

Towards Critical Studies of Climate Adaptation Planning: Uncovering the Equity Impacts of Urban Land Use Planning

Authors: Isabelle Anguelovski¹, Linda Shi², Eric Chu³, Daniel Gallagher², Kian Goh⁴, Zachary Lamb², Kara Reeve⁵, Hannah Teicher²

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1. Senior Researcher and Principal Investigator, Institute for Environmental Science and Technology, Universitat Autònoma de Barcelona
2. Doctoral Candidate, Department of Urban Studies and Planning, Massachusetts Institute of Technology
3. Assistant Professor of Urban Studies, Department of Geography, Planning, and International Development Studies, University of Amsterdam
4. Assistant Professor, School of Architecture, Northeastern University
5. Urban Management Specialist, RTI International

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Abstract

A growing number of cities are preparing for climate change impacts by developing adaptation plans. However, little is known about how these plans and their implementation affect the vulnerability of the urban poor. We critically assess initiatives in eight cities worldwide and find that land use planning for climate adaptation can exacerbate socio-spatial inequalities across diverse developmental and environmental conditions. We argue that urban adaptation injustices fall into two categories: acts of commission when interventions negatively affect or displace poor communities and acts of omission when they protect and prioritize elite groups at the expense of the urban poor.

Introduction

Municipal jurisdictions over land use planning and development present opportunities to mainstream climate change adaptation action at the local level. Cities in both the global North and South deploy diverse strategies to integrate climate considerations into land use planning, for instance through physical infrastructure strategies and different land development and management tools. To boost political salience and financial feasibility, these efforts often emphasize co-benefits with other development objectives. However, the emphasis on “win-win” adaptation solutions also obscures the uneven costs and benefits borne by different groups, provoking the question of: adaptation for whom, by whom, and how? While momentum and funding grows for cities to adapt, researchers must investigate whether some adaptation efforts are effectively prioritizing the needs of marginalized and vulnerable populations or whether they merely re-package business-as-usual land use planning approaches that have so often left such groups behind. Indeed, efforts to reduce climate vulnerability through land use planning tools are often embedded in the very institutions and development processes that reproduce uneven risk exposure and socio-economic vulnerability.

This paper assesses whether and how a selection of current climate adaptation planning approaches exacerbate or create new urban socio-spatial inequalities. Our study addresses the lack of critical scholarship at the nexus of land use planning and climate adaptation by examining experiences in eight cities around the world: Boston (USA), New Orleans (USA), Medellín (Colombia), Santiago (Chile), Metro Manila (Philippines), Jakarta (Indonesia), Surat (India), and Dhaka (Bangladesh). These cities have adopted diverse planning strategies, including developing explicit adaptation plans, linking adaptation to disaster risk reduction or broad efforts to promote resilience, and meeting long-standing infrastructure and developmental backlogs. We selected

cities in both the global North and South to highlight different ways land use planning for adaptation can affect urban equity and justice regardless of developmental, political, and ecological contexts.

Our analysis shows that land use plans in the name of climate adaptation or resilience can produce maladaptive outcomes for historically marginalized residents through two types of injustices: acts of commission and acts of omission. We find acts of commission when infrastructure investments, land use regulations, or new protected areas disproportionately affect or displace disadvantaged groups. Conversely, acts of omission refer to plans that protect economically valuable areas over low-income or minority neighborhoods, frame adaptation as a private responsibility rather than a public good, or fail to involve affected communities in the process. While these patterns echo past experiences with land use and infrastructure development (e.g., Flyvbjerg, Bruzelius, and Rothengatter 2003), they also represent a “double” injustice (Leichenko and O’Brien 2008) because disadvantaged groups who contributed the least to global carbon emissions are bearing the brunt of the social costs of adaptation and, at the same time, are being excluded from the benefits of climate adaptation action.

Challenges in Planning for Justice in Climate Adaptation

Land use planning interventions over infrastructure, zoning, and development often entail a reallocation of financial, political, and human resources. Existing scholarship highlights two mutually reinforcing aspects of justice: distributive justice allocates resources to maximize benefits for the most disadvantaged (Rawls 1971; Walzer 1983) while procedural justice ensures meaningful participation of communities in decisions that affect them in order to counteract past oppression (Young 1990). However the pursuit of these principles remains challenging due to

competing planning goals, political incentives, fiscal realities (Godschalk 2004), and weak recognition of the needs and identities of historically marginalized groups (Young, 1990; Honneth 1992).

Scholars of environmental justice have shown that polluting forms of land uses, such as incinerators, hazardous waste sites, and power plants, are often sited nearby marginalized and impoverished neighborhoods (Bullard, 2000; Mohai, Pellow, & Roberts, 2009). Mega-projects for flood mitigation and transportation have displaced millions worldwide (Flyvbjerg, Bruzelius, and Rothengatter 2003), even as private property development along vulnerable waterfronts has increased exponentially. Scholars have also documented the disproportionate availability of environmental amenities, such as parks and trees, in more affluent neighborhoods. However more recently, even environmental goods have been shown to produce negative impacts through gentrification (Anguelovski 2015; Dooling 2009). New priorities around climate adaptation and resilience, therefore, emerged against this backdrop of urban segregation, spatial inequality, and the uneven application of land use planning and development interventions.

Recent adaptation efforts draw on many existing planning instruments (Anguelovski, Chu, and Carmin 2014; Bulkeley and Castán Broto 2013; Shi, Chu, and Carmin 2016).¹ For example, many cities are integrating adaptation with disaster risk reduction efforts (IPCC 2014); designing adaptation specific infrastructures such as dams and seawalls (Carmin, Dodman, and Chu 2013); or updating building codes, zoning ordinances, land use plans, and capital investment policies to include risk assessments (Cutter et al. 2014; Taylor et al. 2012). These efforts reflect a reliance on

¹ Adaptation refers to the process of adjustment to current or projected climate change and its effects in order to mitigate negative impacts or take advantage of beneficial changes (IPCC 2014). In this paper, we include both efforts to reduce risks to baseline climatic events and to additional impacts under climate change since many local governments worldwide see adaptation as complementary or the same as disaster risk reduction (IPCC 2014).

rational and comprehensive approaches to overcome uncertainty and produce “win-win” benefits (e.g., Godschalk, Brody, and Burby 2003; While and Whitehead 2013).

Operationally, adaptation planning, especially in the global North, focuses on infrastructure and land use planning solutions. Northern priorities around addressing social vulnerability target building community social capital or short-term solutions such as cooling centers, emergency contact lists, and provision of materials in multiple languages (Preston, Westaway, and Yuen 2011). Conversely, the global South often argues for the “right to development” as a way to raise individual adaptive capacity (Ayers and Dodman 2010). Such efforts promote community-based and pro-poor adaptation actions that tackle underlying drivers of vulnerability, including poverty, housing insecurity, and inadequate access to social services (Bulkeley, Edwards, and Fuller 2014; Castán Broto, Oballa, and Junior 2013). Globally, adaptation planning commonly involves downscaling climate models and pursuing technical monitoring and evaluation strategies (Füssel 2007; Nay et al. 2014). Adaptation, in this sense, draws on strategic and goal-oriented planning (Measham et al., 2011), which emphasize obtaining the best available climate data as a basis for taking scientifically sound actions.

Adaptation planning often also reflects practices inspired by the communicative turn in planning practice (Forester 1999; Purcell 2009). To tackle multi-sector challenges, some cities have established offices to coordinate action across agencies; formed committees to engage public, private, and academic actors (Anguelovski and Carmin 2011); or made concerted efforts to include vulnerable and marginalized communities (Archer et al. 2014; Bulkeley et al. 2013). Participatory and inclusive planning has helped to avoid top-down decisions, foster consensus on adaptation priorities and strategies, and promote durable decisions and plans (Castán Broto, Boyd, and Ensor 2015; Chu, Anguelovski, and Carmin 2015; Healey 2005; Innes and Booher, 2010; Shapiro 2009).

However, scholars are beginning to question how adaptation planning strategies – even those designed to be participatory – may be exacerbating unequal outcomes. Rational, technocratic, and communication-focused planning approaches by nature advocate for an ideal “public good” while deemphasizing asymmetric power dynamics and conflict over resources (Flyvbjerg 1998; Wildavsky 1979; Yiftachel 2000). Focusing on “climate proofing” and “win-win” solutions therefore hide tradeoffs associated with the uneven distribution of adaptation costs and benefits (Pelling, Matyas, and O’Brien 2014). Furthermore, adaptation through technocratic interventions or the devolution of responsibility to individual households ignores existing inequality in adaptive capacity and produces zones of greater “ecological security” or green enclaves (Hodson and Marvin 2010). There is growing evidence that urban economic actors may be employing the rhetoric of climate resilience to entrench speculative, exclusionary, or unsustainable practices, thus exacerbating historic injustices associated with infrastructure and land use development (Sovacool, Linnér, and Goodsite 2015).

These discussions demonstrate how efforts to catalyze adaptation as a new policy arena sometimes problematically align adaptation with development interests in ways that undermine the need for deeper reforms (Anguelovski, Chu, and Carmin 2014; Bulkeley and Tuts 2013; Preston, Mustelin and Maloney 2013; Simon and Leck 2015). In response, some scholars argue that efforts to resist, incrementally adapt, and build or design their way out of the climate crisis are insufficient to redress socio-spatial disparities (Pelling et al. 2014). Rather, cities must pursue deliberate transformative actions to increase the scale of interventions, address drivers of socio-spatial vulnerability, and fundamentally alter economic growth paradigms and class relations (Kates, Travis, and Wilbanks 2012; Pelling et al. 2014).

