persisted.

New York's unequal provision of transportation infrastructure is built into the fabric of the city. Transportation, as much as redlining or restrictive covenants, was and is a key component to the spatialization of race in the city (see Winner 1980). Robert Moses, New York's City Planning Commissioner (among his many titles) throughout the mid-20th Century, promoted auto-led

⁵ In addition to the pay-for-performance 'Environmental Impact Bond' worth US\$25 million that Christopher (2018) examines, D.C. Water has been a large issuer of the sort of green bonds under consideration in this article to the tune of more than US\$500 million. Given Washington D.C.'s well documented history of segregation (Manning 2010), municipal austerity (Debonis, 2011), racially-inflected gentrification (Prince 2016), and, now, use of green bonds, Washington D.C. is precisely the type of city that our analysis may help interpret as the impacts of climate change - or preparations for those impacts - become more visible and debts for those interventions mount.

development, which often had racially deleterious consequences. An infamous racist, Moses was responsible for vast demolitions and dispossessions targeting neighborhoods of color; up to 500,000 people were displaced, directly, or indirectly, by Moses's 'slum clearance' (Caro, 1974). These dispossessions facilitated the construction of motorways that eased (white) auto-commuting from suburbs while displacing communities of color to further-flung parts of the boroughs with less access to public transit. The processes of displacement, redlining, and the transformation of neighborhoods Moses perceived as slums into actual slums, as in Sunset Park, Brooklyn, contributed to the racial unrest of the 1960s (Freilla, 2004). This, in turn, was followed by new rounds of disinvestment in those neighborhoods, helping format New York's contemporary spatiality of inequality.

Now, even the parts of the city that are historically well served by transportation suffer from reliability issues. For some New Yorkers, the subway's poor on-time performance is merely an annoyance (if a vexing one). But for low income workers, often women, people of color, and immigrants who rely exclusively on public transportation, a late train can mean losing a job, missing a doctor's appointment for which they will be charged, or sending a child to disciplinary proceedings for tardiness. This is especially true for service industry workers (again, primarily women and people of color), whose transportation needs are even less well served than New Yorkers who travel during peak hours. The flexibilization of work has not been matched by an increase in trains and busses during non-peak times (Stringer 2018). In this way, the risks produced by the subway system crises of maintenance and funding, inflected by Sandy's damage to the system, are unevenly borne across axes of social difference.

Following the municipal financial crisis that was part of the wider economic downturn in the early 1970s the New York transit system infamously fell into disrepair, especially the subway. Graffitied MTA trains became synonymous with racialized urban blight (Dickinson 2008), and with the U.S 'urban crisis' more generally. When MTA began to dig itself out of the hole created by austerity in 1981, it did so both through marginally higher state appropriations and through expanded borrowing powers (Rivera, 2008). In 1981, MTA carried no long-term debt; by 1999 outstanding debt stood at US\$17.5 billion (Rivera, 2008). Debt levels stabilized briefly, but in 2002 the debt was restructured, dramatically prolonging the repayment period on existing debt (NY Torch 2010). This meant greater capital availability and increased headroom for further borrowing in the short term, but the trade-off was an ever-increasing debt burden that would be borne by multiple generations of transit users. Debt issued in the early 1990s would not be paid off until 2032 (Rivera 2008).

Following the 2002 restructuring, MTA's debt load began to grow even more rapidly, reaching nearly US\$30 billion in 2009 (PCAC 2012), an increase of nearly 60% in a decade, and a pace which MTA has maintained. Including its \$6.2 billion in green bonds, MTA debt now stands at nearly \$50 billion. Debt service is MTA's second largest cost after labor and is growing at twice the rate (Braun 2018). Because of this deteriorating financial situation, MTA's credit rating was downgraded in August 2018 to A by Standard and Poor's, closer to non-investment grade than prime (Scaggs 2018). This, perversely, will further raise borrowing costs on future issuances, exacerbating the austerity-fueled hole in which it finds itself.

To address challenges of funding and to highlight the positive environmental impacts of mass transit, in 2016 MTA turned to what was at the time a relatively untested tool to finance its operating expenses and capital spending in the form of its initial green bond offering. The issuance came on the heels of MTA's 'fix and fortify' program in the wake of Sandy that identified critical upgrades needed in indispensable parts of the system. Observers reckon that the 'fix' part of the program, which was paid for primarily through US federal disaster recovery funds, went reasonably well, though it is difficult to parse in light of the overarching maintenance crisis (DeMause 2016). However, the 'fortify' part of the equation has been much slower to materialize, remaining an aspiration tied to MTA's underfunded capital budget. To fund fixes and fortifications, while also simply raising enough capital to keep transit running, MTA has continued to issue debt, much of which now bears a green label. MTA offers half of each bond issuance to retail investors, and even conducts marketing campaigns in stations for some issuances (Interview with MTA official, October 2018). Part of this marketing effort around the green bond was to entice younger buyers, as millennials are thought to be shifting toward 'impact investing', or investments that promise to deliver desirable social or environmental outcomes (Interview with MTA official, October 2018).

As Rosenman (2019) and Kish and Leroy (2015) demonstrate, impact investing (of which green bonds might be considered a part) is a way that the life chances of the poor and people of color come to be further imbricated with financial logics. Offering bonds to retail investors, and advertising them to commuters is, in effect, a way for New Yorkers with investable income to extract rents from New Yorkers dependent on public transportation. Given that a substantial proportion of the 60% of New Yorkers who live paycheck-to-paycheck are also reliant on mass transit (Afridi 2016), and the majority of ridership is women, people of color and immigrants (Kabak 2010, Saska 2015), the use of debt to fund mass transit operations represents an intra-urban reverse subsidy where the poor and communities of color indirectly transfer rents to people with investable money. Meanwhile, these communities disproportionately bear the environmental risks of the next storm. People with investable income are more likely to be able to afford other means of transportation in response to crises of mobility, both ordinary and extraordinary, particularly through on-demand ride hailing, the growth of which is driving down subway ridership (Colon 2018). The combination of unreliable service and taxi deregulation is fueling what was recently pronounced a "death spiral" (Durkin 2018) as the maintenance crisis drives middle class riders to ride hailing apps, in turn reducing fare revenues, leading to further constrained budgets and deteriorating borrowing conditions, and, ultimately to fare rises and further borrowing. That is without adding the next storm into the equation.

