

## Climate adaptation as strategic urbanism

Chu, Eric; Anguelovski, Isabelle; Roberts, Debra

DOI:

[10.1016/j.cities.2016.10.016](https://doi.org/10.1016/j.cities.2016.10.016)

License:

Creative Commons: Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)

*Document Version*

Peer reviewed version

*Citation for published version (Harvard):*

Chu, E, Anguelovski, I & Roberts, D 2017, 'Climate adaptation as strategic urbanism: assessing opportunities and uncertainties for equity and inclusive development in cities', *Cities*, vol. 60, no. Part A, pp. 378-387.  
<https://doi.org/10.1016/j.cities.2016.10.016>

[Link to publication on Research at Birmingham portal](#)

### General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

### Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.

## **Climate Adaptation as Strategic Urbanism:**

### **Assessing Opportunities and Uncertainties for Equity and Inclusive Development in Cities**

**Abstract:** An increasing number of cities are recognising the impacts of climate change on their development pathways. In this paper, we assess strategic climate adaptation actions in the cities of Durban (South Africa), Indore (India), and Medellin (Colombia), and examine different approaches to integrating emerging adaptation priorities into urban plans, programmes, or governance arrangements. We highlight sources of planning tension – particularly between aspects of the planning process and larger urban political economic forces – that reshape how subsequent adaptation interventions are framed and implemented. We find that when advanced with a focus on alignment with development, strategic actions that transcend individual actor or sectoral interests have a better chance at taking root. However, we note that a procedural focus in strategic urbanism must also be accompanied by an integrated assessment of planning outcomes in order to ensure more equitable and inclusive development in cities. Although strategic approaches may facilitate coherent policy framings, targeted actor coalitions, and opportunities for collaborative action, such approaches are often unable to adequately capture the difficult policy trade-offs or contestations that are required to further overall adaptive capacities of cities. In other words, strategic adaptation actions must be considered in relation to the powerful, and often entrenched, political economic interests that constrain urban equity at-large.

**Keywords:** Climate change adaptation; strategic planning; development; governance; cities

## 1. Introduction

Cities are increasingly responding to climate change by pursuing strategic adaptation actions. In this paper, we build on the concept of “strategic planning devices” by Salet (2007), which he defines as collective missions, visions, or plans that facilitate broad political coalitions and stimulate certain joint courses of action to promote particular visions of development. We extend the idea of strategic devices to theorise emerging climate adaptation efforts in cities, which refer to processes of adjusting to actual or expected climate impacts in order to moderate or avoid harm (IPCC, 2014). As opposed to comprehensive or fully “mainstreamed” adaptation plans, strategic adaptation actions are often aligned according to a particular sectoral vision, which range from raising risk awareness (Anguelovski & Carmin, 2011; Carmin, Dodman, & Chu, 2013) to combining broad waste reduction, greening, and energy efficiency programmes with plans to combat extreme impacts such as cyclones and heat waves or slow onset risks such as increasing temperatures, changing precipitation patterns, and sea level rise (Rosenzweig et al., 2010).

The ability to identify strategic adaptation actions is critical for cities in the global South because of their disproportionate exposure to impacts, lower capacity to respond, relative concentration of low-income groups, and fragmented governance arenas (Ayers & Dodman, 2010; Bicknell, Dodman, & Satterthwaite, 2009). Many cities are in fact connecting adaptation goals with general development needs, and are devising strategic actions to protect housing, infrastructure, public services, and other capital assets against impacts (Anguelovski & Roberts, 2011; Shi, Chu, & Carmin, 2016). However, there is to date little empirical knowledge on how rapidly urbanising cities balance adaptation needs with pre-existing strategic (and often larger-scale) urban development projects – especially those related to environmental protection, poverty reduction, infrastructure, and economic growth – as well as navigate relevant institutional structures and actors who likely have conflicting planning priorities. In response, this paper surveys theories of strategic planning, climate governance, and inclusive development to uncover different opportunities and constraints associated with targeted adaptation actions in cities. Then, we apply these concepts to the case studies of Durban, Indore, and Medellin, and ask: How are strategic climate adaptation objectives being integrated into urban development? To what extent are such processes creating new political coalitions and ensuring more equitable planning outcomes?

To answer these questions, we examine Durban’s plans to integrate adaptation into strategic ecological infrastructures, Indore’s targeted approach to bring climate resilience into community development projects, and Medellin’s strategic actions to reduce climate risks through spatial planning and greening projects. We compare these cases and highlight sources of planning tension – especially between aspects of planning processes and larger urban political economic forces

traditionally shaping the development of cities – as well as the prospects of strategic adaptation actions for advancing inclusive development. When advanced with a focus on procedural alignment with development goals, we argue that strategic adaptation actions can promote integration with urban projects, particularly those around land use, water and sanitation, and ecosystem services. However, although strategic plans can promote leadership, resource support, and agenda awareness, the degree to which they trigger more equitable political economic relationships – both within and beyond individual sectors – and catalyse more inclusive development outcomes remains uncertain. In particular, strategic adaptation actions often seek to defer difficult policy trade-offs between development and environmental priorities, as well as compartmentalise or repress broad political contestations in cities. In other words, they do not catalyse an essential, larger discussion on political economic restructuring needs. These critiques therefore offer new theoretical insights at the intersection of climate adaptation, urban development, and strategic urbanism.

## **2. Applying Theories of Strategic Urbanism to Climate Adaptation**

In this section, we revisit theories of strategic urbanism to examine the opportunities for integrating adaptation mandates into development plans and policies. We refer to development as processes of wealth and income creation, livelihood improvement, and poverty reduction. We also highlight the particular challenges experienced by cities in the global South when confronted with high poverty, inequality, and resource capacity deficits. Figure 1 illustrates our conceptual approach to unpacking the two sources of planning tension inherent in strategic adaptation approaches, namely the need for procedural integration (objective 1) and the need for political economic restructuring (objective 2). We argue that these dual objectives present unique challenges for adaptation planning and, if not pursued simultaneously, may result in inequitable and exclusive adaptation outcomes.

FIGURE 1 HERE

Theories of strategic urbanism note the importance of articulating shared visions of the future (Albrechts, 2004, 2006). Strategic planning promotes a set of targeted actions that are synergistic to a city's stated development goals, allows for interventions aimed at socioeconomic progress, and facilitates collaboration between different stakeholders (Steinberg, 2005). In contrast to comprehensive planning – such as citywide master planning – strategic plans are derived from operational or normative goals that can be achieved through coordinating within or across sectors, identifying appropriate knowledge, delineating resource support streams, and pursuing joint implementation mandates (Albrechts, 2013; Healey, 2004; Salet, Bertolini, & Giezen, 2013). In this vein, Salet (2007) defines “strategic devises” as collective missions and visions that catalyse action in fragmented urban governance arenas. The strategic dimension is dependent on the ability to transcend

individual horizons in scope and time – such as extending beyond single actors, single-purpose behaviours, and singular timeframes of bureaucratic routines – and on the ability to identify issue frames that allow for joint action (Salet, 2007). Climate adaptation is thus an archetypal strategic planning challenge because it requires bridging public and private interests, local and extra-local jurisdictions, and short versus long-term development timeframes.

In the past, strategic plans have helped realise broad sustainability agendas (Malekpour, Brown, & de Haan, 2015), especially when considering them in relation to public health (Bowen & Ebi, 2015), disaster risk reduction (Solecki, Leichenko, & O'Brien, 2011), ecosystem protection (Roberts et al., 2012), and infrastructure needs (Anguelovski et al., 2016; Todes, 2012). The ability to integrate these agendas and identify collective preferences not only requires skillful coordination in cities dominated by fragmented interests and power, it also requires innovations to overcome the barriers of the sector-minded, single-issue approaches typical of municipalities organised according to territorial jurisdictions (Chu, 2016; Evans & Karvonen, 2014; Salet, 2007). When applied to climate adaptation, strategic planning can be a robust approach because it delineates pathways for institutionalisation, promotes political support and linkage to municipal budgets, and allows for the articulation of interventions despite continued risks and uncertainties (Carmin, Anguelovski, & Roberts, 2012).