This paper contributes to this debate by setting a foundation for critical studies of adaptation planning. Building on theories of comparative urbanism, we examine how land use plans and interventions create or exacerbate socio-spatial inequalities. Such critical examinations are necessary given the growing global portfolio of urban adaptation interventions and increasing incidences of social, spatial, and environmental injustices attributed to them.

Methodology

This paper explores ways in which land use planning for climate adaptation can lead to maladaptive outcomes for disadvantaged communities. With the goal of identifying key drivers of maladaptation in mind – but without prior knowledge of which kinds of equity issues may be present – we selected emblematic cases of cities that are at the forefront of climate adaptation planning across the global North and South. Much academic and policy literature documents how each city is responding to climate risks, although not all are labeling their efforts as adaptation. For example, some use the vocabulary of resilience in the context of a changing climate. Each city has also progressed far enough in their adaptation planning process to allow for early assessments of their implications.

We purposefully selected prominent examples of early adopter cities across a wide range of technocratic and communicative planning approaches, and included cases with different levels of economic development, sources of climate vulnerability, and governance arrangements. We did so both to inductively identify the full set of mechanisms by which land use planning for adaptation may lead to greater inequality, as well as to examine whether and how patterns of injustice hold regardless of context (Briggs 2008; Robinson 2011).

The eight cities we examined include Boston, New Orleans, Medellín, Santiago, Metro Manila, Jakarta, Surat, and Dhaka. Table 1 summarizes each city’s climate risks and vulnerability and Table 2 highlights their main land use planning initiatives and strategies for climate adaptation.

INSERT TABLE 1 HERE

New Orleans, USA	Medellin, Colombia	Santiago, Chile	Boston, USA
<p>Climate risks: More frequent and severe storms; sea level rise (SLR); land subsidence</p> <p>Vulnerability: City below sea level, dependent on old infrastructure; inadequate housing, evacuation options, and access to services by the poor</p>	<p>Climate risks: More frequent and severe precipitation; landslides, mudslides; drought, temperature rise; water supply</p> <p>Vulnerability: Development on slopes without adequate foundations, especially 280,000 poor households</p>	<p>Climate risks: Increasing water scarcity; intensifying urban flooding; rising urban heat island effects</p> <p>Vulnerability: Low income neighborhoods vulnerable to drought, floods, and heat island effects</p>	<p>Climate risks: More frequent and severe storms and precipitation; land subsidence; SLR; urban heat</p> <p>Vulnerability: Areas built on landfill, including low income areas, are flood prone</p>
Dhaka, Bangladesh	Metro Manila, Philippines	Jakarta, Indonesia	Surat, India
<p>Climate risks: River flooding, waterlogging, SLR, high heat, waterborne disease</p> <p>Vulnerability: Rapid population growth, constrained land supply; large poor population (40% informal); reliance on river embankments</p>	<p>Climate risks: More frequent and severe storms; storm surge, subsidence, SLR; landslides; high heat</p> <p>Vulnerability: High flood risk; metro produces 40% of national GDP, has density of 18,000 people/km², and 102,000 informal families living along waterways</p>	<p>Climate risks: More frequent and severe storms and flooding, subsidence, SLR</p> <p>Vulnerability: Rapid population growth; projected floods threaten 4.5 million in North Jakarta and informal settlements along the coast and 13 rivers</p>	<p>Climate risks: More frequent and severe storm; severe river flooding; coastal erosion due to SLR</p> <p>Vulnerability: Rapid urbanization; high rates of informality; floods threaten informal settlements and critical urban industries</p>

Table 1: Key Climate Risks and Vulnerability of Selected Case Study Pairs

INSERT TABLE 2 HERE

City	Adaptation Policies and Plans	Adaptation Land Use Strategies
<i>Uneven Access to Flood Protective Infrastructure</i>		
New Orleans	<p>Resilient New Orleans (2015)</p> <ul style="list-style-type: none"> • Greater New Orleans Urban Water Plan (2013) • Unified New Orleans Plan (2007) • Bring New Orleans Back (2005) 	<ul style="list-style-type: none"> • Reduce reliance on pumps/levees, take advantage of water as an urban amenity • Despite proposals to realign land use in the city to reduce hazard exposure, no significant changes to land use planning or strategy implemented to address climate-related risks

Dhaka	<ul style="list-style-type: none"> ● Dhaka Metropolitan Development Plan (1995-2015) ● Flood Action Plan 8a and 8b (1991) 	<ul style="list-style-type: none"> ● Flood mitigation is of primary concern. Zones set aside for flood flow, flood water retention, and traditional rural settlements but weak enforcement and high urbanization pressure
<i>Selective Land Use Regulations and Resettlement</i>		
Metro Manila	<ul style="list-style-type: none"> ● 2035 Metropolitan Flood Management Master Plan (2012) ● Climate Change Act (2009) ● Disaster Risk Reduction Act (2009) 	<ul style="list-style-type: none"> ● New dams and dikes, dredge canals, upgrade existing drainage infrastructure ● Relocate 125,000 households from waterway embankments to surrounding provinces
Medellin	<ul style="list-style-type: none"> ● Development Plan (2012-2015) ● Territorial Organization Plan (2013) ● Metropolitan Green Belt (2012) ● Plan Bio 2030 (2013) ● Integral Urban Projects (2004-) 	<ul style="list-style-type: none"> ● 46 mile green ring to limit growth and new settlements ● Relocation of the urban poor on hillsides to promote core density ● Climate education for poor neighborhoods ● Improvement to public and alternative transport ● Upgrade dwellings to conform with building codes
<i>Privileging Elite Participation</i>		
Santiago	<ul style="list-style-type: none"> ● Climate Adaptation Plan for the Metropolitan Region of Santiago (2010-2012) ● National Climate Change Action Plan (2008) and Strategy (2006) 	<ul style="list-style-type: none"> ● Improved drainage channels and green urban spaces; reduced water demand through flow restriction fixtures; reformed institutions to manage water basin-wide. ● Adaptation Plan is yet to be implemented, but national government intends to replicate the planning process in cities throughout the country.
Jakarta	<ul style="list-style-type: none"> ● National Capital Integrated Coastal Development Plan (2014) ● National Action Plan for Climate Change Adaptation (2013) ● Strategy for Mainstreaming Adaptation into National Development Planning (2012) ● Jakarta Coastal Defense Strategy (2012) 	<ul style="list-style-type: none"> ● Giant Sea Wall and new city for 1.5 million people on reclaimed land in the Jakarta Bay to stop floods from the sea and ease drainage on land ● Large retention ponds behind the wall are pumped out to maintain drainage from rivers and canals ● Ongoing canal and river dredging projects by World Bank and JICA require eviction of slum settlements
<i>Private Sector Embeddedness</i>		
Boston	<ul style="list-style-type: none"> ● Enhancing Resilience in Boston (2015) ● Greenovate Boston Climate Action Plan (2014) ● Building Resilience in Boston, Climate Ready Boston, Preparing for the Rising Tide (all 2013) 	<ul style="list-style-type: none"> ● Integration of climate into city operations, e.g. climate review in development permitting ● Lobbying regional entities and neighboring cities to climate proof infrastructure ● Expanding FEMA maps to include sea level rise ● Private sector action and resilience zones
Surat	<ul style="list-style-type: none"> ● Asian Cities Climate Change Resilience Network pilot city (2008-2014) ● Surat Climate Change Trust (2013) ● Surat Climate Resilience Strategy (2011) 	<ul style="list-style-type: none"> ● Design competition on housing for low-income flood-prone areas; cool roof and passive ventilation for public housing; GIS database of vulnerable slums to facilitate evacuation ● Recent projects: End-to-end early warning system, Urban Health and Climate Resilience Centre

Table 2: Key Adaptation Policies, Plans, and Land Use Strategies in Case Sites

Our analysis is based on fieldwork conducted between 2011 and 2015. Each co-author was responsible for one case study (and in one case, two), and conducted interviews and observed or participated in climate adaptation and planning meetings. Through snowball sampling, we conducted interviews in each city covering a variety of themes related to climate adaptation beyond issues of equity and justice. Interviews lasted between 30 minutes and 2.5 hours and did not require translators (except in Dhaka). Interviewees included elected officials, mid-level staff and directors of national, state, and municipal departments for climate, environment, housing, water, infrastructure, and economic development; local financial institutions and private companies; international foundations and transnational networks; nongovernmental and community-based organizations; and designers, engineers, academics, and other local experts.

Interview questions focused on experiences of climate impacts, responsibilities in adaptation or resilience planning, strategies or decisions around crafting and implementing land use and infrastructure plans, tensions between goals and priorities articulated within the plans, and issues of equity and justice when considering adaptation needs. We triangulated interview data by participating in adaptation planning meetings and analyzing contents of adaptation reports, policies, regulations, and meeting minutes. We constructed narratives for each case study using these multiple stakeholder perspectives and data sources.

We inductively analyzed and compared adaptation interventions from across the eight cities to identify patterns of procedural and distributive equity. This process identified two broad categories of equity considerations: acts of commission and acts of omission.² In a second stage of data analysis consisting in a thematic analysis of the cases, we identified four strategies associated with these two categories of inequity: (1) provision of protective infrastructure; (2) enforcement

² Due to the scope of the paper and the number of case example, our analysis does not include interview quotes. However, we make references to our field observations and interviews throughout the section.

of land use regulations; (3) participation in planning processes; and (4) engagement with the private sector. We then identified pairs of cities whose climate adaptation experiences best illustrate how these four mechanisms are exhibited on the ground. These pairings emerged inductively from the analysis, and are not a priori framings based on speculation. The objective of this iterative analysis was to develop and propose an analytical framework that serves as a foundational critique of ongoing adaptation activities commonly found around the world. This framework can then be applied to other cities to assess potential inequitable impacts of adaptation projects.