Cape Town: Municipal Autonomy and Household Debt Impairment

Cape Town is marked by enduring and dramatic inequality materialized in the city's infrastructures (Jaglin 2008). While the inability to access drinkable water is statistically insignificant, the everyday dynamics of water access are more complex given the city's highly differentiated urban form. As Rodina (2016) makes clear, accessing water in the city is complicated by broader dynamics of informality, insecurity, and uneven tenure. The city has

made impressive strides in extending water provisioning, but the intensity of segregation and inequality in the city means that consistent water access is a challenge for many, especially when access overlaps with broader dynamics of insecurity, informality, and indebtedness.

These dynamics were pushed to their limit between 2016 and 2018, when the city of Cape Town reached the precipice of a water crisis that nearly resulted in citywide rationing under the specter of 'Day Zero.' The city was narrowly able to avoid a full-scale crisis of water delivery through huge reductions in personal water consumption by urban residents, the negotiating of significant water transfers from the agricultural sector, and, ultimately, the return of rain. Reductions in personal water usage were unprecedented: Capetonians reduced their water footprint by roughly 50% over the course of two years through a combination of punitive tariffs, voluntary reductions, and technical approaches including pressure reductions in pipes (For an overview of the crisis and the municipal response, see Ziervogel, 2019).⁶

The city's water crisis quickly became a financial crisis. Declining revenues resulting from reduced water consumption created a complex fiscal situation for the city, as the crisis reduced the city's revenue, inhibiting cross-subsidization. Roughly 10% of the city's operating budget comes from water tariffs. In early 2018 the city proposed a drought levy to make up for reduced income from tariffs because of the crisis. This levy would have subsidized the budget through a system based not on water usage but on property values. A complex coalition of rich and poor actors aggressively pushed back, arguing that the proposal unfairly affected residents who had lowered their water consumption considerably. The levy was scrapped (Kamaldien, 2018). As a result, the city released a budget that included a significant increase in water cost, with tiered pricing based on water usage. This budget has since been walked back as restrictions on water usage have relaxed, with residents now being allowed to use 100 litres per person (versus 50 at the height of the crisis). While the new tariffs were politically unpopular, they were justified as being necessary due to the combined situation of reduced water income and increased costs due to augmentation.

The city's water crisis fits into a longer dynamic of increased pressure on the municipality from continued in-migration (often to informal settlements), worries about water availability due to climate change, and limited federal investment in the water sector. South African municipalities have a large degree of financial autonomy, especially in the domains of human settlement (including water) and public transportation. This gives municipalities license to operate semi-independently, but also requires they find ways of funding their operations. The bulk of municipal revenues comes from their own revenue streams, mainly service charges and property taxes (SACN, 2018: ii). In Cape Town, for the budget year 2016/2017, 82% of the city's revenues came from their own sources (SACN, 2018: 7). Gaps in revenue that are available to municipalities to fund infrastructure and critical services are growing, however, and municipalities are being increasingly encouraged by national government to increase their borrowing. The Development Bank of South Africa's Municipal Infrastructure Investment

⁶ Research and analysis of Cape Town's water crisis was conducted in collaboration with Suraya Scheba (See Scheba & Millington, 2018).

Framework has outlined the capital requirements for South Africa's municipal services, including water supply (See Palmer *et al*, 2017: 142). In the case of water supply, the estimated capital needs roughly double the actual capital spent, and municipal funding gaps are expected to grow in the next decade (See SACN, 2018: v). As Palmer *et al* (2017) note, "[T]here remains a gap in the availability of capital that applies across the municipal spectrum. This...means that poor households are deprived of adequate services, and too many are left to live in underserved informal settlements and depressed rural settlements (156). The use of debt finance is one means of plugging this gap.

The City of Cape Town issued a green bond in July 2017. While issued in the midst of the water crisis, the decision to issue a green bond formed part of the city's longer-term strategy to issue bonds in recognition of declining financial resources at the federal level (Interview with Western Cape provincial government employee, October 2018) In describing the bond itself, representatives of the treasury department noted that its issuance was part of the then-mayor's strategy to articulate a green strategy in the years preceding the crisis (Interview with Representatives of Cape Town Treasury Department, July 2018). The extra cost of processing the bond was justified as a material demonstration of the city's commitment to green ambitions. As the city possesses comparatively high rates of creditworthiness in relation to other municipalities in South Africa, accessing capital presents little difficulty for the city (Interview with Western Cape provincial government employee, October 2018). As such, bonds have proved an effective means of raising capital in the context of federal austerity, economic slowdown, and political conflicts between the Democratic Alliance (who govern the Western Cape) and the African National Congress (who govern at the national level).