For cities in the global South, framing climate change as a development priority – both in terms of economic progress and scientific innovation – can motivate support for strategic efforts (Anguelovski, Chu, & Carmin, 2014; Bain et al., 2016; Carmin et al., 2013; Leck & Roberts, 2015; Leichenko, 2011). However, the socioeconomic and spatial restructuring of cities – such as through globalisation, competitive urbanism, and recent austerity measures – has increasingly led to the creation of powerful regimes and interest groups that prevent cities from effectively accounting for collective wellbeing (Brenner & Theodore, 2002). Additionally, the shift from “government” to “governance” entails more democratic power, accountability, and transparency (Bardhan, 2002; Cheema, 2007), but can also lead to the consolidation of decision-making within small groups of elites (Swyngedouw, 2005). In other words, larger urban political economic structures – including the roles of finance, political ideology, and social movements in contesting planning agendas – also have an influential role in directing strategic climate adaptation outcomes (Chu, 2016b).

To tailor adaptation actions to the political economic realities in cities, many have pursued policies that balance both climate change and development goals (Ayers & Dodman, 2010; Halsnæs & Trærup, 2009). Adaptation can be “mainstreamed” into environmental management, asset procurement, and public finance mechanisms (Carmin et al., 2012). Others have cooperated with civil society organisations to improve equity, awareness, and knowledge transfer (Archer et al., 2014; Chu,

Anguelovski, & Carmin, 2016) or have engaged with the creative potential of residents (Chu, 2016a; Rodima-Taylor, Olwig, & Chhetri, 2012). As a result, the hallmark of many climate adaptation actions is a pursuit of strategic approaches, as well as a reliance on cross-sectoral tools and experimentation with different participatory arrangements (Anguelovski et al., 2014; Bulkeley, Castán Broto, & Edwards, 2015).

There is consensus that adaptation must be integrated into development agendas, whether comprehensively or strategically (Desouza & Flanery, 2013; Hunt & Watkiss, 2011). Hence, logically, much of the scholarship has focused on the procedural inclusiveness of planning processes (objective 1 in Figure 1). Objective 2 – i.e. the degree that strategic actions can promote more equitable outcomes and improve overall urban resilience – has been less theorised. Equity and inclusiveness are important parameters for assessing adaptation outcomes due to the uneven distribution of power in cities (Paavola, 2008; Schlosberg, 2012), as well as the fact that low-income communities tend to be the most vulnerable to climate impacts and have the least capacity to respond (Ayers & Dodman, 2010). Even though broadly inclusive planning processes are critical (Archer et al., 2014; Aylett, 2010; Chu et al., 2016), their success will be diminished if they do not recognise that facilitating equitable outcomes of climate actions is equally important (Hughes, 2013; Meerow & Newell, 2016; Shi et al., 2016; Sovacool, Linnér, & Goodsite, 2015). For cities of the global South, structural constraints to integrating adaptation into different urban agendas, bridging deficits in finance, staffing capacity, information, and local leadership (Carmin et al., 2013), and anticipating or coping with increasingly severe climate impacts (Carmin et al., 2012) all further affect the degree to which strategic actions can truly redress entrenched forms of poverty and inequality (Anguelovski et al., 2016).

In sum, our review highlights how the majority of theories on strategic urban actions for addressing climate change focus on the procedural dimensions of planning, including approaches to facilitate coherent policy framings, targeted actor coalitions, and opportunities for collaboration. However, as recent scholarship on the justice implications of climate resilience suggests (see Béné et al., 2014; Bulkeley et al., 2013; Fainstein, 2015; Pelling, 2010), many strategic interventions are unable to further the overall equity and inclusiveness of adaptation actions vis-à-vis existing development interests (Shi et al., 2016; Sovacool, Linnér, & Goodsite, 2015). There often is a mismatch between the procedural aspects of planning and the more normative priorities of transforming entrenched and powerful political economic regimes – particularly those oriented towards capital production and accumulation – that have historically framed urban development in the global South. This paper therefore seeks to empiricise these critiques by assessing the difficult trade-offs and political contestations in three different contexts, and contributes to the literature by

illuminating the tensions inherent within the logic strategic adaptation planning that often prevent the achieving of adaptation benefits for all urban residents.

### **3. Methodology**

In this paper, we examine Durban's plans to integrate adaptation into strategic ecological infrastructures, Indore's targeted approach to bringing climate resilience into community development projects, and Medellin's strategic actions to reduce climate risks through spatial planning and green infrastructure projects. We selected the three cities because they are critical and emblematic cases of early adopters of adaptation actions, and are, at the same time, illustrative of a growing number of cities in the global South facing high rates of growth and urbanisation. Yet, they are also pursuing a wide range of strategic actions to integrate adaptation with environmental protection, green space conservation, and poverty reduction goals (see Table 1 for summary), and they are doing so in ways that recognise the needs of vulnerable communities. In reference to Figure 1, our assessment of the different planning approaches is particularly valuable for understanding how adaptation objectives are being integrated into different development agendas and for analysing the extent to which this integration contributes to more inclusive and equitable planning outcomes.

The analysis of Durban, Indore, and Medellin is based on qualitative data collected between 2013 and 2016. In the case of Durban, our empirical analysis is strengthened by the fact that one of the authors has been a key actor in framing and implementing climate change programmes in the city since the early 2000s. For Medellin and Indore, the authors conducted semi-structured interviews, document analysis, and ethnographic fieldwork that sought to uncover the different approaches to adaptation planning, the various participatory processes employed, and the political, economic, and spatial ramifications of strategic adaptation interventions. The interview transcripts were analysed thematically to uncover the trends, opportunities, and constraints associated with different strategic approaches. The case narratives are also supported by illustrations of key projects on the ground, with a particular focus on unpacking the procedural versus the political economic tensions inherent within such strategic actions.

### **4. Comparing Strategic Approaches to Urban Adaptation Planning**

In this section, we analyse experiences from Durban, Indore, and Medellin to show the tensions within different strategic adaptation approaches and their implications for urban equity and inclusion. Durban's experience highlights how strategic adaptation goals can be integrated into infrastructure planning processes; Indore's experience showcases how strategic experiments can be

applied in small-scale, community settings; while Medellin experience demonstrates how strategic visions are applied in large-scale spatial planning approaches.

#### ***4.1 Durban: Adaptation through Strategic Ecological Infrastructure***

Durban is the largest port on the east coast of Africa and the third largest of South Africa's metropolitan areas. However, among the country's major cities, Durban has the highest percentage of people living in poverty and has high levels of inequality. The city also has considerable backlogs in infrastructure and basic services. In response to these challenges, Durban's *Integrated Development Plan* (2015) established a vision of a caring, equitable, and liveable city where poverty is addressed through infrastructure-led growth and job creation (eThekweni Municipality, 2015). Climate projections show Durban will experience increases in temperature, more variable rainfall, sea level rise, and storm surge (Golder Associates, 2011). These impacts put Durban at risk from flash floods, droughts, and coastal erosion exacerbated by sea level rise, currently calculated to be 2.7 mm per year (Mather, Garland, & Stretch, 2009).