Equity Impacts of Adaptation and Land Use Planning

A comparison of the eight cities shows how land use planning interventions for adaptation can disproportionately impact low income and minority groups by creating or exacerbating different forms of socio-spatial inequality. Despite the diversity of approaches pursued across the cities (see Table 2), they share patterns of unjust outcomes. We present the cases in thematic pairs representing each of the four mechanisms of inequity to demonstrate how these patterns manifest across contexts, although more than one mechanism can be at work in any given city. The first two pairs (New Orleans and Dhaka, Metro Manila and Medellin) unpack the inequitable impacts of specific infrastructure and spatial planning interventions. The second two pairs (Santiago and Jakarta, Boston and Surat) highlight procedural equity implications of decision-making approaches that exclude the poor or rely on private sector action.

Uneven Access to Flood Protective Infrastructure in New Orleans and Dhaka

Many cities rely on engineered infrastructure to reduce exposure to flood risks, despite research showing that such efforts often increase flood losses (Colten, Kates, and Laska 2008).

Both New Orleans and Dhaka have recently strengthened flood protection infrastructures, such as levees, canals, and pumps, in response to disasters. The two cities vary in their socioeconomic contexts, but have taken similar approaches to reducing risks through physical infrastructure interventions, which have in turn resulted in comparable trends of social-spatial inequity and vulnerability entrenchment.

For New Orleans, the unequal distribution of flood impacts became clear within days of the levees collapsing after Hurricane Katrina in 2005. Before and after Katrina, land use and development patterns have played a significant role in determining how vulnerability is distributed (Finch, Emrich, and Cutter 2010). Throughout the city's history, predominantly lower-income and African-American neighborhoods developed in areas with greater flood risks (Campanella 2007). Although New Orleans has experienced a surge in community development and environmental projects since Katrina (Irazabal and Neville 2007), the city has also witnessed a wave of “disaster capitalism” (Klein 2008) and privatization of public services. The failures of early planning efforts – together with Mayor Ray Nagin's avowed faith in a market-based recovery – contributed to the inability to address the land use and flood hazard nexus in urban planning.

Post-Katrina, the city underwent several extensive planning processes, but there was fierce public opposition to an early plan by the Bring New Orleans Back Commission (BNOBC) that sought to “shrink the city's footprint” to reduce flood vulnerability. This became known as the “green dot plan” after the infamous map that was interpreted as calling for the conversion of several low-lying neighborhoods into green space. The plan proposed widespread replacement of predominantly African-American residential areas, such as Gentilly, with parks while sparing similarly heavily damaged and predominantly white neighborhoods, such as Lakeview. This top-down plan seemed to confirm African-American communities' fears and suspicions of land-

grabbing (Breunlin and Regis 2007). Having acquired an aura of racially-charged opportunism, the BNOBC plan was soon abandoned and with it discussions of substantial land use change largely disappeared.

While the U.S. government has spent more than US\$14.5 billion since Katrina to strengthen New Orleans' flood infrastructure, neither the levee alignments nor the city's land use patterns have substantially changed (Interviews 2014, 2015; USACE 2014). Post-Katrina gentrification of relatively flood-safe neighborhoods along the Mississippi River's natural levees, together with the recovery's failure to address persistent and uneven flood vulnerability through land use reform, means that poor African-American communities will likely continue to be disproportionately vulnerable. The recent *Greater New Orleans Urban Water Plan* suggests a number of urban design strategies to productively reintegrate water into the fabric of the city, but the plan does not propose any significant changes to land use patterns (Papacharalambous et al. 2013). Furthermore, the *Urban Water Plan's* inattention to issues of equity and inclusion, coupled with an emphasis on increasing property values by expanding waterfront residences, raises concerns about potential gentrification and the creation of "ecological enclaves" (Checker 2011; Hodson and Marvin 2010). The 2015 *Resilient New Orleans Strategy*, which proposes improving stormwater drainage and establishing a savings-matching program to help low- and middle-income residents set aside emergency funds, is an attempt to make the city both more equitable and adaptable. However, recent waves of gentrification of low-income and Black neighborhoods such as Tremé will likely instead shift resources to neighborhoods where housing prices are skyrocketing (Interviews 2015).

Like New Orleans, Dhaka is located in an extensive and dynamic river delta. The city faces rapid urbanization with limited access to flood-safe land for expansion. After destructive floods in

1987 and 1988, the Government of Bangladesh implemented the Greater Dhaka Integrated Flood Protection Project (GDIFPP) to reduce flooding in the city. Under this plan, earthen embankments, pumps, and sluice gates were constructed to protect the more urbanized western Dhaka. However, resource constraints have delayed planned embankments in less densely populated area of eastern Dhaka. The planning and execution of the GDIFPP, along with broader development trends, have disproportionately burdened the urban poor. The siting of embankments, designed with little consultation of residents, has caused major disruptions to adjacent communities and their livelihoods. Initial designs have also excluded substantial areas of low-income settlement and caused widespread waterlogging inside the protected zone (Rasid and Mallik 1996).

Due to the inadequate application of land use controls and insufficient provision of land and public housing, the western embankment has caused displacement of poor communities inside and outside the protected zone. Interviews with residents (2014) reveal that poor communities living next to canals and embankments are threatened with eviction in the name of flood protection, which discourages investment in flood adaptation. Meanwhile, although the *Dhaka Metropolitan Development Plan* designates “flood flow zones” and floodwater retention areas as off-limits to development (RAJUK 1997), the municipality has allowed powerful private developers to conduct landfilling in these areas for middle and high-income housing (Feldman and Geisler 2012). In addition to residential displacement, uncontrolled landfilling is also replacing paddy land and canals with expanses of river sand, undermining agriculture and fishing-based livelihoods (Interviews with affected communities (2014); site visits).

Low-income and minority groups in both New Orleans and Dhaka continue to face high flood risks despite the construction of new flood infrastructure. In New Orleans, historic power imbalances between wealthier whiter neighborhoods and lower-income black communities have

limited efforts to upgrade infrastructure in ways that would better protect poor minority residents from future disasters, and address the roots of the city's mounting vulnerability to floods. In Dhaka, urbanization pressures, conflicting incentives, and uneven land use enforcement have also promoted flood-exacerbating development while displacing the poor.

Selective Enforcement of Land Use Regulations and Resettlement in Manila and Medellin

Many cities are opting to resettle vulnerable populations out of risk areas. Unlike Northern cities, where most property rights are clear and formal, informal settlements in the South have few legal protections, are easier to evict and cheaper to expropriate, and are located in areas targeted for resettlement by infrastructure projects and more profitable private developments (Moser and Satterthwaite 2010). Faced with climate change, governments are expanding or adopting new forms of eviction and resettlement programs. Our analysis of Manila and Medellin demonstrate how resettlement and selective growth containment in the context of land use planning for adaptation can exacerbate the vulnerability of the poorest.

After suffering devastating floods in 2009 and 2012, Metro Manila was confronted with the need to upgrade the region's flood management infrastructure. In response, the government adopted the *2035 Metropolitan Flood Management Master Plan* in 2012, which, for a cost of US\$8.4 billion, funded long-standing plans to build dams and road dikes, dredge canals and widen waterways, rehabilitate and expand drainage infrastructure, protect and reforest the upper watersheds, and improve disaster preparedness (GFDRR 2013). Politicians and the media blamed informal households for clogging drainage networks during past flooding events (GFDRR 2013). In response, the *Master Plan* proposed to relocate 100,000 households away from waterway embankments. As of 2014, 20,000 households have been resettled (Moss 2014). Despite efforts to prioritize in-city relocation, most resettlement housing is built in surrounding provinces due to

escalating land prices and national caps on social housing costs. Additionally, poor communities continue to be exposed to floods, typhoon winds, heat, and landslides in resettlement sites, where they have fewer livelihood resources to cope with impacts (site visits and interviews with housing officials and community organizations (2013)).

Flood risks in Metro Manila are also attributed to the fact that national building codes, local zoning ordinances, and post-disaster reconstruction guidelines do not stipulate higher standards for development in flood zones. Since most local governments do not enforce a national law of three-meter easements along waterways, 41% of Metro Manila's 273 waterways have been filled for roads, private shopping malls, and middle-income housing (Senate of the Philippines 2013). Interviews with housing officials (2013) show that clearing waterways is most easily implemented in informal areas even though public, private, and informal developments have all impaired the floodplain. In that sense, the *Master Plan's* targeting of informal settlements to make room for water ignores the contribution of formal sector – and higher-end – developments to the floodplain urbanization and their responsibilities for climate adaptation.

Like Manila, Medellin shares similar challenges of expanding no-build zones and relocating residents from risk-prone areas. As one of Mayor Aníbal Gaviria's 31 flagship projects, the Metropolitan Green Belt (announced in 2012) seeks to contain growth while reducing landslide risks. This project builds on Medellin's tradition of urban rebranding, physical interventions, and municipal entrepreneurialism to address pervasive social problems. The plan, which will affect 230,000 residents living above the 1,800-meter altitude limit set by the Green Belt, proposes a Zone of Protection, which is the Green Belt itself; a Zone of Transition with new parks and risk mitigation measures; and a Zone of Consolidation, with new social housing high-rises and spatial improvement projects (Agudelo Patiño 2012). Controversially, the plan proposes to relocate

thousands of poor residents away from ill-defined “non-recoverable areas” with high risks of landslides or flooding.