Interviews with treasury department representatives suggest that projects were largely selected post hoc; once a decision to use a green bond had been made, the challenge was then to locate projects that fit the criteria (Interview with Representatives of Cape Town Treasury Department, July 2018). As a result, the bond has largely been used to refinance existing projects and infrastructures, which were discovered through an audit of the city's existing projects. The funds are mainly directed towards water supply infrastructure for improvements to reservoirs, alongside the development of technologies to give the city more control over the water system, heightening the city's ability to reduce water pressure and therefore usage, and reduce water losses from leaks. Critically, significant funding from the green bond is earmarked for the continued installation of household flow regulators or water management devices (WMDs). WMDs form a significant component of the city's strategy to manage demand as well as pursue household debt recovery through the ability to restrict residents' water usage electronically. They deliver an allotment of water before cutting off, resetting the next day. They are designed to regulate water demand while also minimizing household debt. Starting in 2001, all South African citizens have been guaranteed at least 25 litres of water per person per day or 6 kilolitres per household per month as part of the county's Free Basic Water (FBW) program (Enqvist & Ziervogel, 2019; Yates & Harris, 2018). WMDs are designed to provide FBW water while ensuring that residents to not use more water than they can afford. The rollout of WMDs began in 2007, and roughly 250,000 have been installed since (Roeland, 2018; Yates & Harris, 2018). Of these, roughly 160,000 have been installed in homes deemed indigent, often in the

city's racialized peripheries and townships through a compulsory program linked to eventual debt clearance and the fixing of leaks (Roeland, 2018).

The relationship between WMDs and debt recovery involves a complex conjoining of demand management with debt recovery on behalf of the city, one that is deepened through green debt financing. As Yates and Harris (2018) make clear, the central preoccupation of Cape Town's water demand management reduction policies, "have been as much about cost recovery as they have been about drought mitigation - until recently the City targeted indebted households rather than high volume consumers in general" (81). The installation of WMDs is increasingly linked to a changing regulatory understanding of FBW. While the first 6 kilolitres per household per month was previously delivered free of charge, all water is now chargeable on a tiered basis (Yates & Harris, 2018: 79). For residents to receive their free water, they need to register as indigent (and re-register every 12 months). Registration, however, can be burdensome, requiring residents to prove their poverty (Socio-economic Rights Institute 2013: 44). As a result, Yates and Harris (2018) estimate that many indigent households are not formally registered. Indigent households cannot refuse the installation of WMDs.

The relationship between debt recovery, debt financing, and demand management suggests that an uptick in municipal borrowing will deepen patterns of racialized austerity that are already being felt in poor households. Cape Town's green bond has facilitated a series of technical responses to water scarcity through water commercialization. Activist organizations like the Water Crisis Coalition have argued that WMDs disproportionately impact poor households due to their installation in homes where water bills have gone unpaid. While WMDs are designed to hold people to their allotted FBW - and in this sense are formally in line with South Africa's constitution - the intersection of WMDs with other inequalities complicates this simple calculation. Residents of townships and informal settlements often subdivide their homes and rent out their backyards as an income generating strategy in the context of extreme unemployment, and so household sizes may vary considerably. As such, many who are in possession of WMDs are at risk receiving less water than their guaranteed allotments due to overlapping infrastructures of informality and inequality (Socio-Economic Rights Institute 2013: 64). Additionally, WMDs are marked by breakdown and uncertainty, and residents regularly complain about their functionality, flagging the similar if differentiated crises of urban infrastructure hit by climate change in Cape Town and New York.

Maladaptive debts

Across many cities, the present conjuncture is marked by a toxic blend of racialized inequality, environmental change, and municipal austerity, inviting considerations of who bears which risks, and to what degree. In these cases, municipal water users in Cape Town and New Yorkers dependent on public transportation find themselves doubly at risk. First, they are endangered by increasing climate instability that threatens to disrupt the provision of essential public services, rendering access to water or transit more difficult, if not impossible. At the same time, residents are financially endangered as growing debt burdens, increasing costs of borrowing associated with credit rating downgrades and global interest rate increases, and rising rates or fares to pay

for each are applied to service users who have no other options. While the wealthier can opt out, as they do in New York through the increasing use of ride hailing apps, and in Cape Town as the rich are able to buy virtually unlimited supplies of bottled water, the poor are locked into paying for the service, and in turn contribute to the rents extracted by each utilities' creditors.

Quotidian struggles around access reflect elaborations of twinned environmental and financial risk, and marginalized communities who are endangered through the risks manifested through the issuance of debt, green or not. Previously, the novelty of green finance may have been overstated, and been, in the grand scheme of capital's production of nature, a 'nonevent' (Lave 2018). A focus on municipal finance, however, as a mechanism through which responses to climate crisis is materializing, can render apparent the deep linkages between finance, austerity, and inequality in cities. This leads us to tentatively suggest that there is evidence that the role played by climate finance may be deepening. At the same time, we emphasize that new forms of finance or municipal governance are not producing entirely new socio-environmental outcomes, but are intensifying existing inequities of service provision and associated economic and environmental risks for marginalized communities.

In New York, conservative think tanks and some in the media are pinning the blame for rising costs and the maintenance crisis on workers' salaries and pensions, signaling increased risks for workers through new rounds of austerity and calls for union busting (e.g. Gelinis, 2011). This is doubly significant because of the demographic profile of New York transit workers. In 2007, 70% of transportation workers were people of color; African Americans constituted more than 40% of the workforce despite being a quarter of the city's population at the same time (LMIS, 2009). Meanwhile, the median annual earnings for MTA employees was around US\$90,000 per year in 2015 (Knocke 2016), significantly higher than most blue-collar jobs. Therefore, any attack on workers is explicitly an attack on communities of color, who will be disproportionately impacted by job losses or cuts to pay and benefits. By pursuing adaptation through debt rather than broad based taxation at the federal and state level to fund radically increased appropriation to the system, the books will be balanced on the backs of the workers and transit users **just as the financial and ecological books are being balanced on the back of the racialized poor in Cape Town.**

This follows a broader pattern of the racialized impacts of austerity. Federal austerity in the US has transcalar impacts because of the importance of intergovernmental transfers. Austerity has hastened the shift from government to governance, a well-trod feature of neoliberalization more broadly (Peck 2012); a less well explored dimension is who lost jobs as parts of the state have contracted. Given that federal and some states desegregated work early compared to much of the private sector, public sector employment was a cornerstone of African American class ascendancy in the US in the 1960s and 1970s (Laird 2017). However, as these workers retired or were laid off and their positions were contracted out, employment was rendered precarious, less well paid, or simply unfulfilled. The loss of government jobs has been a contributor to growth of the racial wage gap. In 1979, black men's average hourly salary was 22% lower than that of white men. By 2015, the gap had grown to 31% (Redden and Kasperkevic 2015). MTA's financial precarity, maintenance crisis, and environmental vulnerability disproportionately

impacts the everyday lives of people of color, and increased debt service will increase pressure to make cuts elsewhere, most likely on the salary and benefits of a workforce that is disproportionately comprised of people of color.