Even though South African cities have no formal climate change planning obligations, the Environmental Planning and Climate Protection Department (EPCPD) of eThekweni Municipality – the local government responsible for managing Durban – nonetheless initiated the Municipal Climate Protection Programme (MCP) in 2004. The MCP's targeted adaptation work-stream began in 2007 following a climate impact assessment, and is comprised of several components. First, adaptation plans focused on three strategic sectors: municipal water, health, and disaster management functions. Second, Durban is committed to improving capacity of local communities through community-based adaptation. Third, there is a strong ecosystem-based component in all interventions. Fourth, it has pursued urban management interventions that address specific environmental challenges, such as urban heat islands and increased storm water runoff. Fifth, the city is developing locally appropriate climate change tools, particularly in the form of sea level rise and cost benefit models of human benefit and ecological integrity. Finally, the municipality has taken highly visible actions to mainstream climate protection, such as through mega-event greening, to raise the profile of climate change and institutional restructuring (Diederichs & Roberts, 2015).

Procedurally, Durban's adaptation approach has been phased and opportunistic because of limited precedents, interest, leadership, institutional support, and resources (Roberts & O'Donoghue, 2013). The city has relied on cultivating institutional champions who have deep sectoral knowledge, and who can then identify points of integration and overlapping spheres of influence and networks (Roberts, 2008; Sutherland et al., 2014). This is a particularly strategic approach since adaptation in Durban is an unfunded mandate and is dependent on strong leadership. These policy champions have



been critical in recasting climate change as a key development issue, and minimising the marginalisation associated with environmental programmes (Interview, 2015). For example, the municipality established a multi-stakeholder partnership addressing the role of ecological infrastructure in increasing water security and adaptive capacity in the uMngeni River catchment. This reflects a shift towards a “socio-ecological systems approach” to managing water, biodiversity, climate change, and poverty challenges (Sutherland et al., 2014). Such a procedural framing allows for the building of cross-sectoral coalitions – such as between the EPCPD and municipal water, infrastructure, and energy departments – as well as motivates the creation of strategic multi-stakeholder planning arenas to ensure that the adaptation agenda remains relevant to the larger development discourse in Durban.

The developmental needs of the city, its high climate risk profile, and limited capacities make adaptation a priority for the foreseeable future, although opportunities are also sought to secure mitigation co-benefits. As illustrated in Figure 1, three large-scale community reforestation projects – initiated to offset the carbon footprints of the FIFA Football World Cup™ in 2010 and the COP17 meeting in 2011 (Diederichs & Roberts, 2015) – created new carbon sinks and delivered multiple adaptation co-benefits, such as biodiversity conservation and improved ecosystem services. The project also brought socioeconomic co-benefits – particularly in relation to job creation and vocational skills development – which have been important for encouraging and sustaining local climate action within vulnerable communities, where risk acceptance levels are generally higher and where climate risks are secondary to livelihood concerns (Interview, 2015). Building on these initial successes, Durban has combined local adaptation and mitigation agendas into a unified climate change strategy, which promotes clearer links to the city’s overall development objectives (Roberts et al., 2016). In other words, despite a stronger focus on the procedural aspects of adaptation planning, emerging strategic interventions have catalysed a broader discussion around how the city’s climate change agenda itself should be framed, and which, in 2015, contributed to Durban establishing a mayoral climate change committee.

FIGURE 2 HERE

Although the strategic alignment of climate adaptation priorities with broader development priorities in Durban has resulted in a number of early adaptation successes, these actions have so far yielded mixed results and have often proved expensive and time consuming (Cartwright et al., 2013; Walsh et al., 2013). The focus has been on adapting to constantly evolving decision-making pathways composed of manageable and adjustable steps over time, each triggered by a change in available resources, knowledge, and response to unexpected opportunities (Leck & Roberts, 2015; Roberts, 2010). This procedural focus has allowed city officials to learn from successes and failures, and have

generated a cycle of reflective practice to understand the complexity of adaptation actions (Interview, 2015). Although many of the “no-regrets” approaches – such as managing and restoring ecological infrastructure in the uMngeni River watershed and initiating large-scale reforestation programmes – are beneficial under a range of climate scenarios, such interventions somewhat bypass inherently political discussions around the trade-offs between adaptation and development. These “no-regrets” approaches may be seen as incremental steps that do not address larger political discourses of climate denialism within government (Carmin et al., 2013), counter the failure by government to prioritise the climate response agenda, or do not envision development approaches that redress structural forms of poverty and inequality.

Durban’s experience highlights the complexity of adaptation planning, which often necessitates a portfolio of incremental and strategic solutions that emerge from opportunistic and experimental approaches (Interview, 2015). Examples of this include building target multi-stakeholder partnerships or reframing ecological infrastructures as adaptation interventions. Such framings allow adaptation to be cast as a development opportunity, where strategic projects showcase how these benefits manifest on the ground. Although strategic planning processes focus on minimising political contestation and highlighting synergies with the city’s overall development agenda, there is a need for robust integrated assessments to understand whether such strategic actions are able to both guard against immediate mal-adaptive results and ensure long-term inequitable outcomes. In Durban, such an assessment of the long-term environmental and social impacts of adaptation interventions is currently being initiated through the establishment of research partnerships with the local university.

#### ***4.2 Indore: Adaptation through Strategic Community Service Delivery Projects***

Indore, with a population of more than 2.2 million, is the commercial capital of Madhya Pradesh in India. The city has experienced 40% decadal population growth and approximately 6.5% annual economic growth over the past several decades (Indore Municipal Corporation, 2006). A third of the population lives in slum settlements and a significant proportion of these settlements are prone to flooding, waterlogging, and vector-borne diseases (Indore City Resilience Strategy, 2012). Rapid urbanisation has also led to traffic congestion, high rates of solid waste generation, inadequate public services, and general environmental degradation (Interview, 2014). Even though Indore is not directly exposed to many natural hazards, the city does have a history of addressing slow onset risks such as droughts.

With support from the Rockefeller Foundation’s Asian Cities Climate Change Resilience Network (ACCCRN), climate adaptation planning in Indore began in 2009 and culminated in the

release of the *Indore City Resilience Strategy* in 2012. The adaptation planning process began with a series of scenario-building workshops amongst different urban stakeholders to help raise awareness of specific climate impacts in relation to current socioeconomic development needs (Kernaghan & da Silva, 2014; Sharma, Singh, & Singh, 2014). The *Indore City Resilience Strategy* identified water, public health, and human settlements sectors as most vulnerable to climate change and, therefore, proposed pilot projects for addressing these key impacts (Indore City Resilience Strategy, 2012). Since the local government – in the form of the Indore Municipal Corporation (IMC) – is resource constrained, the planning process prioritised engagement with civil society actors for capacity support (Interview, 2014).

Water scarcity and supply consistency have been critical issues impacting Indore (Indore City Resilience Strategy, 2012). Much of the urban poor depend on public or community water sources such as standpipes, hand pumps, and wells. Currently, approximately 80% of the city's water comes from the Narmada River located more than 70 kilometres away. This is supplemented by two municipal water tanks and more than 2000 tube-wells distributed across the city (see Figure 3).

FIGURE 3 HERE

To anticipate increased water shortages, climate adaptation projects have focused strategically on water conservation and protection as critical urban development priorities (Interview, 2014). Between 2010 and 2013, the city experimented with different community-based water conservation technologies and devised new decentralised wastewater management models. One example is in Rahul Gandhinagar, a settlement of 5,000 residents without piped water, where a reverse osmosis plant was built to improve the quality of drinking water. The facility is managed by a local women's group dedicated to championing the benefits of reverse osmosis-treated water, which include reducing gastrointestinal disease infection rates and improving overall community health (Chu, 2016a). Although the municipality did not directly finance the reverse osmosis facility, the municipality did subsidise electricity rates for the facility's operational needs. In a second community, Ganeshnagar, the municipality launched a water-harvesting program to provide water to households without access to public pipelines. The programme initiated a local system of collecting and storing rainwater, filtering this water through drums, and collecting water through common-access taps (Interview, 2014). Profits from both strategic projects were subsequently used by community members to complement existing livelihood improvement projects. This way, local ownership over strategic interventions ensured that decision-making processes would be more inclusive and outcomes would be more beneficial to low-income residents.