According to low-income residents, the municipality is overestimating the number of non-recoverable risk areas in their communities as a justification for relocation. Experts also note that the municipality has not performed adequate risk mitigation studies nor responded to community concerns about relocation (Interviews 2015). As a result, many residents are asking for the creation of a Dialogue Table (*Mesa de Concertación*) with representatives from the city planning agency and are opposed to leaving the houses they built for public, one-size-fits-all social housing tower blocks on the other side of the city (interviews with affected poor communities in Comuna 8 (2013, 2015)). By contrast, the *Green Belt Plan* reveals that higher-income neighborhoods are not being displaced, even though they have also expanded beyond the zones of buildable area and are situated on steep slopes. For example, some high-tower gated communities located next to important reserves of native forest are allowed to grow despite their potential expansion into protected land (Arango, 2012).

The relocation of poor residents to make way for the Green Belt does not solve the problem of growing low-income housing demand since the number of new housing units will be lower than the number of those lost. In this case, the demand for housing will instead likely shift to fragile hillsides outside of Medellin. The *Plan Bio 2030* (2013), developed by a local university in consultation with local and regional stakeholders, expands the Green Belt to the metropolitan valley. However the surrounding towns have not yet incorporated this concept into their territorial organization plans. Also, observations of community meetings (2013) showed that low-income residents in Medellin fear that the proposed monorail system along the Green Belt will attract tourists and wealthier residents to their neighborhoods and dispossess long-time residents of their

green space for the recreation and esthetical pleasure of historically more privileged groups. Municipal councilors also concur with community concerns, and further argue that such a mega-project may raise land prices, lead to local tax increases, and eventually change the social composition of hillside communities. This confirms many residents' fear that the Green Belt will introduce more social-spatial inequities (Interviews 2013). The lack of meaningful public engagement and recognition of low-income communities' development visions exacerbate procedural justice concerns and increase distrust in municipal plans.

Examples from both Manila and Medellin reveal that uneven enforcement of land use regulations and evictions — in the name of adaptation — results in wealthier formal settlements remaining in place while poor informal communities are displaced or relocated. Adaptation interventions therefore can produce social and physical isolation and trauma for vulnerable urban residents, while overlooking the importance of social cohesion, political recognition, and livelihood protection for the long-term wellbeing of low-income communities.

Privileging Elite and Expert Participation in Santiago and Jakarta

Santiago, the capital of Chile, is one of Latin America's most segregated cities and is increasingly vulnerable to climate impacts due to the melting of Andean glaciers and increasing frequency of extreme weather events. Similarly, Jakarta, the capital of Indonesia, has high levels of intra-urban inequality and is considered one of the world's most climate vulnerable megacities. Today both cities are confronted with climate risks and impacts because of private market forces and elite interests usurping low-income communities' concerns during planning processes. These market forces reinforce urban inequality and challenge objectives of inclusive participation in the context of spatial and social stratification.

In Santiago, the city's 800,000 low-income residents suffer from with chronic water shortages and are disproportionately affected by increasing urban heat, precipitation, and other extreme hazard risks (Correa, 2015; Welz, Schwarz, and Krellenberg 2014). In 2010, regional authorities initiated the Climate Adaptation Santiago (CAS) project and in 2012 launched the *Climate Adaptation Plan* for the Metropolitan Region of Santiago. The planning process included ten roundtables with public, private, academic, and civil society actors (Barton, Krellenberg, and Harris 2014; Krellenberg and Katrin 2014), and proposed to rehabilitate drainage canals to reduce flood risk, reduce water demand through flow-restriction fixtures in low-income areas, increase urban green space, and create a body overseeing water management.

Although advertised as a participatory process, the Climate Adaptation Santiago project in fact did little to ensure participation of marginalized groups, either through direct representation or efforts to prioritize their adaptation needs (Interviews 2015). For example, in response to high vulnerability of the city's central and southern districts to drought, civil society representatives advocated reforming the 1981 *Water Code*, which is a military government-era policy instrument promoting water privatization that fails to ensure minimal potable water access by the poor during droughts (Bauer 1997; Borzutzky & Madden 2011). This debate led to confrontations over water market regulation with Santiago's water regulator, the *Superintendencia de Servicios Sanitarios*, who threatened to abandon the process. Interviews with coordinators of the process and civil society participants (2015) revealed that, to diffuse the debate, coordinators urged those advocating for reform to "tone down their rhetoric and avoid proposing any legal or political reforms at the national level."

To achieve consensus, the coordinators ultimately restricted the ability of the adaptation strategy to address the urban poor's vulnerability by systematically privileging certain groups'

interests. The fragmentation of the metropolitan region into 52 sub-regions, the limited capacity and knowledge of vulnerable groups, and the impracticality of ensuring representation given the large number of stakeholders were all cited as challenges to direct representation of marginalized groups (Interviews with municipal officials and technical consultants 2015). These factors, together with the failure of the Ministry of Environment to conduct a public consultation process following the publication of the plan, constrained knowledge dissemination to the most vulnerable areas. Recent civil society mobilizations beyond the adaptation planning process have led to renewed political pressure on the national government to reform the *Water Code*.

Like Santiago, Jakarta faces similar challenges with prioritizing the vulnerability of the urban poor in adaptation planning efforts. The city has long struggled with serious flooding, particularly impacting poor residents in informal *kampungs* along low-lying riverbanks and coasts. After devastating floods in 2007, the Indonesian government, with funding and assistance from the Netherlands government, launched a study that culminated in the 2011 *Jakarta Coastal Defense Strategy* (JCDS) (Indonesia Ministry of Public Works 2011). The JCDS, exclusively authored by Dutch hydrologists, engineers, and consultants, proposed a series of floodwalls and retention lakes in the Jakarta Bay, protecting the city against sea level rise while enabling existing rivers and canals to drain into the lakes. These ideas were incorporated into the 2014 *National Capital Integrated Coastal Development Master Plan* (NCICD), also known as the “Giant Sea Wall.” While the JCDS focused on technical feasibility, the NCICD prioritizes a visually symbolic vision of future urban development. The elite and expert-based plan proposes a “new city” for 1.5 million people on reclaimed land, between the infrastructural elements of the sea walls and retention lakes. Shaped like a giant Garuda, Indonesia’s national symbol, it also showcases a new central business district, while paying much less attention to sustainable livelihoods of lower-

income residents. The project is privately funded, with new leasable land paying for the flood infrastructure (Indonesia Coordinating Ministry for Economic Affairs 2014).

The NCICD shifts issues of land use out of the existing city altogether – thus sidestepping traditional planning challenges — by proposing a sea wall city on newly reclaimed land that is financed by real estate development and serves simultaneously as financial center and flood infrastructure. At the same time, the plan requires clean rivers flowing into the retention ponds, and places increased urgency on ongoing projects to dredge and widen canals and rivers. These projects entail extensive evictions and relocation of residents living in *kampung* settlements along the riverbanks (Jakarta Regional Development Planning Agency 2012), disrupting economic livelihoods and longstanding social networks. While it promises social housing and attention to displaced villages and fisheries on paper, the plan has been conducted with little public participation or attention to marginalized communities. Although novel in concept and scale, the plan appears to be in line with trends of privatizing urban development, infrastructure, and services that have often resulted in protected enclaves for wealthier residents at the expense of poor communities (Firman et al. 2011; Kooy 2014; Padawangi 2012).

The NCICD is a striking example of frequent contradictions between large-scale plans and politics on the ground. The NCICD plan broke ground in 2014, but interviews with World Bank officials, Jakarta city government officials, and community organizers (2013 and 2014) show that progress on river dredging and relocation projects – which are necessary to the long-term success of the plan – has been slow, in part because of resistance by the urban poor. Community groups in two at-risk *kampungs* have organized counter-proposals to relocation and have forged working relationships with some city officials to consider rehousing within the area (Shepherd 2014). Nevertheless, eviction and demolition of riverbank informal settlements continue. The NCICD, in

effect, is presenting a technically, economically, and symbolically ambitious solution for adaptation while largely circumventing principles of equity and inclusion.

Participation and inclusion of the most marginalized remain peripheral to adaptation planning. While there have been successes attributed to communities mobilizing and fostering relationships with city officials, continued evictions from informal settlements in Santiago and Jakarta show that the needs and priorities of poor communities are still very much neglected in practice. Examples from both cities underscore how adaptation planning efforts challenge the utility of cursory or “check-list” participatory processes. Adaptation plans can privilege elite participation over the populations being “planned for” by redefining what it means to be vulnerable, who is included in such definitions, and what issues are negotiable in efforts to reduce exposure. Furthermore, planners sometimes seek to depoliticize adaptation by skirting more controversial historical development issues and policies that are at the root of unequal access to resources. As a result, strategies that emerge from adaptation processes can often entrench the vulnerability of the urban poor.

Private Sector Embeddedness, Lobbying, and Rent-Seeking in Boston and Surat

Adaptation interventions require dedicated finance and capacity support. Due to deficits in international and intergovernmental adaptation resources, Boston and Surat have relied on private actors critical to the local economy for political legitimacy, strategy development, and project financing to protect capital assets against climate impacts. Although the two cities are situated in different socioeconomic contexts, both are key nodes in global financial networks and commodity flows. Boston is a center for biotechnology, healthcare, and education while Surat is a hub for textile, diamonds, and petrochemical industries.

Flooding and sea level rise maps for Boston show the ocean taking back reclaimed land and returning the city to its pre-1600s boundaries (TBHA 2013). At risk is some of Boston's most valuable real estate, including Back Bay, parts of the Financial District, the new Innovation and Seaport Districts, as well as some of the city's poorest communities of color such as East Boston and Dorchester. In response to these projections, Boston undertook a two-pronged, public and private sector climate resilience approach to identify vulnerabilities and adaptation options, which culminated in the 2014 *Greenovate Boston: Climate Action Plan*. On the private side, former Mayor Thomas Menino established the Green Ribbon Commission in 2010 to convene local business, civic, and institutional leaders to address climate risk to private property. The Green Ribbon Commission procured two guides, *Building Resilience in Boston* (2013) and *Enhancing Resilience in Boston* (2015), on how to retrofit buildings in ways that complement existing actions by private property owners to manage climate risks.