Meanwhile, capital spending activities are unevenly distributed. Work continues on the massively expensive Hudson Yards extension that will primarily serve new corporate banking headquarters in west Manhattan. While cost estimates to shore up the subway in the next ten years come in around \$40 billion, the proposed responses have been insufficient, piecemeal, and often regressive. The newest initiative would see the introduction of a congestion charge levied on cars entering the CBD, with proceeds ring-fenced mostly for the subway. The new fee is projected to raise \$US800 million to US\$1.5 billion annually over the next decade, but importantly, advocates note that the revenue could be leveraged into further bond issuances worth as much as 17 times the value of the congestion charge (Fitzsimmons 2018). Further, as Huber (2016) has shown, tying environmental funding to dedicated revenue sources, rather than drawing from general state obligations that can be funded through progressive taxation is risky because those mechanisms are easily reversed and can experience wild swings.

In Cape Town, the city's water crisis called attention to the complex financial and social dynamics associated with climate change in a city marked by deeply racialized inequality just as the crisis of mobility has in New York. Cross-subsidization of poor households is a critical component of municipal policy in South Africa, and the city is committed to some forms of redistribution through tariffs. These mechanisms are stretched beyond limit by shifting tariff structures in the wake of drought-induced scarcity, however, and uncertainty is heightened by the sheer intensity of the city's inequality. Debt recovery and demand management have converged to create a situation in which poor households face financial uncertainty as well as regularized water scarcity due to changes in water pricing and indigent access.

This differentiated exposure to risk is entrenched by green debt through the continued deployment of WMDs as means of conjoined demand reduction and debt recovery. The need to recover costs has come to be framed not through a lack of funding but rather on purported non-payment, with the ultimate effect that new water demand management strategies are ultimately punitive. Municipalities need to cover costs through payments made by users of municipal services, who are one of the primary sources of revenue for the city. This has been primarily accomplished in Cape Town through the deployment of WMDs and the reconfiguring of Free Basic Water, both of which prioritize debt recovery over service delivery. WMDs can increase vulnerability for poor households given the difficulties in registering as indigent, the result of which would be that extremely poor households pay a disproportionate household cost on water. The linkage between debt recovery, demand management, and climate change adaptation threatens to deepen processes of uneven water access in the city by shifting the valuation of water and heightening the comparative burden onto poor households (See Yates & Harris 2018). This has implications not just for water but for municipal services more broadly, as South African cities continue to face the challenge of finding ways to fund redistribution in the context of economic slowdown and climatic uncertainty.

Green debt adds one more layer to this matrix, linking efforts to reduce household indebtedness to the issuance of debt at the municipal level. Critically, Cape Town's debt was not used to fund new expansive infrastructures for decarbonizing water provisioning or leveling access, but rather formed a component of a broader strategy to manage demand through technological means. Climate debt in this case mirrors ongoing dynamics of austerity but adds a layer of risk given the city's dependency on tariffs to fund its operations. These include other social services for the city's most vulnerable, who are impacted by shifting financial priorities in the context of climate crisis.

Conclusion

The climate crisis is here, and the political and social infrastructures to respond have not yet been created. Debt is one of the few mechanisms that municipalities have for attempting to manage the financial and ecological crises magnified by climate change. Increasingly this debt is carrying explicitly environmental aspirations, codified through mechanisms designed to ensure that finance is targeted for environmental outcomes. Money managers are, in the words of the Financial Times, "the new warriors of climate change" (Raval & Mooney, 2018), and are becoming the arbiters for what types of responses to climate change are fundable, at what scale, and where. We worry that not only are these new warriors ill equipped, but that their tactics produce unacceptable collateral damage, particularly among those least responsible for, but most vulnerable to, conditions that have been produced through the operations of racial capitalism.

We want to highlight the ways that climate finance yields increasingly dangerous geographies for urbanites subject to racialized austerity and environmental change. Municipal green finance is framed as a mechanism for enabling sustainable transitions, but it is structured through existing racialized geographies of inequality. We call for further engagement with climate debt to understand municipal governance in climate crisis and to contest austerity. Conceptually, by drawing together Cape Town and New York City, we highlight the need for fine-grained, comparative analysis of racial capitalism in distant cities to understand the relational geographies of climate change and associated patterns of differentiated adaptation.

If, as Kate Aronoff (2018) has proposed, the choice that confronts us is not between transitioning to a future of climate change or not, but between a just transition or one led by and for elites, we must illuminate how the latter is already playing out. As we have demonstrated, municipal debt, whether green or not, serves to aggravate entrenched inequality and displace environmental and financial risks onto those least able to bear them. While we would challenge municipal finance and planning offices to radically reconsider priorities and the types of programs that are earmarked for funding, our concern is primarily located with higher order political scales where borrowing and redistribution can create more progressive and broad-based socialities of risk (Christophers *et al*, 2018). WMDs are no more the just solution for Cape Town than rising transit fares for business-as-usual service is for New York. Instead, federal officials and multilateral pools of capital must make large volumes of concessionary money available for creative, huge, and democratic interventions in cities that will reduce risks for **the**

many who are least able to manage them. This could take any number of forms. In the United States, the UK, and some countries in Western Europe, discussions about a Green New Deal are heating up and reflect many of the concerns we have raised here, particularly in emphasis on municipal adaptations and a focus on derisking social, political, and economic life for vulnerable communities (e.g. Ocasio-Cortez, 2019). However, producing new regimes of risk that are more equitably distributed in cities in the Global South may prove even more challenging as central governments lack many of the fiscal tools at the scale of northern counterparts. Indeed, enabling cities in the South to raise municipal debt for adaptation is one of the primary directions of travel for multilateral development banks (World Bank, n.d.).