Apart from improving water access in slum communities, Indore also made use of ACCCRN support to rehabilitate and conserve existing urban lakes. Across the many lakes degraded by development pressures and pollution, the city conducted biodiversity and household surveys, drafted water quality protection plans, and constructed community sewage treatment plants (Interview, 2014). These municipal efforts are supported by various ward committees and community welfare associations (Chu, 2016a), which encouraged cooperation between community beneficiaries and different local waste management utilities.

Many of Indore's adaptation projects that have strategically facilitated a focus on water conservation as a critical urban development priority have catalysed some institutional change in the local government itself. For example, the municipality is integrating wastewater management mandates into revisions of City Development Plans, prioritising adequate storm water drainage for new road developments, and introducing financial incentives for household water harvesting technologies (Interview, 2014). Also, in recent annual budgets, the municipality has included a line item entitled "climate change safety expenses," which earmarks approximately US\$75,000 per year for climate change programmes. By framing and promoting co-benefits between adaptation needs and urban development priorities, small-scale strategic interventions – many of which target poor communities – have sought to build multi-stakeholder relationships between local infrastructure users, municipal decision-makings, and external funders.

However, due to the city's existing governance constraints, much of the strategic adaptation actions exists outside of formal municipal decision-making and is driven strongly by community-based organisations and private actors, such as the Rockefeller Foundation. Like Durban, strategic approaches in Indore have focused on the procedural aspects of adaptation planning, such as in terms of building coalitions between neighbourhood groups, local NGOs, and external funders, as well as identifying actions that are relatable, easy, and cheap to implement. Although Indore focused on articulating community-level strategic actions – and thus point to clear poverty reduction implications – there is no vision to build upon these incremental projects to facilitate more inclusive development across the city (Chu, 2016a). Furthermore, unlike Durban, the lack of institutional champions who can bring together high-level planners and managers may be affecting Indore's ability to visibly and structurally institutionalise climate adaptation priorities. Without an integrated assessment of the different opportunities and constraints of the city's entire climate adaptation portfolio, strategic interventions will only target discrete sectors, actors, and locations rather than building overall urban adaptive capacity.

#### ***4.3 Medellin: Adaptation through Strategic Green Infrastructure and Territorial Planning***

Under current climate projections, Medellín will face increasing frequencies of extreme rainfall, extending dry periods, and increasing temperatures affecting the Andean ecosystem that contributes to a secure water supply. Today, due to many inadequately constructed buildings along hillsides, 180,000 households in Medellín are at risk of mudslides. In response to uncontained urban growth and increasing climate risks, in 2012, Mayor Aníbal Gaviria announced the construction of a 46-mile long Metropolitan Green Belt (Cinturón Verde). The US\$249 million ring of protected natural space was conceived to integrate emerging adaptation needs – especially water protection and reforestation – with other urban greening, congestion alleviation, and urban upgrading priorities in Medellín’s poorer neighbourhoods. As one of Mayor Gaviria’s 31 flagship projects, the Green Belt builds upon Medellín’s tradition of urban rebranding, spatial planning, and entrepreneurialism to address pervasive socio-spatial urban problems (Hernandez- Garcia, 2013; Sotomayor, 2015).

At an elevation of 1,600 meters, the Green Belt connects three distinct projects. First, a “protection zone” preserves hillside ecosystems and creates new protected areas. Next is a “transition zone” that includes new parks, bike paths, and risk management infrastructures. This area also coincides with the highest concentration of low-income neighbourhoods that lack basic services and amenities (Interview, 2016). Finally, beyond the Green Belt itself is the “consolidation zone,” which, in the words of Mayor Gaviria, is designed to “re-conquer the valley” with new parks, multi-family housing and multi-modal transportation networks (Municipio de Medellín, 2014). These projects are designed to help Medellín achieve sustainable and climate resilient development, but may displace approximately 230,000 residents who live in high-risk areas or on future Green Belt protected land.

Together with EDU – the public company responsible for the Green Belt project – Mayor Gaviria’s administration is working to connect the Green Belt with existing or upcoming spatial development plans. For example, the city’s *Territorial Organization Plan* (POT) focuses on protecting water resource, densifying the urban core, and increasing access to public transportation, all of which are critical climate change priorities (Municipio de Medellín, 2014). Medellín is also introducing new Integral Urban Projects (PUI) as part of the city’s planned expansion. PUIs are meant to address adaptation needs by bringing housing units in line with building codes, strengthening existing infrastructure, improving quality of public spaces, and creating new transport links in low-income neighbourhoods. Lastly, the *Plan Bio 2030* focuses on the role of the Green Belt to further environmental services, disaster prevention, and urban growth containment (Municipio de Medellín, 2011). These strategic connections between the Green Belt and spatial planning highlight how the city is framing emerging adaptation needs by extending across different development objectives and institutional arrangements.

Yet, in the midst of rebranding these projects as directly addressing the needs of low-income neighbourhoods, the Green Belt is raising equity implications for these same residents. Mimicking historical patterns of spatial development, the municipality has started to relocate communities living on land that is deemed unstable or risky. Notably, in Comuna 8 – from where the municipality is relocating 6,600 households – residents are opposed to resettlement in faraway public housing (Interview, 2016). Although new public housing may be more comfortable and safe if constructed using participatory designs that compensate for residents’ loss of social networks and livelihoods, these relocation projects will not actually solve the problem of growing low-income housing demand across the region, and will instead promote expansion of new low-quality settlements along fragile hillsides (see Figure 4).

FIGURE 4 HERE

Controversies over eviction and relocation highlight the contentious politics surrounding how climate risks are defined and communicated to different communities. There are disagreements between different risk assessments – including those produced by the city’s Risk Zone Maps, the Geological Suitability Map, and different resident-produced estimates (Municipio de Medellín, 2014) – about the specific number of households located in “non-recoverable risk” areas. Rather than benefitting from onsite retrofitting and upgrading, low-income residents are simply relocated (Interview, 2016). In contrast, there are no plans to move wealthy residents in the neighbourhoods of El Poblado, Cedro Verde, and Alto de las Palmas. Rich neighbourhoods also seem to be unrestrained in their expansion up the hills, which correspond to areas that the city had previously deemed at high risk of landslides (Interview, 2016). Finally, gated communities located next to native forest reserves, such as in the case of Alto de Escobero, are permitted to expand without any mandates for resettlement. Such incidences highlight how adaptation may actually exacerbate historic displacement trends, and that a focus on adaptation as an environmental good may benefit the urban elite to a greater extent than socially-vulnerable residents (Anguelovski et al., 2016).

Around the Pan de Azúcar mountain, where the municipality is implementing the Jardín Circunvalar pilot project, low-income residents are also losing access to green space because the area is being converted into ecological corridors, recreational spaces, playgrounds and educational centres. Observations of community meetings (2013) and interviews (2016) reveal that the Green Belt seems to target visitors, tourists, and wealthier residents to the Pan de Azúcar trails, while dispossessing long-time residents of their traditional use of the space. For example, the city has built new stone and concrete hiking trails and bike paths without considering their impacts on existing walking paths built and used by local residents. Since private developers support much of the Green Belt project, local residents have voiced concerns over rising land prices, increasing taxes, and the changing social

composition of neighbourhoods, all of which will introduce more socio-spatial inequities (Interview, 2016).