The option for each asset management company and real estate investment firm to invest in retrofitting for climate preparedness highlights the different levels of adaptive capacity among private property owners. Through their own risk management initiatives, some asset management companies are building relationships with public and non-profit emergency services providers, such as the Red Cross and police and fire departments, providing a direct line to assistance during disaster events (Interviews 2015). In interviews with the city's leading property owners, they note that they are investing in risk mitigation, such as temporary flood barriers, and diffusing and institutionalizing these ideas through the Green Ribbon Commission's reports and industry events (Interviews 2015). These efforts may result in unintentionally propagating ecological enclaves around key financial buildings in South Boston or Downtown. In addition, some investors are

either shedding or avoiding high-risk waterfront real estate, which may cumulatively drain financial resources from vulnerable properties.

Low-income communities, on the other hand, have been slower to develop risk assessment knowledge and adaptation plans. The exception is East Boston, where the Neighborhood of Affordable Housing, Inc., received a US\$100,000 grant from the Kresge Foundation to support education and adaptation planning in low-income communities. However given the geographic scale of urban poor communities, property protection would only be achievable with the construction of large-scale public infrastructure. Accordingly, in the absence of compensatory public investments in vulnerable poor neighborhoods, greater adaptive capacity of large private property owners will exacerbate uneven levels of flood risk protection.

Like Boston, Surat's adaptation agenda has been shaped by a desire to involve economically important private actors in the city's adaptation process. Between 2008 and 2014, Surat was a pilot city for the Rockefeller Foundation's Asian Cities Climate Change Resilience Network (ACCCRN), which focused on improving the city's flood risk management approaches, water supply and distribution infrastructure, and public health emergency responses. After the release of the *Surat City Resilience Strategy* in 2011, adaptation actions were institutionalized within the Surat Climate Change Trust, a nonprofit organization that aims to sustain the policy momentum initiated by ACCCRN (Chu et al. 2015).

While early initiatives focused on reducing the vulnerability of slum neighborhoods, the planning process largely omitted meaningful participation of marginalized communities (Chu 2015). Projects implemented under ACCCRN assessed and catalogued areas vulnerable to flood and disease risks (ACCCRN 2011), especially the 400 slums under high exposure to flood and vector-borne diseases (Bhat et al. 2013). Among others, the city initiated a design competition

around planning for flood risk in low-income neighborhoods, designed a web-based vulnerable people's database, and created an urban services monitoring system to distribute real-time data and evaluate the performance of the city's water delivery and waste collection systems. However, as many interviews with civil society leaders (2013) highlighted, these projects were initiated and driven by municipal officials and technical consultants, with little direct representation from local communities. Even though approaches catered to the interests of vulnerable communities, they in fact entrenched ongoing privatization trends in redirecting infrastructures towards economically important petrochemical, textile, and diamond industries, monetizing of water and sanitation services, and evicting marginalized communities from public lands.

Land use and physical infrastructure redevelopment measures pursued since 2011 have focused on protecting economically valuable assets, such as oil refineries and textile mills, against future flood risks, while displacing communities residing in vulnerable riverine and floodplain areas. Even though many communities have been relocated from hazardous areas, interviews with slum dwellers (2013) show that the new public housing is located far from sources of economic opportunity. Similarly, projects implemented by the Surat Climate Change Trust have not yet addressed historic patterns of representational and distributional injustice. For example, the Urban Health and Climate Resilience Center, launched in June 2013, installed an improved vector-borne disease surveillance system, steered an interdisciplinary health research and advisory team, and initiated a community outreach program. However, these projects relied on local business consortia and technical consultants, such as the city's chamber of commerce, who have historically played a key role in urban development (Chu 2015).

Boston and Surat have leveraged their roles as global investment centers to promote adaptation interventions embedded in ongoing property protection, asset management, and

economic development agendas. However, privatization of responsibilities is also incentivizing rent-seeking behavior over the city's infrastructure and public services. Their experiences show that institutionalization of adaptation through public-private partnerships or private networks can sometimes yield exclusionary behaviors.

Discussion: Acts of Commission and Acts of Omission in Urban Climate Adaptation

This paper lays the foundation for critical studies of urban climate adaptation and responds to calls for empirical research on the justice implications of ongoing land use planning interventions and development controls (e.g., Chu et al. 2015; Davoudi et al. 2009; Fainstein 2015). While land use strategies can be effective tools for promoting adaptation (Davoudi et al. 2009; Wilson 2006) and much adaptation is planned with the poor in mind, our results question whether these interventions are able to advance equitable outcomes or socially just development pathways in the long-term. Figure 1 presents a framework for theorizing the equity impacts of urban land use interventions in the name of adaptation. We argue that each of the four land use planning strategies – infrastructure provision, enforcement of land use regulations, participation in planning processes, and engagement with the private sector – can exacerbate socio-spatial inequality. We find acts of commission when infrastructure investments, land use regulations, or the creation of protected areas disproportionately affect or displace low-income and minority communities. Conversely, we find acts of omission when plans protect economically valuable and already privileged areas at the expense of disadvantaged neighborhoods, thus framing adaptation as a private responsibility rather than a public good, or when they fail to involve affected communities.

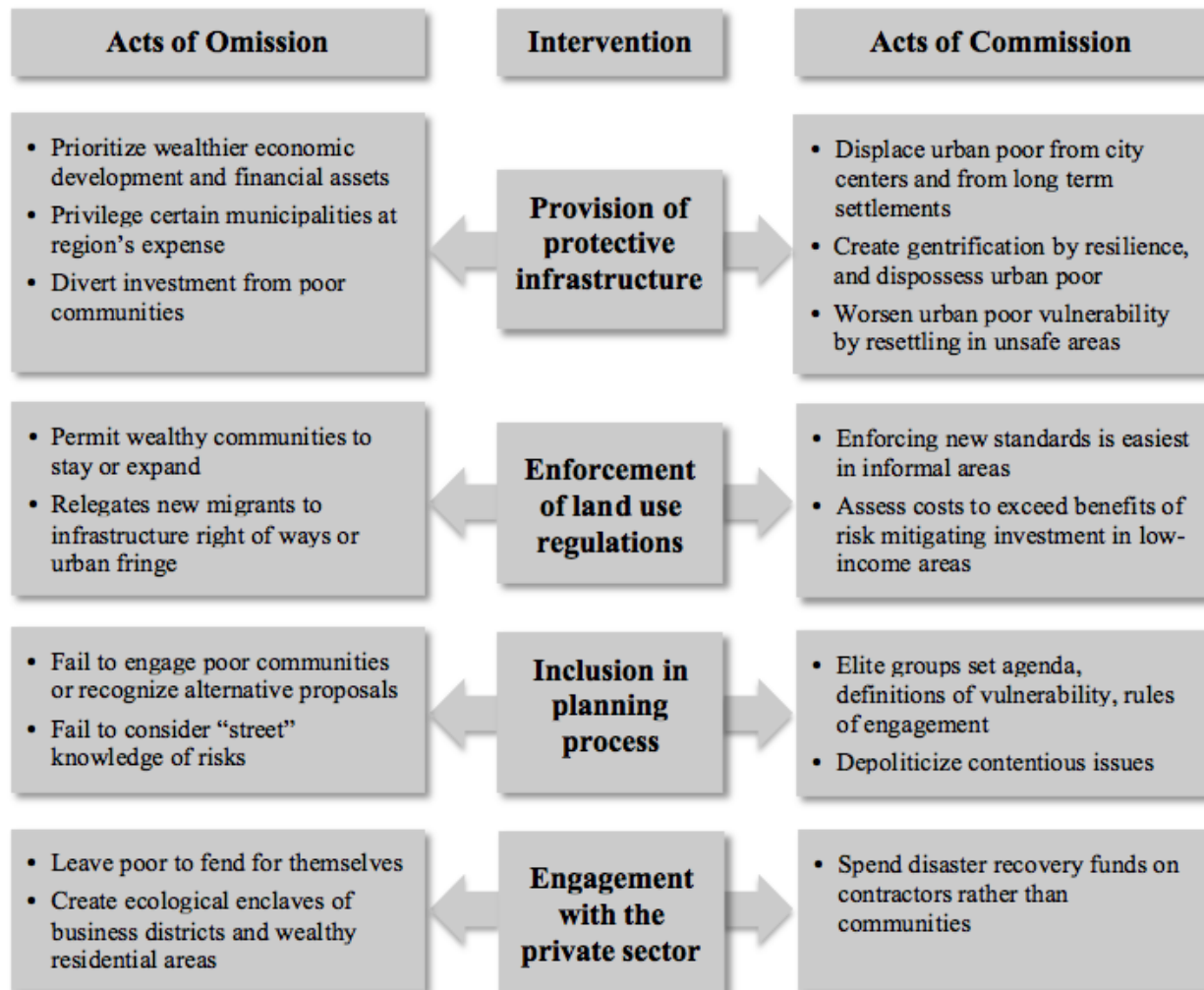


Figure 1: Equity Impacts of Land Use Planning for Climate Adaptation

This framework highlights how inequity in adaptation planning is a dual process of favoring certain privileged groups while simultaneously denying resources and voice to marginalized communities. Multiple land use planning strategies are in play at any given time, and both the strategies and equity outcomes they generate are interconnected and co-dependent. For example, processes of expanding infrastructure into protected central business districts rely on uneven enforcement of land use planning regulations. In other cases, even though attempts by municipalities to move vulnerable populations out of the high-risk areas are commendable, poor communities residing in hazardous areas are often forced to relocate while rich households living

in those same areas are allowed to stay. This may be due to the poor's lesser influence in decision-making processes or private investors' ability to build high-end developments in at-risk areas. Inequitable outcomes of climate adaptive land use strategies, therefore, are reinforced through a combination of exclusionary planning, unequal distribution of adaptation benefits, and perpetuation of unsustainable development patterns.