Our analysis demands a fundamentally different approach, one that would account for the intrinsic inequities reflected in how climate change is differentially experienced across scales (See Ranganathan & Bratman, 2019). For example, academics and activists must keep the notion of 'climate debt' squarely located as a critique that recognizes how rich countries have incurred vast overdrafts on the atmosphere and must compensate for the losses and damages they produce. Ideally, compensation would be compounded by the repatriation of capital stolen through colonialism and extorted through dizzyingly unfair terms of trade that continues today (Hickel 2017).

Barring this more radical solution, cities in the South must still be given access to vast pools of money in a way that reflects their historically-produced, structurally disadvantaged position. There is no need to reinvent the wheel; capital could flow through existing institutions whose missions would be shifted away from facilitating profit-oriented investment. For example, the Green Climate Fund must be capitalized fully, then those funds disbursed as direct investment rather than as leveraging capital that merely facilitates expanded borrowing for the Global South and expanded rent capture for northern investors. Indeed, multilateral capital flows for adaptation by and large reflect the New Washington Consensus preference for subsidizing investors in the name of leveraging private capital (Mitchell & Sparke 2016).

The expansion of leveraged multilateral flows in the South or municipal borrowing in the North both serve to entrench extant regimes of financial and environmental risk for non-elites, and particularly marginalized communities. This critique is applicable to the field of 'green finance', or even the 'green economy' more broadly, as financiers and states grasp with increasing desperation for business-as-usual solutions to capital's socio-ecological contradictions. Thus far, climate-financial interventions to slow the pace of environmental degradation or prepare communities for new climate realities have largely failed; our research demonstrates how new risks are produced and distributed through financial interventions, rather than ameliorated. Producing new and, more egalitarian regimes of risk is critical if we want to avoid discovering what the realization of racially inflected climate-financial risk looks like, over and over again.

Acknowledgments

Funding for this paper came from the Economic and Social Research Council–Department for International Development joint fund for poverty alleviation research ES/M009408/1, for the

project titled 'Turning Livelihoods to Rubbish? Assessing the Impacts of Formalization and Technologization of Waste Management on the Urban Poor' and Swedish Research Council project grant, 'Climate Change and Transformations of Financial Risk' (#2015-01694). Thanks to Ilias Alami and Brett Christophers for comments on earlier drafts, two anonymous reviewers, and Suraya Scheba for conversation and collaboration throughout the research process.

Works Cited

Afridi, L. (2016). How is Economic Opportunity Threatened in Your Neighborhood? 2016. New York: Association for Housing and Neighborhood Development.

Arestis, P., Charles, A., & Fontana, G. (2013). Financialization, the great recession, and the stratification of the US labor market. *Feminist Economics* 19(3), 152-180.

Aronoff, K. (2018). With a green new deal, here's what the world could look like for the next generation. *The Intercept* 5 December 2018. Available at <https://theintercept.com/2018/12/05/green-new-deal-proposal-impacts/>. Last accessed 17 January 2019.

Ashton, P. (2012). 'Troubled assets': The financial emergency and racialized risk. *International Journal of Urban and Regional Research*, 36(4), 773-790.

Asiyanbi, A. P. (2018). Financialisation in the green economy: Material connections, markets-in-the-making and Foucauldian organising actions. *Environment and Planning A: Economy and Space*, 50(3), 531-548.

Baucom, I. (2005). *Specters of the Atlantic: finance capital, slavery, and the philosophy of history*. Durham, NC: Duke University Press.

Beymer-Farris, B. A., & Bassett, T. J. (2012). The REDD menace: Resurgent protectionism in Tanzania's mangrove forests. *Global Environmental Change*, 22(2), 332-341.

Bigger, P. (2017). Measurement and the circulation of risk in green bonds. *Journal of Environmental Investing* 8(1): 273-287.

Bigger, P., & Dempsey, J. (2018). Reflecting on neoliberal natures: An exchange. *Environment and Planning E: Nature and Space*, 1(1-2), 25-75.

Bledsoe, A., & Wright, W. J. (2019). The anti-Blackness of global capital. *Environment and Planning D: Society and Space*, 37(1), 8-26.

Bracking, S. (2015). Performativity in the Green Economy: how far does climate finance create a fictive economy?. *Third World Quarterly*, 36(12), 2337-2357.

Braun, M. (2018). MTA's Rising Debt and Payroll Cost Take Toll on Bond Rating. Bloomberg, 12 March 2018. Available at <https://www.bloomberg.com/news/articles/2018-03-12/mta-s-rising-debt-and-payroll-costs-take-toll-on-credit-rating>. Last accessed 22 November 2018.

Buckeley, H. (2010). Cities and the governing of climate change. *Annual review of environment and resources*, 35, 229-253.

Caro, R. (1974). *The power broker: Robert Moses and the fall of New York*. New York: Knopf.

Calvário, R., Velegrakis, G., & Kaika, M. (2017). The political ecology of austerity: An analysis of socio-environmental conflict under crisis in Greece. *Capitalism Nature Socialism*, 28(3), 69-87.