In response to these perceived representational inequities of different strategic interventions associated with the Green Belt, residents of Comuna 8 have led a community planning process to highlight their own development visions (Interview, 2016). Residents are advocating for formal housing and the construction of new rental units in anticipation of general urban growth needs. The city has, in turn, proposed alternative plans to better preserve existing housing, protect livelihoods, and broaden access to urban agriculture (Interview, 2016), but community leaders still regret the absence of meaningful consideration of community development plans. Such tensions highlight the dilemmas of strategic urbanism, where conflicts between climate and development persist despite a clear articulation of strategic planning goals. In this case, the tendency is for cities to designate protected natural areas through imposing new spatial control tools at the expense of local residents' access to traditional lands. Although Medellin has achieved some recent success in containing, beautifying, and protecting urban spaces against development stresses and climate impacts, the city is now facing new concerns of economic loss, social disintegration, and “green” gentrification among low-income communities and their ecological amenities.

## **5. Strategic Adaptation Planning: Opportunities for Equity and Inclusiveness?**

We have presented three different strategic approaches to climate change adaptation planning, ranging from mainstreaming adaptation into ecosystem protection in Durban, harnessing community-based actions for small-scale service delivery in Indore, to constructing large-scale greenbelt infrastructures in Medellin (see Table 1 for summary). All three highlight the tension between balancing the procedural implications of strategic planning and the more normative priorities of tackling entrenched political economic interests – this finding is illustrated in Figure 5. In this section, we further compare these approaches and show that although strategic actions can promote leadership, resource support, and procedural awareness, the degree to which they trigger more equitable political relationships and catalyse more inclusive development outcomes remains uncertain.

TABLE 1 HERE

As described by Salet (2007), strategic planning devices promote leadership, capacity support, and agenda awareness. However, the implications for access to resources, infrastructure, or even displacement attributed to strategic projects – such as in the case of the Green Belt in Medellin – points to the shortcomings of a procedural focus to strategic adaptation planning. On the one hand, articulating strategic adaptation goals by linking them to established institutional mandates, political

coalitions, or funding streams is a clear barometer of planning progress, as highlighted in both the Durban and Indore examples. On the other hand, a reliance on building upon existing planning processes may be indicative of structural constraints that inhibit cities from redistributing resources to tackle new, multi-scalar environmental problems such as climate change. For example, Durban's ecosystem-based actions were designed with the city's historic (pre-1994) deeply inequitable development patterns in mind, so plans focused on bringing new economic opportunities to communities that were previously socially and spatially disadvantaged. Although these incremental actions prevented communities from being further marginalised, such ecosystem-based actions were unable to more widely critique dominant capital-oriented land use and property development interests in Durban – an approach that was seen as too politically sensitive and would deter potential institutional coalitions and further “silo” the city's climate change agenda (Carmin et al., 2013; Roberts & O'Donoghue, 2013).

We find that strategic approaches often inadequately capture the difficult policy trade-offs or political economic contestations that are required to further overall adaptive capacities of cities. In reference to Figure 1, we find that strategic adaptation actions lack focus on objective 2, namely the need to challenge dominant – often neoliberal – political economic structures that characterise unequal development in cities. For example, in Medellin, many construction contracts for the Green Belt went to property developers and architecture firms with strong ties to wealthy local politicians. This may explain why some high-end condominium buildings were allowed to extend along adjacent hillsides (Anguelovski et al., 2016). Similarly, in Indore, the need to financialise the provision of water and sanitation services rendered many informal settlements more susceptible to climate risks, thus resulting in a need to design alternative, community-based for public service delivery. So, without an integrated assessment of the different political economic opportunities and constraints of Medellin and Indore's entire climate adaptation portfolio, strategic interventions will only target discrete sectors, actors, and locations. Such approaches therefore run counter to recent scholarship on justice and inclusion in climate adaptation (see Shi et al., 2016; Sovacool et al., 2015), where the focus has shifted to assessing how adaptation actions can catalyse more transformative approaches to planning and development at-large (Anguelovski et al., 2016; Bahadur & Tanner, 2014; Pelling, O'Brien, & Matyas, 2015). In Durban, for instance, although the city has experienced profound political transformation since 1994, the degree to which the adaptation agenda challenges more recent economically exclusive development patterns is uncertain. Figure 5 summarises the difference between procedural and political economic approaches to adaptation and, as we further discuss, this difference rest on two broad sources of planning tension associated with how strategic adaptation actions are framed against contemporary urban development agendas.

FIGURE 5 HERE



The first source of tension comes from *within* local government, and is attributed to differences in internal priorities, visions, and capacities. The literature notes the importance of champions, leader departments, and clear goals (Anguelovski & Carmin, 2011), but many of these champions find it difficult to build long-lasting and solid partnerships across different sectors. For example, in Durban, the EPCPD experiences difficulty with garnering buy-in from certain departments because of historically conflicting priorities, even though stronger partnerships have emerged more recently. Durban's focus on aligning with seemingly a-political biodiversity and ecosystem protection agendas allows the city to pursue strategic adaptation actions away from ideologically contentious issues that entail "higher-stake" developmental trade-offs. This procedural focus of strategic actions has, however, laid a foundation for introducing more critical discussions of socioeconomic vulnerability, such as in the case of integrating community livelihoods, ecosystem protection, and informal settlements priorities in the city's adaptation work. Similar situations can be seen in Indore and Medellin, where strategic adaptation actions have focused on providing environmental goods – water and urban greening respectively – rather than tackling socio-economic vulnerabilities and housing needs linked to lower adaptive capacities in the first place.

The second source of tension is *between* local governments and communities who are trying to influence adaptation by advocating against inequities – and as such offering alternatives to the dominant development discourse – from the bottom up. Since many cities continue to follow neoliberal economic growth and development models that are susceptible to dynamics of competitive urbanism and capital accumulation (Brenner & Theodore, 2002), strategic actions designed to facilitate dialogue across sectors or between different stakeholders must similarly navigate these entrenched political economic structures. For example, Medellin's Green Belt project shows that despite commitments to integrate new green infrastructure into development plans in socially conscious ways, strategic climate adaptation efforts can at times accelerate cultural, economic, and physical displacement of vulnerable residents (Anguelovski et al., 2016). Here, the distribution of adaptation benefits continues to be rooted in historic urban power inequities, especially in terms of how elite interests influence the planning agenda and the role of finance in shaping infrastructure outcomes.

In response to these two broad sources of planning tension, grassroots actions contesting strategic adaptation plans are starting to create entry-points to further equity and inclusiveness. For example, in Durban, vulnerable communities are increasingly benefiting from poverty reduction outcomes of local ecosystem protection projects (Interview, 2014). Here, equity has emerged as a by-product of the creation of new socio-ecological systems and development of a restoration economy. Furthermore, the city's upcoming resilience strategy will tackle social vulnerability and equity in order to contest dominant pathways of neoliberal urban development. In Medellin, local mobilisations

against particular Green Belt projects are refocusing municipal priorities from infrastructure development to broader issues of poverty reduction, access to housing, environmental justice, and livelihoods security. However in Indore, where there are institutional constraints to replicating community projects, there exists a gap between local advocacy and genuine improvements to structural inequality experienced by poor residents. Powerful urban residents may end up reaping adaptation benefits at the expense of marginalised communities that are already vulnerable to climate impacts.

Challenges around equity and inclusiveness are prompting cities to identify more transformative adaptation visions that remedy patterns of unjust or unsustainable development. The two tensions highlighted in this section are in fact connected: one derives from the internal political constraints of strategic planning and the other is attributed to the external economic pressures seeking to redirect strategic actions. These tensions are even more acute in the global South, where resource constraints and governance fragmentation pose additional challenges for adaptation planning. Cities like Durban, Indore, and Medellin are making progress towards integrating adaptation into other development needs, but future research must also critically reflect on the means and ends of current unsustainable urban development. Our findings show that adaptation can be a double-edged sword, and strategic plans should not entrench capital-oriented processes of urban growth and production. Rather, cities should experiment with more cohesive cross-sectoral partnerships and civil society networks to support inclusive and pro-poor adaptation plans.