Provision of protective infrastructure

The first — and one of the most common — land use planning strategies for climate adaptation is to strengthen and expand protective infrastructure, which municipalities often present as “resilient,” “climate proofing,” or “win-win” interventions (Bassett and Shandas 2010). However our case studies show how these strategies can negatively affect the poor. In some cities, climate adaptive infrastructure, such as Jakarta's proposed Giant Sea Wall and Boston's temporary flood barriers erected by large property management companies, prioritize investments in economically valuable areas at the expense of or in lieu of already underserved neighborhoods. These acts of omission represent the unequal allocation of scarce resources and the creation of ecological enclaves for privileged groups that exclude the poor from climate protection.

In other cities, grey infrastructure, such as levees in Dhaka and Surat, and green infrastructure, such as Metro Manila's drainage canals and Medellin's Green Belt, are examples of acts of commission. There, adaptation actions directly displace low-income communities, either immediately or eventually, through climate gentrification. Across the global South, resettlement sites tend to be far from livelihood opportunities, disconnected from social networks, and continue to be affected by disaster risks, thereby reducing communities' adaptive capacity and long-term security. The lack of regional adaptation assessment and planning mechanisms results in a zero sum game, as seen in Medellin, Metro Manila, Dhaka, and New Orleans, where vulnerable groups

are shifted away from hazard-prone areas in the urban core to similarly hazard-prone areas on the periphery or outskirts of protected zones. Taken together, these acts of commission and omission in infrastructure planning exacerbate socio-spatial inequalities by requiring the poor to bear the relocation burden of adaptation strategies. Here, our cases highlight how rational and technocratic planning approaches to overcome climate uncertainty (Füssel 2007; Measham et al. 2011) fail to consider long-term equity implications of risk reduction and resettlement decisions.

Enforcement of land use regulations

Second, many cities are amending zoning and development regulations to limit or prohibit development in risk-prone areas. This approach yields unjust outcomes when governments unequally or selectively enforce land use regulations in informal and low-income settlements. For example, in Dhaka, Metro Manila, and Medellin, failure to enforce past land use and zoning controls has led to widespread private housing and commercial development in environmentally sensitive areas. In this case, low-income and informal communities are singled out following major disasters and targeted for resettlement. Conversely, local governments commit acts of omission when they permit wealthier communities to remain in places of high risk or expand their properties into risk-prone or environmentally protected areas, including into areas recently vacated by resettled informal settlements.

The injustice of these land use planning practices becomes especially apparent when compared against historical and developmental trends in places like Santiago, Metro Manila, Dhaka, and Surat, where high income inequality, low wages, inadequate affordable housing provision, and exclusionary zoning practices have forced the poor to reside in high risk areas with few public services. In the absence of policy changes to affordable housing, disaster risk reduction, floodplain management regulations on all properties, and stringent state control over where real

estate projects take place, planning efforts to align the built environment with climate adaptive zoning regulations can perpetuate historic injustices and produce maladaptive outcomes for the poor.

Inclusion in the planning process

Third, our study reveals ways in which adaptation planning fails to promote procedural justice. Adaptation planning processes – such as those in Dhaka, Metro Manila, and Jakarta – do not meaningfully include representatives from socially vulnerable groups, demonstrating a clear act of omission. Moreover these plans ignore community-based alternatives for risk management, livelihood protection, and wealth creation. This stands in contrast to acts of commission where business groups receive public support for developing strategies to remain in place, as seen in Boston, Surat, and Medellin.

Acts of omission interact with acts of commission when decision-making processes exacerbate power asymmetries between stakeholders (Flyvbjerg 1998; Wildavsky 1979; Yiftachel 2000). Planners in some of the cases disregarded the “street knowledge” and interests of poor residents while simultaneously privileging expert opinion in defining risk tolerance levels or categorizing populations as being vulnerable. These processes violate the rules and principles of good communicative and deliberative planning (Forester 1999; Healey 2005; Innes and Booher 2009). For example, Santiago’s *Climate Adaptation Strategy* planning process highlights how facilitators can play a powerful role in perpetuating or advancing dominant discourses of vulnerability.

Engagement with the private sector

Finally, due to the lack of public funding for adaptation, cities are reliant on the private sector for implementation, which can exacerbate existing unequal access to climate protection.

Framing adaptation as a private responsibility is an act of omission that places the onus on private enterprises to take action and mobilize resources in lieu of the state. For instance, compared to the city government, Boston's large property owners and asset management companies have greater access to financial resources and political support, including through the Green Ribbon Commission. Such concentration of adaptation resources within wealthy business districts can create ecological enclaves that exacerbate climate risks elsewhere, as evidenced by rampant landfilling in Dhaka. Conversely, governments produce acts of commission when they leverage disaster events or the rhetoric of climate adaptation to entrench privatized modes of development. In New Orleans, the outsourcing of disaster recovery to private contractors led to unaccountable spending that failed to produce significant recovery on the ground. At the same time, Mayor Nagin's policy of "letting people vote with their feet" as a market approach to promote recovery favored wealthier and whiter neighborhoods while gentrifying historically black areas. As a result, the embeddedness of private interests within public sector adaptation plans incentivizes corporate rent seeking behaviors in the delivery of urban infrastructure and public services, thus jeopardizing the prospects of long-term equitable development pathways in cities.

Reflections on Policies for Transformative Urban Climate Adaptation

Under climate change, municipalities around the world are struggling to balance their economic development responsibilities with protecting human health and wellbeing. The aim of this paper is not to accuse cities of being unjust regardless of which adaptation approach they take. Rather, we argue that current climate adaptation planning approaches in fact face many identical pitfalls in distributive and procedural equity compared to traditional land use or transportation planning. As a result, it is imperative to critically assess whether planning projects that purport to

be resilient – and therefore implicitly sustainable and beneficial for all – fall into the same planning “traps” of privileging or protecting elite groups at the expense of disadvantaged groups.

We conclude that climate adaptation planning must confront four challenges of inequity. First, we see a need and opportunity for planners to facilitate open multilevel dialogues on evaluating climate risks against adaptation options, tradeoffs, and strategies for how to realign the built environment. Communicating climate risks assessments with stakeholders in a context-sensitive manner is particularly needed. Adaptation processes should also pay attention to issues of displacing and relocating the urban poor because this may reinforce institutionalized inequities that are responsible for vulnerabilities in the first place. Planners must acknowledge that some residents will choose to stay in high-risk areas until they are, literally, washed out because they deem alternatives not worthwhile. In such cases, planners can help enhance their capacities to cope with climate impacts while remaining in place.

Second, planners can advance equitable adaptation by identifying the most scientifically-sound approaches for protecting against, accommodating, or retreating from climate impacts. If these guidelines are sufficiently applied to all social groups, this would provide a framework for more equitably rebuilding or redeveloping the built environment after climate impacts or disasters. However, research is still needed on how cities can adequately evaluate the level of protection different structural and nature-based approaches can provide.

Third, planners have an obligation to advocate for transformative adaptation interventions that place justice front and center, and avoid marketing “resilient” projects that merely re-package development-as-usual. Planners can facilitate meaningful engagement of marginalized urban residents through iterative processes that at times may result in difficult debates and trade-offs. Here, scholars have an opportunity to support planners by identifying best practices and

developing principles to guide project evaluation. For example, they could propose an environmental justice assessment of climate adaptation options much like Executive Order 12898 in the U.S.

Finally, planners and municipal officials must manage private interests so that investors can provide the needed resources to prepare cities to respond to climate impacts rather than dictate the objectives and beneficiaries of funding flagship economic zones or business corridors. Both elite actors and marginalized groups should accept some responsibility for reducing impacts or bearing the burden of adaptation.

In conclusion, this paper highlights how adaptation interventions can reinforce historic trends of socio-economic vulnerability, compound patterns of environmental injustice, and create new sources of inequity. We find that unjust climate adaptation planning is not merely defined as a neglect of marginalized communities; rather, injustice should also be theorized and examined relationally (and spatially) against interventions in other – often more privileged – communities, sectors, and urban spaces. Rather than relying on technocratic or a-political (or-post political) approaches often found in land use, infrastructure, or sustainability planning (Swyngedouw, 2007), climate adaptation plans must take into account historic legacies of social and racial injustice in order to avoid turning adaptation into a private and privileged environmental good with exclusionary and maladaptive externalities. Future adaptation plans must critically consider the distribution of adaptation benefits, costs, and responsibilities across society, address unsustainable and inequitable development patterns, and apply interventions that – at a minimum – treat groups equally regardless of socio-economic status or – better yet – actively prioritize beneficial outcomes for disadvantaged and vulnerable groups.