Chattopadhyay, S. (2012). *Unlearning the city: Infrastructure in a new optical field*. University of Minnesota Press.

Chomba, S., Kariuki, J., Lund, J. F., & Sinclair, F. (2016). Roots of inequity: How the implementation of REDD+ reinforces past injustices. *Land Use Policy*, 50, 202-213.

Christophers, B. (2015). The limits to financialization. *Dialogues in Human Geography*, 5(2), 183–200.

Christophers, B. (2018). Risk capital: Urban political ecology and entanglements of financial and environmental risk in Washington, D.C. *Environment and Planning E: Nature and Space*, 1(1–2), 144–164.

Christophers, B., L. Johnson, & P. Bigger (2019). Stretching scales: Risk and sociality in climate finance. *Environment and Planning A: Economy and Space*. [Online Early]

Climate Bonds Initiative (n.d.). *The 10 point case*. Available at <https://www.climatebonds.net/projects/promotion/10-point-case>. Last accessed 4 July 2019.

Climate Bonds Initiative (2019). *Green bonds: State of the Market 2018*. London: Climate Bonds Initiative.

Cohen, D.A. (2017). The other low-carbon protagonists: Poor people's movements and climate politics in Sao Paulo. In M. Greenberg and P. Lewis (Eds.), *The City is the Factory: New Solidarities and Spatial Strategies in an Urban Age* (pp. 140-157). Ithaca, New York: Cornell University Press

Debonis, M. (2011). After 10 years, D.C. control board is gone but not forgotten. *Washington Post* 10 January 2011. Available at <https://www.washingtonpost.com/local/after-10-years-dc->

[control-board-is-gone-but-not-forgotten/2011/01/30/AB5485Q_story.html?noredirect=on&utm_term=.6e7137358fb5](https://www.villagevoice.com/2011/01/30/AB5485Q_story.html?noredirect=on&utm_term=.6e7137358fb5). Last accessed 20 December 2018.

DeMause, N. (2016). The MTA's climate change dilemma: How do you plug a million holes? *Village Voice*. 13 December 2016. Available at <https://www.villagevoice.com/2016/09/13/the-mtas-climate-change-dilemma-how-do-you-plug-a-million-holes/>. Last accessed 21 December 2018.

Dempsey, J., & P. Bigger. (2019). Intimate mediations of for-profit biodiversity conservation: Waste, profit, and accumulation. *Antipode*, 51(2), 517-538.

Dempsey, J., & D.C. Suarez. (2016). Arrested development? The promises and paradoxes of "selling nature to save it". *Annals of the American Association of Geographers*, 106(3), 653-671.

Dickinson, M. (2008). The making of space, race and place: New York City's war on graffiti, 1970-the present. *Critique of Anthropology*, 28(1), 27-45.

Enqvist, J. P., & G. Ziervogel. (2019). Water governance and justice in Cape Town: An overview. *Wiley Interdisciplinary Reviews: Water*. e1354.

Farand, C. (2018). G7 fossil fuel subsidies worth \$100bn a year to industry, study finds. *DeSmogUK*. 8 June 2018. Available at <https://www.desmog.co.uk/2018/06/04/uk-worst-g7-countries-hiding-fossil-fuel-subsidies-report/>. Last accessed 18 January 2019.

Farnsworth, K. & Z. Irving. (2012). Varieties of crisis, varieties of austerity: Social policy in challenging times. *Journal of Poverty and Social Justice*, 20(2), 135-149.

Fitzsimmons, E.G. (2017). Cuomo declares a state of emergency for New York City subways. *New York Times* 29 June 2017. Available at <https://www.nytimes.com/2017/06/29/nyregion/cuomo-declares-a-state-of-emergency-for-the-subway.html>. Last accessed 21 December 2018.

Fitzsimmons, E.G. (2018). Can charging drivers really solve the subway crisis? *New York Times*. 12 October 2019. Available at <https://www.nytimes.com/2018/10/12/nyregion/congestion-pricing-subway-mta.html?rref=collection%2Fbyline%2Femma-g.-fitzsimmons>. Last accessed 5 July 2019.

Fredrickson, G. (1981). *White Supremacy: A Comparative Study of American and South African History*. Oxford: Oxford University Press.

Freilla, O. (2004). Burying Robert Moses's legacy in New York City. In Bullard, B., G.S. Johnson, and A. Torres (eds). *Highway Robbery: Transportation Racism and Routes to Equity*. Cambridge, MA: Southend Press.

Gelinas, N. (2011). The MTA's too-nice pay. *New York Post* 13 July 2011. Available at <https://nypost.com/2011/07/13/mtas-too-nice-pay/>. Last accessed 29 December 2018.

Harris, L., Kleiber D., Goldin, J., Darkwah, A. & Morinville, C. (2017). Intersections of gender and water: comparative approaches to everyday gendered negotiations of water access in underserved areas of Accra, Ghana and Cape Town, South Africa. *Journal of Gender Studies*, 26(5), 561-582.

Hart, G. (2006). Denaturalizing dispossession: Critical ethnography in the age of resurgent imperialism. *Antipode*, 38(5), 977-1004.

Hart, G. (2018). Relational comparison revisited: Marxist postcolonial geographies in practice. *Progress in Human Geography*, 42(3), 371-394.

Harvey, D. (2005). *A Brief History of Neoliberalism*. Oxford: Oxford University Press.

Hickel, J. (2017). *The Divide: A Brief Guide to Global Inequality and its Solutions*. New York: Random House.

Hinds, K. (2012). Totalling Sandy's losses: How New York's MTA got to \$5 billion. *WNYC*. Available at <https://www.wnyc.org/story/286877-totalling-sandy-losses-how-new-yorks-mta-got-to-5-billion/>. Last accessed 4 July 2019.