## **6. Conclusion**

In reflecting on Durban, Indore, and Medellin's experiences, we find that when advanced with a focus on alignment with development – particularly in relation to sustainability, environmental protection, spatial planning, or livelihood security – strategic adaptation actions can promote integration with urban programmes and practices. Not only can processes like this facilitate more deliberative planning pathways (see Fischer, 2006; Forester, 1999; Hajer & Wagenaar, 2003 for example), such strategic approaches can also promote stronger leadership, resource support, agenda awareness, and political recognition across municipal departments, private actors, and civil society representatives (Albrechts, 2013; Salet, 2007). Despite the procedural benefits of strategic adaptation planning, this paper further contributes to the literature on urban climate adaptation by arguing that strategic approaches must also challenge neoliberal development pathways and remedy existing social, economic, and spatial inequalities prevalent in cities across the global South. In other words, as we illustrated in Figure 1, the objective of identifying effective adaptation planning processes must be accompanied by a more normative goal of transforming existing political economic structures from within.

Although Durban, Indore, and Medellin have had some success in pursuing strategic adaptation actions, they continue to face development inequalities that affect how participatory processes are designed, how adaptation projects are prioritised and evaluated, and the extent to which adaptation benefits are equitably distributed across the city. The objective of this paper is not to suggest that strategic adaptation actions always result in a “dead end”; instead we are arguing that strategic approaches must expand their scope and serve as stepping-stones to critically reflect on dominant neoliberal urban development paradigms and to begin to transform them from within. Despite some promising steps being taken in Durban’s upcoming *City Resilience Strategy* and a growing recognition of gentrification pressures in Medellin, whether strategic climate adaptation actions in secondary cities such as Indore will prove to be inclusive and equitable in the long run remains to be seen. As a result, even though we show that strategic planning approaches can help articulate specific points of policy integration, cities must also tackle difficult policy trade-offs between climate and development, as well as directly confront political contestations within and beyond cities. This way, the collective benefits of disparate strategic adaptation actions can be harnessed to achieve benefits for all urban residents.

## References

- Albrechts, L. (2004). Strategic (Spatial) Planning Reexamined. *Environment and Planning B: Planning and Design*, 31(5), 743–758. <http://doi.org/10.1068/b3065>
- Albrechts, L. (2006). Bridge the Gap: From Spatial Planning to Strategic Projects. *European Planning Studies*, 14(10), 1487–1500. <http://doi.org/10.1080/09654310600852464>
- Albrechts, L. (2013). Reframing strategic spatial planning by using a coproduction perspective. *Planning Theory*, 12(1), 46–63. <http://doi.org/10.1177/1473095212452722>
- Angelovski, I., & Carmin, J. (2011). Something borrowed, everything new: innovation and institutionalization in urban climate governance. *Current Opinion in Environmental Sustainability*, 3(3), 169–175. <http://doi.org/10.1016/j.cosust.2010.12.017>
- Angelovski, I., Chu, E., & Carmin, J. (2014). Variations in approaches to urban climate adaptation: Experiences and experimentation from the global South. *Global Environmental Change*, 27, 156–167. <http://doi.org/10.1016/j.gloenvcha.2014.05.010>
- Angelovski, I., & Roberts, D. (2011). Spatial Justice and Climate Change: Multiscale Impacts and Local Development in Durban, South Africa. In J. Carmin & J. Agyeman (Eds.), *Environmental Inequalities Beyond Borders: Local Perspectives on Global Injustices* (pp. 19–43). Cambridge, MA: MIT Press.
- Angelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., ... Teicher, H. (2016). Equity Impacts of Urban Land Use Planning for Climate Adaptation: Critical Perspectives from the Global North and South. *Journal of Planning Education and Research*, 36(3), 333–348. <http://doi.org/10.1177/0739456X16645166>
- Archer, D., Almansi, F., DiGregorio, M., Roberts, D., Sharma, D., & Syam, D. (2014). Moving towards inclusive urban adaptation: approaches to integrating community-based adaptation to climate change at city and national scale. *Climate and Development*, 6(4), 345–356. <http://doi.org/10.1080/17565529.2014.918868>
- Ayers, J., & Dodman, D. (2010). Climate change adaptation and development I: the state of the debate. *Progress in Development Studies*, 10(2), 161–168. <http://doi.org/10.1177/146499340901000205>
- Aylett, A. (2010). Conflict, Collaboration and Climate Change: Participatory Democracy and Urban Environmental Struggles in Durban, South Africa. *International Journal of Urban and Regional Research*, 34(3), 478–495. <http://doi.org/10.1111/j.1468-2427.2010.00964.x>
- Bahadur, A. V., & Tanner, T. M. (2014). Transformational resilience thinking: putting people, power and politics at the heart of urban climate resilience. *Environment and Urbanization*, 26(1), 200–214. <http://doi.org/10.1177/0956247814522154>
- Bain, P. G., Milfont, T. L., Kashima, Y., Bilewicz, M., Doron, G., Garðarsdóttir, R. B., ... Saviolidis, N. M. (2016). Co-benefits of addressing climate change can motivate action around the world. *Nature Climate Change*, 6, 154–157. <http://doi.org/10.1038/nclimate2814>
- Bardhan, P. (2002). Decentralization of Governance and Development. *Journal of Economic Perspectives*, 16(4), 185–205. <http://doi.org/10.1257/089533002320951037>
- Béné, C., Newsham, A., Davies, M., Ulrichs, M., & Godfrey-Wood, R. (2014). Review Article: Resilience, Poverty and Development. *Journal of International Development*, 26(5), 598–623. <http://doi.org/10.1002/jid.2992>
- Bicknell, J., Dodman, D., & Satterthwaite, D. (Eds.). (2009). *Adapting Cities to Climate Change: Understanding and Addressing the Development Challenges*. New York: Earthscan.
- Bowen, K. J., & Ebi, K. L. (2015). Governing the health risks of climate change: towards multi-sector responses. *Current Opinion in Environmental Sustainability*, 12, 80–85. <http://doi.org/10.1016/j.cosust.2014.12.001>
- Brenner, N., & Theodore, N. (2002). Cities and the Geographies of “Actually Existing Neoliberalism.” *Antipode*, 34(3), 349–379. <http://doi.org/10.1111/1467-8330.00246>
- Bulkeley, H., Carmin, J., Castán Broto, V., Edwards, G. A. S., & Fuller, S. (2013). Climate justice and global cities: Mapping the emerging discourses. *Global Environmental Change*, 23(5), 914–925. <http://doi.org/10.1016/j.gloenvcha.2013.05.010>
- Bulkeley, H., Castán Broto, V., & Edwards, G. A. S. (2015). *An Urban Politics of Climate Change*:

- Experimentation and the Governing of Socio-Technical Transitions*. New York and London: Routledge.
- Carmin, J., Anguelovski, I., & Roberts, D. (2012). Urban Climate Adaptation in the Global South: Planning in an Emerging Policy Domain. *Journal of Planning Education and Research*, 32(1), 18–32. <http://doi.org/10.1177/0739456X11430951>
- Carmin, J., Dodman, D., & Chu, E. (2013). *Urban Climate Adaptation and Leadership: From Conceptual to Practical Understanding* (OECD Regional Development Working Paper No. 2013/26). Paris, France: Organisation for Economic Co-operation and Development (OECD). <http://doi.org/10.1787/5k3ttg88w8hh-en>
- Cartwright, A., Blihnaut, J., De Wit, M., Goldberg, K., Mander, M., O'Donoghue, S., & Roberts, D. (2013). Economics of climate change adaptation at the local scale under conditions of uncertainty and resource constraints: the case of Durban, South Africa. *Environment and Urbanization*, 25(1), 139–156. <http://doi.org/10.1177/0956247813477814>
- Cheema, G. S. (2007). *Decentralizing Governance: Emerging Concepts and Practices*. (G. S. Cheema & D. A. Rondinelli, Eds.). Washington, DC: Brookings Institution Press.
- Chu, E. (2016a). Mobilising Adaptation: Community Knowledge and Urban Governance Innovations in Indore, India. In M. Roy, S. Cawood, M. Hordijk, & M. Hulme (Eds.), *Urban Poverty and Climate Change: Life in the Slums of Asia, Africa and Latin America* (pp. 238–254). London and New York: Routledge.
- Chu, E. (2016b). The Governance of Climate Change Adaptation Through Urban Policy Experiments. *Environmental Policy and Governance*. <http://doi.org/10.1002/eet.1727>
- Chu, E. (2016c). The political economy of urban climate adaptation and development planning in Surat, India. *Environment and Planning C: Government and Policy*, 34(2), 281–298. <http://doi.org/10.1177/0263774X15614174>
- Chu, E., Anguelovski, I., & Carmin, J. (2016). Inclusive approaches to urban climate adaptation planning and implementation in the Global South. *Climate Policy*, 16(3), 372–392. <http://doi.org/10.1080/14693062.2015.1019822>
- Desouza, K. C., & Flanery, T. H. (2013). Designing, planning, and managing resilient cities: A conceptual framework. *Cities*, 35, 89–99. <http://doi.org/10.1016/j.cities.2013.06.003>
- Diederichs, N., & Roberts, D. (2015). Climate protection in mega-event greening: the 2010 FIFA™ World Cup and COP17/CMP7 experiences in Durban, South Africa. *Climate and Development*, 1–9. <http://doi.org/10.1080/17565529.2015.1085361>
- EThekweni Municipality. (2015). *Integrated Development Plan 2015/2016*. Durban, South Africa.
- Evans, J., & Karvonen, A. (2014). “Give Me a Laboratory and I Will Lower Your Carbon Footprint!” - Urban Laboratories and the Governance of Low-Carbon Futures. *International Journal of Urban and Regional Research*, 38(2), 413–430. <http://doi.org/10.1111/1468-2427.12077>
- Fainstein, S. S. (2015). Resilience and Justice. *International Journal of Urban and Regional Research*, 39(1), 157–167. <http://doi.org/10.1111/1468-2427.12186>
- Fischer, F. (2006). Participatory Governance as Deliberative Empowerment: The Cultural Politics of Discursive Space. *The American Review of Public Administration*, 36(1), 19–40. <http://doi.org/10.1177/0275074005282582>
- Forester, J. (1999). *The Deliberative Practitioner: Encouraging Participatory Planning Processes*. Cambridge, MA: MIT Press.
- Golder Associates. (2011). *Community-based adaptation to climate change in Durban* (No. Report Number 10290-9743-13). Durban, South Africa.
- Hajer, M. A., & Wagenaar, H. (Eds.). (2003). *Deliberative Policy Analysis: Understanding Governance in the Network Society*. Cambridge, UK: Cambridge University Press.
- Halsnæs, K., & Trærup, S. L. M. (2009). Development and climate change: a mainstreaming approach for assessing economic, social, and environmental impacts of adaptation measures. *Environmental Management*, 43(5), 765–78. <http://doi.org/10.1007/s00267-009-9273-0>
- Healey, P. (2004). Creativity and urban governance. *Policy Studies*, 25(2), 87–102. <http://doi.org/10.1080/0144287042000262189>
- Hernandez- Garcia, J. (2013). Slum tourism, city branding and social urbanism: the case of Medellin, Colombia. *Journal of Place Management and Development*, 6(1), 43–51. <http://doi.org/10.1108/17538331311306122>

- Hughes, S. (2013). Justice in Urban Climate Change Adaptation: Criteria and Application to Delhi. *Ecology and Society*, 18(4), 48. <http://doi.org/10.5751/ES-05929-180448>
- Hunt, A., & Watkiss, P. (2011). Climate change impacts and adaptation in cities: A review of the literature. *Climatic Change*, 104(1), 13–49. <http://doi.org/10.1007/s10584-010-9975-6>
- Indore City Resilience Strategy. (2012). *Indore City Resilience Strategy for Changing Climate Scenarios*. (G. K. Bhat, V. P. Kulshreshtha, U. A. Bhonde, U. Rajasekar, A. K. Karanth, & M. K. Burvey, Eds.). Indore, India: TARU Leading Edge.
- Indore Municipal Corporation. (2006). *Indore City Development Plan*. Indore, India: Indore Municipal Corporation.
- IPCC. (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. (C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, ... L. L. White, Eds.). Cambridge and New York: Cambridge University Press.
- Kernaghan, S., & da Silva, J. (2014). Initiating and sustaining action: Experiences building resilience to climate change in Asian cities. *Urban Climate*, 7, 47–63. <http://doi.org/10.1016/j.uclim.2013.10.008>
- Leck, H., & Roberts, D. (2015). What lies beneath: understanding the invisible aspects of municipal climate change governance. *Current Opinion in Environmental Sustainability*, 13, 61–67. <http://doi.org/10.1016/j.cosust.2015.02.004>
- Leichenko, R. (2011). Climate change and urban resilience. *Current Opinion in Environmental Sustainability*, 3(3), 164–168. <http://doi.org/10.1016/j.cosust.2010.12.014>
- Malekpour, S., Brown, R. R., & de Haan, F. J. (2015). Strategic planning of urban infrastructure for environmental sustainability: Understanding the past to intervene for the future. *Cities*, 46, 67–75. <http://doi.org/10.1016/j.cities.2015.05.003>
- Mather, A. A., Garland, G. G., & Stretch, D. D. (2009). Southern African sea levels: corrections, influences and trends. *African Journal of Marine Science*, 31(2), 145–156. <http://doi.org/10.2989/AJMS.2009.31.2.3.875>
- Meerow, S., & Newell, J. P. (2016). Urban resilience for whom, what, when, where, and why? *Urban Geography*, 1–21. <http://doi.org/10.1080/02723638.2016.1206395>
- Municipio de Medellín. (2011). *Bio 2030 Plan Director Medellín, Valle de Aburrá*. Medellín, Colombia.
- Municipio de Medellín. (2014). *Plan de Ordenamiento Territorial – POT*. Medellín, Colombia.
- Paavola, J. (2008). Science and social justice in the governance of adaptation to climate change. *Environmental Politics*, 17(4), 644–659. <http://doi.org/10.1080/09644010802193609>
- Pelling, M. (2010). *Adaptation to Climate Change: From Resilience to Transformation*. London and New York: Routledge.
- Pelling, M., O’Brien, K., & Matyas, D. (2015). Adaptation and transformation. *Climatic Change*, 133(1), 113–127. <http://doi.org/10.1007/s10584-014-1303-0>
- Roberts, D. (2008). Thinking globally, acting locally -- institutionalizing climate change at the local government level in Durban, South Africa. *Environment and Urbanization*, 20(2), 521–537. <http://doi.org/10.1177/0956247808096126>
- Roberts, D. (2010). Prioritizing climate change adaptation and local level resilience in Durban, South Africa. *Environment and Urbanization*, 22(2), 397–413. <http://doi.org/10.1177/0956247810379948>
- Roberts, D., Boon, R., Diederichs, N., Douwes, E., Govender, N., McInnes, A., ... Spires, M. (2012). Exploring ecosystem-based adaptation in Durban, South Africa: “learning-by-doing” at the local government coal face. *Environment and Urbanization*, 24(1), 167–195. <http://doi.org/10.1177/0956247811431412>
- Roberts, D., Morgan, D., O’Donoghue, S., Guastella, L., Hlongwa, N., & Price, P. (2016). Durban, South Africa. In S. Bartlett & D. Satterthwaite (Eds.), *Cities on a Finite Planet: Toward Transformative Resources to Climate Change* (pp. 96–115). London and New York: Routledge.
- Roberts, D., & O’Donoghue, S. (2013). Urban environmental challenges and climate change action in Durban, South Africa. *Environment and Urbanization*, 25(2), 299–319. <http://doi.org/10.1177/0956247813500904>
- Rodima-Taylor, D., Olwig, M. F., & Chhetri, N. (2012). Adaptation as innovation, innovation as