References

- ACCCRN. *Surat City Resilience Strategy*. Surat, India: Asian Cities Climate Change Resilience Network (ACCCRN) and TARU-Leading Edge, 2011.
- Agudelo Patiño, Luis Carlos. *Formulación del Cinturón Verde Metropolitano del Valle de Aburrá*. Medellín, Colombia: Área Metropolitana del Valle de Aburrá and Universidad Nacional, 2013.
- Angelovski, Isabelle. "From Toxic Sites to Parks as (Green) LULUs? New Challenges of Inequity, Privilege, Gentrification, and Exclusion for Urban Environmental Justice." *Journal of Planning Literature* (2015).
- Angelovski, Isabelle, and JoAnn Carmin. 2011. "Something borrowed, everything new: innovation and institutionalization in urban climate governance." *Current Opinion in Environmental Sustainability* 3 (3):169-175.
- Angelovski, Isabelle, Eric Chu, and JoAnn Carmin. "Variations in Approaches to Urban Climate Adaptation: Experiences and Experimentation from the Global South." *Global Environmental Change* 27 (July 2014): 156–67.
- Arango, S. Radiografía al Cinturón Verde Metropolitano. La Ciudad Verde, 2012. Web. February 28, 2013.
- Archer, Diane, Florencia Almansi, Michael DiGregorio, Debra Roberts, Divya Sharma, and Denia Syam. "Moving towards Inclusive Urban Adaptation: Approaches to Integrating Community-Based Adaptation to Climate Change at City and National Scale." *Climate and Development* 6, no. 4 (2014): 345–56.
- Ayers, Jessica, and David Dodman. "Climate Change Adaptation and Development I: The State of the Debate." *Progress in Development Studies* 10, no. 2 (April 12, 2010): 161–68.
- Bauer, C.J. Bringing water markets down to earth: The political economy of water rights in Chile, 1976–1995. *World Development* 25, no. 5 (1997), 639–656.
- Barton, Jonathan Richard, Kerstin Krellenberg, and Jordan Michael Harris. "Collaborative Governance and the Challenges of Participatory Planning in Santiago de Chile." *Climate and Development* 7, no. 2 (2015): 175–184.
- Bassett, Ellen, and Vivek Shandas. "Innovation and Climate Action Planning." *Journal of the American Planning Association* 76, no. 4 (September 29, 2010): 435–50.
- Bhat, G. K., Anup Karanth, Lalit Dashora, and Umamaheshwaran Rajasekar. "Addressing Flooding in the City of Surat beyond Its Boundaries." *Environment and Urbanization* 25, no. 2 (2013): 429–41.
- Borzutzky Silvia, and Elizabeth F. Madden. Markets Awash: The Privatization of Chilean Water Markets. *Journal of International Development* 96, no. 1 (2011), 10–14.
- Breunlin, Rachel, and Helen A. Regis. "Putting the Ninth Ward on the Map: Race, Place, and Transformation in Desire, New Orleans." *American Anthropologist* 108, no. 4 (2006): 744–64.
- Bulkeley, Harriet, and Vanesa Castán Broto. 2013. "Government by experiment? Global cities and the governing of climate change." *Transactions of the Institute of British Geographers* 38 (3):361-375.
- Bulkeley, Harriet, and Rafael Tuts. 2013. "Understanding Urban Vulnerability, Adaptation and Resilience in the Context of Climate Change." *Local Environment* 18 (6): 646–62.
- Bulkeley, Harriet, JoAnn Carmin, Vanesa Castán Broto, Gareth A.S. Edwards, and Sara Fuller. "Climate Justice and Global Cities: Mapping the Emerging Discourses." *Global Environmental Change* 23, no. 5 (October 2013): 914–25.

- Bulkeley, Harriet, Gareth A.S. Edwards, and Sara Fuller. 2014. "Contesting Climate Justice in the City: Examining Politics and Practice in Urban Climate Change Experiments." *Global Environmental Change* 25: 31–40.
- Bullard, R. D. (2000). *Dumping in Dixie: Race, Class, and Environmental Quality* (3rd ed.). Boulder, CO: Westview Press.
- Campanella, Richard. "An Ethnic Geography of New Orleans." *The Journal of American History* 94, no. 3 (December 1, 2007): 704–15.
- Carmin, JoAnn, Isabelle Anguelovski, and Debra Roberts. "Urban Climate Adaptation in the Global South Planning in an Emerging Policy Domain." *Journal of Planning Education and Research* 32, no. 1 (2012): 18–32.
- Carmin, J, David Dodman, and Eric Chu. 2013. Urban climate adaptation and leadership: From conceptual to practical understanding. OECD Regional Development Working Paper. OECD Publishing, Paris.
- Carmin, JoAnn, Nikhil Nadkarni, and Christopher Rhie. *Progress and Challenges in Urban Climate Adaptation Planning: Results of a Global Survey*. Cambridge, MA: MIT, 2012.
- Castán Broto, Vanesa, Emily Boyd, and Jonathan Ensor. 2015. "Participatory Urban Planning for Climate Change Adaptation in Coastal Cities: Lessons from a Pilot Experience in Maputo, Mozambique." *Current Opinion in Environmental Sustainability* 13: 11–18.
- Castán Broto, Vanesa, Bridget Oballa, and Paulo Junior. 2013. "Governing Climate Change for a Just City: Challenges and Lessons from Maputo, Mozambique." *Local Environment* 18 (6): 678–704.
- Checker, Melissa. "Wiped out by the 'Greenwave': Environmental Gentrification and the Paradoxical Politics of Urban Sustainability." *City and Society* 23, no. 2 (2011): 210–229.
- Chu, Eric. 2015. "The Political Economy of Urban Climate Adaptation and Development Planning in Surat, India." *Environment and Planning C: Government and Policy*
- Chu, Eric, Isabelle Anguelovski, and JoAnn Carmin. "Inclusive Approaches to Urban Climate Adaptation Planning and Implementation in the Global South." *Climate Policy*, (March 27, 2015): 1–21.
- Colten, Craig E., Robert W. Kates, and Shirley B. Laska. "Three Years after Katrina – Lessons for Community Resilience." *Environment* 50, no. 5 (October 2008): 36–47.
- Correa, Paula. "Datos Sobre Pobreza a Nivel Comunal Revelan Alta Segregación En Santiago." *Diario U Chile*, 16 February 2013. <http://tinyurl.com/ka4eo42>. 23 April 2015.
- Cutter, Susan L., William Solecki, Nancy Bragado, JoAnn Carmin, Michail Fragkias, Matthias Ruth, and Thomas J. Wilbanks. "Chapter 11: Urban Systems, Infrastructure, and Vulnerability." In *Climate Change Impacts in the United States: The Third National Climate Assessment*, edited by J.M. Melillo, Terese C. Richmond, and Gary W. Yohe, 282–96. Washington, DC: U.S. Global Change Research Program, 2014.
- Davoudi, Simin, Jenny Crawford, and Abid Mehmood. *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners*. New York: Routledge, 2009.
- De Souza Briggs, Xavier. *Democracy as Problem Solving: Civic Capacity in Communities across the Globe*. Cambridge, MA: MIT Press, 2008.
- Dodman, David, and Diana Mitlin. "Challenges for Community-Based Adaptation: Discovering the Potential for Transformation." *Journal of International Development* 25, no. 5 (2013): 640–659.
- Dooling, Sarah. 2009. "Ecological Gentrification: A Research Agenda Exploring Justice in the City." *International Journal of Urban and Regional Research* 33 (3): 621–39.

- Douglas, Ellen M, Paul H Kirshen, Michael Paolisso, Chris Watson, Jack Wiggin, Ashley Enrici, and Matthias Ruth. 2012. "Coastal flooding, climate change and environmental justice: identifying obstacles and incentives for adaptation in two metropolitan Boston Massachusetts communities." *Mitigation and Adaptation Strategies for Global Change* 17 (5):537-562.
- Fainstein, Susan. *The Just City*. Ithaca: Cornell University Press, 2010.
- _____. "Resilience and Justice: Debates and Developments." *International Journal of Urban and Regional Research* 39, no. 1 (January 2015): 157–67.
- Feldman, Shelley, and Charles Geisler. "Land Expropriation and Displacement in Bangladesh." *Journal of Peasant Studies* 39, no. 3–4 (July 1, 2012): 971–93.
- Finch, Christina, Christopher T. Emrich, and Susan L. Cutter. "Disaster Disparities and Differential Recovery in New Orleans." *Population and Environment* 31, no. 4 (March 1, 2010): 179–202.
- Firman, Tommy, Indra M. Surbakti, Ichzar C. Idroes, and Hendricus A. Simarmata. "Potential Climate-Change Related Vulnerabilities in Jakarta: Challenges and Current Status." *Habitat International* 35, no. 2 (2011): 372–78.
- Flyvbjerg, Bent. *Rationality and Power: Democracy in Practice*. Chicago: University Of Chicago Press, 1998.
- Flyvbjerg, Bent, Nils Bruzelius, and Werner Rothengatter. *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge, UK: Cambridge University Press, 2003.
- Forester, John. *The Deliberative Practitioner: Encouraging Participatory Planning Processes*. Cambridge: MIT Press, 1999.
- Füssel, Hans-Martin. "Adaptation Planning for Climate Change: Concepts, Assessment Approaches, and Key Lessons." *Sustainability Science* 2, no. 2 (2007): 265–75.
- Godschalk, David. (2004). "Land Use Planning Challenges: Coping with Conflicts in Visions of Sustainable Development and Livable Communities." *Journal of the American Planning Association* 70(1), 5–13.
- Godschalk, David, Samuel Brody, and Raymond Burby. 2003. "Public participation in natural hazard mitigation policy formation: challenges for comprehensive planning." *Journal of environmental planning and management* 46 (5):733-754.
- GFDRR. "Towards Integrated Flood Risk Management: Reducing Greater Manila Area's Vulnerability to Flooding and Protecting Its 21 Million Inhabitants." Washington, D.C.: World Bank Global Facility for Disaster Reduction and Recovery, 2013.
- Healey, Patsy. *Collaborative Planning: Shaping Places in Fragmented Societies*. New York: Palgrave Macmillan, 2005.
- Hodson, Mike and Simon Marvin. *World Cities and Climate Change: Producing Urban Ecological Security*. London: Open University Press, 2010.
- Honneth, Axel. "Integrity and Disrespect: Principles of a Condition of Morality Based on the Theory of Recognition." *Political Theory* , 20, no. 2 (1992): 187-201.
- Indonesia, Coordinating Ministry for Economic Affairs. National Capital Integrated Coastal Development Master Plan, October 1, 2014.
- Indonesia, Ministry of Public Works. Jakarta Coastal Defence Strategy (JCDS). 2011.
- Jakarta, Regional Develop. Planning Agency (BAPPEDA). "Ciliwung River Regulations." 2012.
- Innes, Judith E, and David E. Booher. *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. New York: Routledge, 2010.
- IPCC. *Summary for Policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the*

- Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK, and New York, NY, USA: Cambridge University Press, 2014.
- Irazábal, Clara, and Jason Neville. "Neighbourhoods in the Lead: Grassroots Planning for Social Transformation in Post-Katrina New Orleans?" *Planning, Practice & Research* 22, no. 2 (2007): 131–53.
- Kates, Robert W., William R. Travis, and Thomas J. Wilbanks. "Transformational Adaptation When Incremental Adaptations to Climate Change Are Insufficient." *Proceedings of the National Academy of Sciences* 109, no. 19 (May 8, 2012): 7156–6
- Kirshen, Paul, Kelly Knee, and Matthias Ruth. 2008. "Climate change and coastal flooding in Metro Boston: impacts and adaptation strategies." *Climatic Change* 90 (4):453-473.
- Klein, Naomi. *The Shock Doctrine: The Rise of Disaster Capitalism*. Toronto: Alfred A. Knopf Canada, 2007.
- Kooy, Michelle. 2014. "Developing Informality: The Production of Jakarta's Urban Waterscape." *Water Alternatives* 7 (1): 35–53.
- Krellenberg, Kerstin, and Barth Katrin. "Inter- and Transdisciplinary Research for Planning Climate Change Adaptation Responses: The Example of Santiago de Chile." *Interdisciplinary Science Reviews* 39, no. 4 (2014): 360–75.
- Leichenko, Robin and Karen O'Brien. *Environmental Change and Globalization: Double Exposures*. Oxford and New York: Oxford University Press, 2008.
- Marcuse, Peter. *Searching for the Just City: Debates in Urban Theory and Practice*. London and New York: Routledge, 2009.
- Measham, Thomas G., Benjamin L. Preston, Timothy F. Smith, Cassandra Brooke, Russell Gorddard, Geoff Withycombe, and Craig Morrison. "Adapting to Climate Change through Local Municipal Planning: Barriers and Challenges." *Mitigation and Adaptation Strategies for Global Change* 16, no. 8 (May 26, 2011): 889–909.
- Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental Justice. *Annual Review of Environment and Resources*, 34(1), 405–430.
- Moser, Caroline, and David Satterthwaite. "Towards Pro-Poor Adaptation to Climate Change in the Urban Centers of Low- and Middle-Income Countries." In *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*, edited by Robin Mearns and Andrew Norton, 231–58. Washington, D.C.: World Bank, 2010.
- Moss, Trefor. "Philippine Flooding Exposes Need to Protect Manila: Tropical Storm Increases Pressure on Government to Fast-Track \$7.9 Billion Flood Plan." *Wall Street Journal*, September 22, 2014.
- Nay, John Jacob, Mark Abkowitz, Eric Chu, Daniel Gallagher, and Helena Wright. "A Review of Decision-Support Models for Adaptation to Climate Change in the Context of Development." *Climate and Development* 6, no. 4 (April 28, 2014): 357–67.
- Paavola, Jouni, and W. Neil Adger. "Fair Adaptation to Climate Change." *Ecological Economics* 56, no. 4 (2006): 594–609.
- Padawangi, Rita. "Climate Change and the North Coast of Jakarta: Environmental Justice and the Social Construction of Space in Urban Poor Communities." In *Urban Areas and Global Climate Change*, edited by William G. Holt, 321–40. Bingley: Emerald, 2012.
- Papacharalambous, Maria. *Greater New Orleans Urban Water Plan: Implementation*. Waggonner and Ball Architects, 2013.
- Parks, Bradley C., and J. Timmons Roberts. "Climate Change, Social Theory and Justice." *Theory, Culture & Society* 27, no. 2–3 (2010): 134–66.

- Pelling, Mark, Karen O'Brien, and David Matyas. "Adaptation and Transformation." *Climatic Change* (2014): 1–15.
- Preston, B. L., Mustelin, J., & Maloney, M. C. (2013). Climate Adaptation Heuristics and the Science/Policy Divide. *Mitigation and Adaptation Strategies for Global Change*, 20(3), 467–497.
- Preston, Benjamin L., Richard M. Westaway, and Emma J. Yuen. 2011. "Climate Adaptation Planning in Practice: An Evaluation of Adaptation Plans from Three Developed Nations." *Mitigation and Adaptation Strategies for Global Change* 16 (4): 407–38.
- Purcell, Mark. "Resisting Neoliberalization: Communicative Planning or Counter-Hegemonic Movements?" *Planning Theory* 8, no. 2 (2009): 140–165.
- Rajdhani Unnayan Katripakko (RAJUK). *Dhaka Metropolitan Development Plan, 1995-2015, Vol I & II*. Dhaka: RAJUK, 1997.
- Rasid, Harun, and Azim U. Mallik. "Living on the Edge of Stagnant Water: An Assessment of Environmental Impacts of Construction-Phase Drainage Congestion along Dhaka City Flood Control Embankment, Bangladesh." *Environmental Management* 20, no. 1 (January 1996): 89–98.
- Rawls, J. *A Theory of Justice*. (Harvard University Press, 1971).
- Roberts, J. Timmons. "The International Dimension of Climate Justice and the Need for International Adaptation Funding." *Environmental Justice* 2, no. 4 (2009): 185–90.
- Robinson, Jennifer. "Cities in a World of Cities: The Comparative Gesture." *International Journal of Urban and Regional Research* 35, no. 1 (2011): 1–23.
- Senate of the Philippines. *Recto Wants Metro Manila's P351-B Anti-Flood Master Plan Scrutinized*. Press Release. Quezon City: Senate of the Philippines, July 19, 2013.
- Shapiro, Ian. *The State of Democratic Theory*. Princeton: Princeton University Press, 2009.
- Shepherd, Ariel. "Jakarta, Indonesia." In *Grounding Knowledge: Reflections on Community-Driven Urban Practices in South-East Asia*, by Johanna Brugman, Barbara Dovarch, Zahra Kassam, Francesco Pasta, and Ariel Shepherd, 50–81. London, Bangkok: DPU, CAN, and ACHR, 2014.
- Shi, Linda, Eric Chu, and JoAnn Carmin. (2016). Global Patterns of Climate Adaptation Planning. In K. Seto & W. D. Solecki (Eds.), *Handbook on Urbanization and Global Environmental Change*. Philadelphia: Taylor and Francis.
- Simon, David and Hayley Leck. 2015. "Understanding Climate Adaptation and Transformation Challenges in African Cities." *Current Opinion in Environmental Sustainability* 13: 109-116.
- Soja, Edward. 2010. *Seeking Spatial Justice*. Minneapolis: University of Minnesota Press.
- Sovacool, Benjamin K., Björn-Ola Linnér, and Michael E. Goodsite. 2015. "The Political Economy of Climate Adaptation." *Nature Climate Change* 5(7): 616–18.
- Swyngedouw, Erik. 2007. "Impossible Sustainability and the Post-Political Condition: In The Sustainable Development Paradox: Urban Political Economy in the United States and Europe, edited by Rob Krueger and David Gibbs, 13-40 (Guilford Press).
- Taylor, Bruce M., Ben P. Harman, Sonja Heyenga, and Ryan R. J. McAllister. 2012. "Property Developers and Urban Adaptation: Conceptual and Empirical Perspectives on Governance." *Urban Policy and Research* 30 (1): 5–24.
- TBHA. *Preparing for the Rising Tide*. Boston: The Boston Harbor Association, 2013.
- U.S. Army Corps of Engineers. *Greater New Orleans Hurricane and Storm Damage Risk Reduction System Facts and Figures (September 2014)*, 2014.
- Walzer, M. *Spheres of Justice: A Defense of Pluralism and Equality*. (Basic Books, 1983).

- Welz, Juliane, Anke Schwarz, and Kerstin Krellenberg. "Understanding Hazard Exposure for Adaptation in a Climate Change Context." In *Climate Adaptation Santiago*, edited by Kerstin Krellenberg and Bernd Hansjürgens, 127–48. Berlin, Heidelberg: Springer, 2014.
- While, Aidan, and Mark Whitehead. "Cities, Urbanisation and Climate Change." *Urban Studies* 50, no. 7 (April 19, 2013): 1325–31.
- Wildavsky, Aaron B. *Speaking Truth to Power: The Art and Craft of Policy Analysis*. New Brunswick, NJ: Transaction Publishers, 1979.
- Wilson, Elizabeth. "Adapting to Climate Change at the Local Level: The Spatial Planning Response." *Local Environment* 11, no. 6 (2006): 609–625.
- Yiftachel, Oren, and Margo Huxley. "Debating Dominance and Relevance: Notes on the 'Communicative Turn' in Planning Theory." *International Journal of Urban and Regional Research* 24, no. 4 (2000): 907-913.
- Young, I. M. *Justice and the Politics of Difference*. (Princeton University Press, 1990).