Hood, C. (2004). *722 Miles: The Building of the Subways and How They Transformed New York*. Baltimore: Johns Hopkins University Press.

Hu, W. (2018). New York subway's on-time performance hits new low. *New York Times*. 19 March 2018. Available at <https://www.nytimes.com/2018/03/19/nyregion/new-york-subways-on-time-performance-hits-new-low.html>. Last accessed 18 January 2019.

Jaglin, S. (2008). Differentiating networked services in Cape Town: Echoes of splintering urbanism? *Geoforum*, 39(6), 1897-1906.

Kabak, B. (2010). MTA demographics: A glimpse at who rides and how we pay. *Second Avenue Sagas*. 20 October 2010. Available at <http://secondavenuesagas.com/2010/10/20/mta-demographics-a-glimpse-at-who-rides-and-how-we-pay/>. Last accessed 5 July 2019.

Kamaldien, Y. (2018). #WaterCrisis: Funds drought as levy scrapped. *Weekend Argus*, 20 January.

Kish, Z., & Leroy, J. (2015). Bonded life: technologies of racial finance from slave insurance to philanthrocapital. *Cultural Studies*, 29(5-6), 630-651.

Knocke, J. The MTA loses \$6 billion a year and no one cares. *Medium*. Available at <https://medium.com/@johnnyknocke/the-mta-loses-six-billion-dollars-a-year-and-nobody-cares-d0d23093b2d8>. Last accessed 5 July 2019.

Labor Market Information Service. (2009). Employment in New York City Urban Transport. Available at http://www.nyc.gov/html/sbs/wib/downloads/pdf/urban_transit.pdf. Last accessed 5 July 2019.

Laird, J. (2017). Public sector employment inequality in the United States and the great recession. *Demography*, 54(1), 391-411.

Langley, P. (2018). Frontier financialization: Urban infrastructure in the United Kingdom. *Economic Anthropology* 5(2), 172-184.

Lave, R. (2018). Not so neo. In Bigger *et. al* (2018). Reflecting on neoliberal natures: An exchange. *Environment and Planning E: Nature and Space*, 1(1-2), 25-75.

Lawhon, M., Silver, J., Ernstson, H., & Pierce, J. (2016). Unlearning (un) located ideas in the provincialization of urban theory. *Regional studies*, 50(9), 1611-1622.

Long, J., & Rice, J. L. (2019). From sustainable urbanism to climate urbanism. *Urban Studies*, 56(5), 992-1008.

MacKenzie, D. (2009). Making things the same: Gases, emission rights and the politics of carbon markets. *Accounting, Organizations and Society*, 34(3-4), 440-455.

Manning, R. D. (2010). Multicultural Washington, DC: The changing social and economic landscape of a post-industrial metropolis. *Ethnic and Racial Studies*, 21(2), 328-355.

McIntyre, M., & Nast, H. J. (2011). Bio (necro) polis: Marx, surplus populations, and the spatial dialectics of reproduction and "race". *Antipode*, 43(5), 1465-1488.

Millington, N., & Lawhon, M. (2018). Geographies of waste: Conceptual vectors from the Global South. *Progress in Human Geography*, [Online first].

Mitchell, K., & Sparke, M. (2016). The new Washington consensus: Millennial philanthropy and the making of global market subjects. *Antipode*, 48(3), 724-749.

Moore, J. (2015). *Capitalism in the Web of Life*. London: Verso.

NY Torch (2010). Back at the scene of the crime. Available at <https://www.empirecenter.org/publications/back-at-the-scene-of-the-crime/>. Last accessed 20 December 2018.

O'Connor, M. (1994). The second contradiction of capitalism. *Capitalism Nature Socialism*, 5(4), 105-114.

Ocasio-Cortez, A. (2019), *H.Res. 109 - 116th Congress (2019-2020): Recognizing the duty of the Federal Government to create a Green New Deal*. Available at: <https://ocasio-cortez.house.gov/sites/ocasio-cortez.house.gov/files/Resolution%20on%20a%20Green%20New%20Deal.pdf>. Last accessed 4 July 2019.

Ouma, S. (2015). Getting in between M and M' or: How farmland further debunks financialization. *Dialogues in Human Geography*, 5(2), 225-228.

Ouma, S., Johnson, L., & Bigger, P. (2018). Rethinking the financialization of 'nature.' *Environment and Planning A: Economy and Space*, 50(3), 500–511.

Palmer, I., Moodley, N., & Parnell, S. (2017). *Building a capable state: Service delivery in post apartheid South Africa*. London: Zed books.

Partridge, C., & Medda, F. (2018). Premium in the Primary and Secondary U.S. Municipal Bond Markets. Available at SSRN: <https://ssrn.com/abstract=3237032> or <http://dx.doi.org/10.2139/ssrn.3237032>. Last accessed 4 July 2019.

Patel, R., & Moore, J. W. (2017). *A History of the World in Seven Cheap Things: A Guide to Capitalism, Nature, and the Future of the Planet*. Berkeley: University of California Press.

Peck, J (2012). Austerity urbanism: American cities under extreme economy. *City*, 16(6), 626-655.

Permanent Citizens Advisory Committee of the MTA (PCAC) (2012). *The road back: A historic review of the MTA's capital program*. New York: PCAC.

Prasch R (2004) Shifting risk: The divorce of risk from reward in American capitalism. *Journal of Economic Issues*, 38(2), 405–412.

Prince, S. (2016). *African Americans and gentrification in Washington, DC: Race, class and social justice in the nation's capital*. London: Routledge.

Pulido, L. (2000). Rethinking environmental racism: White privilege and urban development in Southern California. *Annals of the Association of American Geographers*, 90(1), 12-40.