- adaptation: An institutional approach to climate change. *Applied Geography*, 33, 107–111. <http://doi.org/10.1016/j.apgeog.2011.10.011>
- Rosenzweig, C., Solecki, W., Hammer, S. A., & Mehrotra, S. (2010). Cities lead the way in climate–change action. *Nature*, 467(7318), 909–911. <http://doi.org/10.1038/467909a>
- Salet, W. (2007). Framing Strategic Urban Projects. In W. Salet & E. Gualini (Eds.), *Framing Strategic Urban Projects: Learning from Current Experiences in European Urban Regions* (pp. 3–19). Oxford and New York: Routledge.
- Salet, W., Bertolini, L., & Giezen, M. (2013). Complexity and Uncertainty: Problem or Asset in Decision Making of Mega Infrastructure Projects? *International Journal of Urban and Regional Research*, 37(6), 1984–2000. <http://doi.org/10.1111/j.1468-2427.2012.01133.x>
- Schlosberg, D. (2012). Climate Justice and Capabilities: A Framework for Adaptation Policy. *Ethics & International Affairs*, 26(4), 445–461. <http://doi.org/10.1017/S0892679412000615>
- Sharma, D., Singh, R., & Singh, R. (2014). Building urban climate resilience: learning from the ACCCRN experience in India. *International Journal of Urban Sustainable Development*, 6(2), 133–153. <http://doi.org/10.1080/19463138.2014.937720>
- Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., ... VanDeveer, S. D. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, 6(2), 131–137. <http://doi.org/10.1038/nclimate2841>
- Shi, L., Chu, E., & Carmin, J. (2016). Global Patterns of Adaptation Planning: Results from a Global Survey. In K. C. Seto, W. D. Solecki, & C. A. Griffith (Eds.), *The Routledge Handbook of Urbanization and Global Environmental Change* (pp. 336–349). Routledge.
- Solecki, W. D., Leichenko, R., & O'Brien, K. (2011). Climate change adaptation strategies and disaster risk reduction in cities: connections, contentions, and synergies. *Current Opinion in Environmental Sustainability*, 3(3), 135–141. <http://doi.org/10.1016/j.cosust.2011.03.001>
- Sotomayor, L. (2015). Equitable planning through territories of exception: the contours of Medellín's urban development projects. *International Development Planning Review*, 37(4), 373–397. <http://doi.org/10.3828/idpr.2015.23>
- Sovacool, B. K., Linnér, B.-O., & Goodsite, M. E. (2015). The political economy of climate adaptation. *Nature Climate Change*, 5(7), 616–618. <http://doi.org/10.1038/nclimate2665>
- Steinberg, F. (2005). Strategic urban planning in Latin America: experiences of building and managing the future. *Habitat International*, 29(1), 69–93. [http://doi.org/10.1016/S0197-3975\(03\)00063-8](http://doi.org/10.1016/S0197-3975(03)00063-8)
- Sutherland, C., Hordijk, M., Lewis, B., Meyer, C., & Buthelezi, S. (2014). Water and sanitation provision in eThekweni Municipality: a spatially differentiated approach. *Environment and Urbanization*, 26(2), 469–488. <http://doi.org/10.1177/0956247814544871>
- Swyngedouw, E. (2005). Governance innovation and the citizen: The Janus face of governance-beyond-the-state. *Urban Studies*, 42(11), 1991–2006. <http://doi.org/10.1080/00420980500279869>
- Todes, A. (2012). Urban growth and strategic spatial planning in Johannesburg, South Africa. *Cities*, 29(3), 158–165. <http://doi.org/10.1016/j.cities.2011.08.004>
- Walsh, C., Roberts, D., Dawson, R., Hall, J., Nickson, A., & Hounsome, R. (2013). Experiences of integrated assessment of climate impacts, adaptation and mitigation modelling in London and Durban. *Environment and Urbanization*, 25(2), 361–380. <http://doi.org/10.1177/0956247813501121>

**Figure 1. An illustration of the objectives of strategic climate adaptation planning**

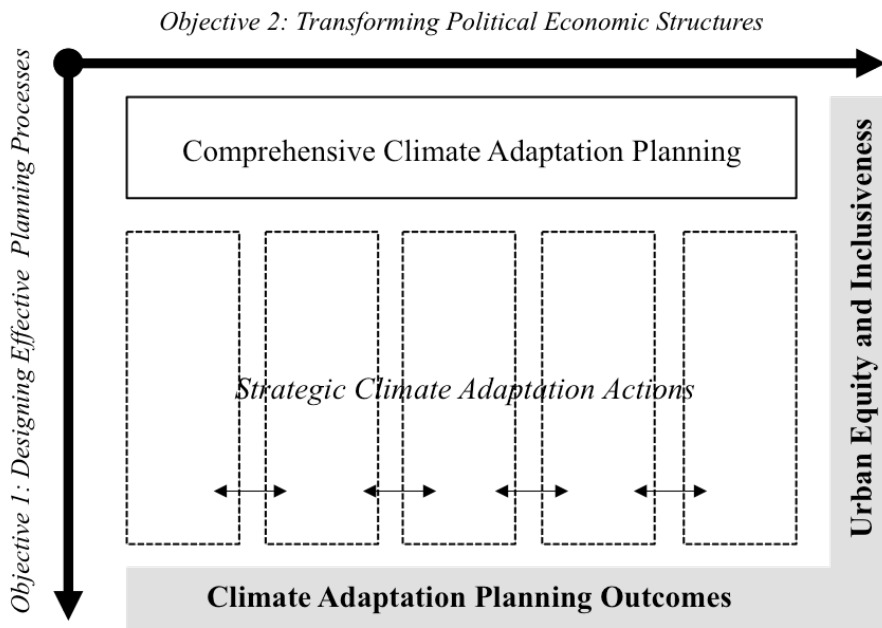




Figure 2. Reforestation project in Durban (photo taken by author)



Figure 3. A water pumping station in Indore (photo taken by author)



**Figure 4. An overview of hillside communities in Medellin (photo taken by author)**



**Table 1. Strategic Actions for Urban Climate Adaptation**

<b>City</b>	<b>Examples</b>
<b>Durban</b>	<ul style="list-style-type: none"><li>- <u>Project evaluation and assessment</u>: Developing tools to prioritise the human benefit of adaptation options</li><li>- <u>Strategic urban management</u>: Drafting policies with adaptation and mitigation co-benefits; establishing multi-stakeholder networks</li><li>- <u>Ecosystem protection</u>: Protecting ecological infrastructure; increasing water security; conserving river basins; managing coastal erosion; protecting biodiversity and ecosystem services</li></ul>
<b>Indore</b>	<ul style="list-style-type: none"><li>- <u>Slum management</u>: Supporting microfinance and women's groups; improving housing quality; providing access to public health services</li><li>- <u>Water conservation</u>: Protecting water bodies; promoting water-water harvesting technologies and water recycling facilities</li><li>- <u>Municipal finance</u>: Offering property tax incentives for water-harvesting technologies; creating a new budget line-item for climate action</li></ul>
<b>Medellin</b>	<ul style="list-style-type: none"><li>- <u>Spatial and territorial planning</u>: Containing urban growth; managing landslides risks; protecting ecosystems through Green Belt</li><li>- <u>Zoning and building codes</u>: Delineating land use zones; improving quality of public housing</li><li>- <u>Demonstration projects</u>: Improving access to public transportation; upgrading marginalised neighbourhoods; designing new public spaces</li></ul>

**Figure 5. Summary of tensions between different strategic adaptation approaches**