Pulido, L. (2016) Flint, Environmental Racism, and Racial Capitalism. *Capitalism Nature Socialism*, 27(3): 1-16,

- Ranganathan, M. (2016). Thinking with Flint: Racial liberalism and the roots of an American water tragedy. *Capitalism Nature Socialism*, 27(3), 17-33.
- Ranganathan, M., & Bratman, E. (2019). From urban resilience to abolitionist climate justice in Washington, D.C. *Antipode*. [Online first].
- Raval, A., and Mooney, A. (2018). Money managers: the new climate warriors. *Financial Times*. 27 December 2019. Available at <https://www.ft.com/content/c245af4a-f875-11e8-af46-2022a0b02a6c>. Last access 5 July 2019.
- Redden, M. and Kasperkevic, J. (2016). Wage gap between white and black Americans is worse today than in 1979. *The Guardian* 20 September 2016. Available at <https://www.theguardian.com/us-news/2016/sep/20/wage-gap-black-white-americans>. Last accessed 18 December 2018.
- Reichelt, H. & Keenan, C. (2017). *The Green Bond Market: 10 Years Later and Looking Ahead*. Washington D.C.: The World Bank.
- Rivera, R (2008). M.T.A. and its debt, and how they got that way. *New York Times*. 26 July 2008. Available at <https://www.nytimes.com/2008/07/26/nyregion/26mta.html>. Last accessed 17 January 2019.
- Robinson, J. (2016). Comparative urbanism: new geographies and cultures of theorizing the urban. *International Journal of Urban and Regional Research*, 40(1), 187-199.
- Rodina, L. (2016). Human right to water in Khayelitsha, South Africa—Lessons from a ‘lived experiences’ perspective. *Geoforum*, 72, 58-66.
- Robertson, M. M. (2006). The nature that capital can see: science, state, and market in the commodification of ecosystem services. *Environment and Planning D: Society and Space*, 24(3), 367-387.
- Roeland, M. (2018). Water curbs: a tale of rich and poor. GroundUp. Available at: <https://www.groundup.org.za/article/water-curbs-tale-rich-and-poor/>. Last accessed 4 July, 2019.
- Rosenman, E. (2019). The geographies of social finance: Poverty regulation through the ‘invisible heart’ of markets. *Progress in Human Geography*, 43(1), 141-162.
- Roy, A. (2005) Urban informality: toward an epistemology of planning. *Journal of the American Planning Association*, 71(2), 147-158.
- Roy, A (2009) The 21st-century metropolis: new geographies of theory. *Regional Studies* 43(6): 819-830.

Roy, A. (2017). Dis/possessive collectivism: Property and personhood at city's end. *Geoforum*, 80, A1-A11.

SACN. 2018. State of City Finances Report 2018. Johannesburg: SACN.

Saska, J. (2015). SEPTA has largest percentage of female riders – 64% - among large transit agencies. PlanPhilly, 26 January 2015. Available at http://planphilly.com/articles/2015/01/26/septa-has-largest-percentage-of-female-riders-64-among-large-transit-agencies?utm_content=buffer97258&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer. Last accessed 14 December, 2018.

Scaggs, A. (2018). New York's MTA downgraded by S&P. *Financial Times* 9 August 2018. Available at <https://www.ft.com/content/5eca988c-9c03-11e8-9702-5946bae86e6d>. Last accessed 14 December 2018.

Smith, N. (2007). 'Nature as Accumulation Strategy', *Socialist Register 2007: Coming to Terms with Nature*. Monmouth: Merlin Press, pp. 16–36.

Socio-economic Rights Institute (2013). Targeting the Poor: An analysis of Free Basic Services (FBS) and Municipal Indigent Policies in South Africa. [WWW document]. Available at: https://www.seri-sa.org/images/Targeting_the_Poor_Nov13.pdf. Last accessed 4 July, 2019.

Sonti, S. (2018). The world that Paul Volcker made. *Jacobin*, 20 December, 2018. Available at <https://jacobinmag.com/2018/12/paul-volcker-federal-reserve-central-bank>. Last accessed 21 December 2018.

Sörqvist, P., Haga, A., Langeborg, L., Holmgren, M., *et al* (2015). The green halo: Mechanisms and limits of the eco-label effect. *Food quality and preference*, 43, 1-9.

Stringer, S. (2018). *Left in the Dark: How the MTA Is Failing to Keep Up With New York City's Changing Economy*. New York: New York City Office of the Comptroller.

Sultana, F. (2018). Gender and water in a changing climate: Challenges and opportunities. In Fröhlich, C., Gioli, G., Cremades, R., & Myrntinen, H. (Eds). *Water Security Across the Gender Divide* (pp. 17-33). London: Springer.

Tripathy, A. (2017). Translating to risk: The legibility of climate change and nature in the green bond market. *Economic Anthropology*, 4(2), 239-250.

UN Environmental Program (2016). *The Adaptation Finance Gap Report 2016*. Nairobi: United Nations Environment Programme.

Winner, L. (1980). Do artifacts have politics? *Daedalus* 109(1), 121-136.

World Bank. (n.d.). City Creditworthiness Initiative: A Partnership to Deliver Municipal Finance. Available at <https://www.worldbank.org/en/topic/urbandevelopment/brief/city-creditworthiness-initiative>. Last accessed 5 July 2019.

Yates, J. S., & Harris, L. M. (2018). Hybrid regulatory landscapes: The human right to water, variegated neoliberal water governance, and policy transfer in Cape Town, South Africa, and Accra, Ghana. *World Development*, 110: 75-87.

Ziervogel, G. (2019). *Unpacking the Cape Town Drought: Lessons Learned: Report for Cities Support Programme Undertaken by African Centre for Cities*. https://www.africancentreforcities.net/wp-content/uploads/2019/02/Ziervogel-2019-Lessons-from-Cape-Town-Drought_A.pdf. Last accessed 4 July 2019.