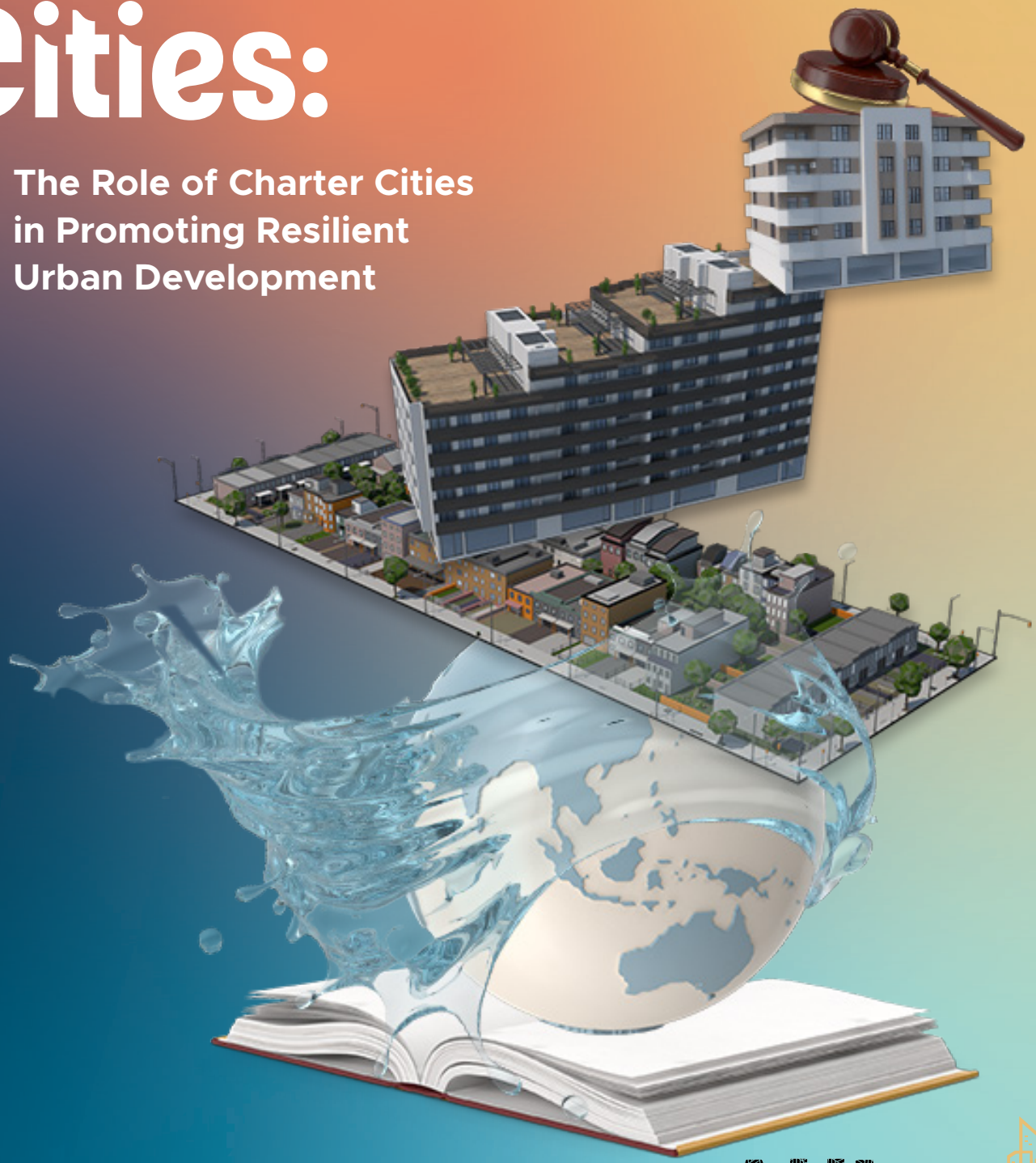
Building Resilient Cities:

The Role of Charter Cities in Promoting Resilient Urban Development



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AUL

CHARTER CITIES INSTITUTE

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1. Introduction

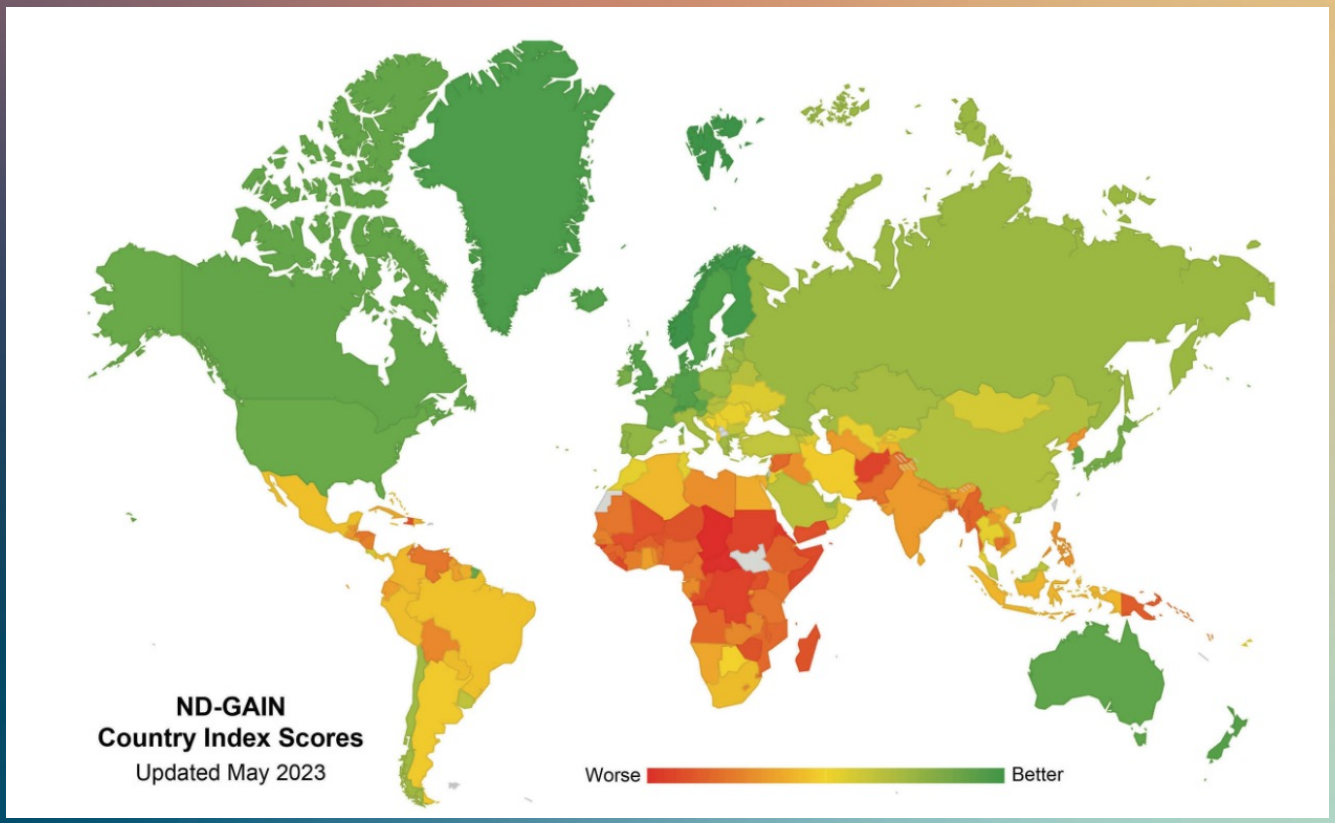
Climate change is rapidly transforming humanity's relationship to the natural world. Higher global surface temperatures, increasingly extreme weather events, abnormal weather patterns, and rising sea levels are not merely environmental concerns, but pose direct threats to the very fabric of our societies (IPCC, 2022). As we witness the escalating impacts of climate change, the critical role of cities in fostering climate-resilient development becomes increasingly evident. As epicenters of population density, economic opportunity, cultural exchange, and innovation, cities have immense potential to confer resilience to households, communities, nations, and the whole of human civilization.[1] However, the compounding challenges of climate change and rapid urbanization are undermining the growth of resilient, productive cities, particularly across the Global South. In this context, charter cities offer a promising solution. These "new cities with new rules" present an opportunity to construct well-governed, sustainable cities from the ground up (Mason & Lutter, 2020, pg. 2). Ultimately, charter cities may hold the key for building resilient urban centers which are capable of propelling human prosperity far into the future.

Indeed, cities have a vital role to play in resilient development. For one, "sustained economic development does not occur without urbanization," (Henderson, 2010, pg. 515). Urban agglomerations give rise to the skills, knowledge, experimentation, and innovation necessary to propel long-run growth. As such, productive cities can generate the capital necessary to finance climate adaptation and mitigation initiatives. They can also spur innovation in green technologies and serve as experimentation grounds for new climate-related policies. Second, cities also provide economic opportunities for households, allowing those who have been negatively impacted by climate change to engage in occupational and/or spatial adaptation. Additionally, access to jobs and higher per capita incomes improve households' ability to withstand and adapt to external climate-related shocks. Third, well-financed and -administered cities can also decrease households' vulnerability to climate change through reliable, high-quality public service provision, such as water and sanitation services, electricity, and waste management. Construction of sound infrastructure and dwellings further increases resilience by ensuring buildings are designed to withstand climate-related hazards. In this way, productive cities – by virtue of their diversity, dynamism, density, and redundancy – are arguably the most resilient human ecosystems in existence. As Bettencourt (2021) argues, "cities are [humanity's] master niche: the primary environments where an open-ended, sustainable future for our kind and for our kind and for life on earth may be imagined and constructed" (pg. 370).

[1] It is important to note here that cities, as large carbon emitters, also have a significant role to play in climate change mitigation efforts. However, because this white paper is primarily concerned with resilience, including absorptive and adaptive capacity, discussion of mitigation will be peripheral and limited. Additionally, this paper focuses on resilience within the physical boundaries of the city, while recognizing that the tendrils of urbanization reach deep into the systems, environments, and economic realities that shape sub-urban and rural life. More nuanced discussion on these points, however, remains outside the scope of this paper.

As such, unlocking the potential of cities across the Global South through well-managed and forward-looking urbanization is one of the most pressing issues facing our world today. Nonetheless, in almost every corner of the globe, urban centers are embroiled in an ongoing battle against climate change. Extreme heat exposure in cities has increased as rising temperatures and heatwaves spawn intense urban heat islands (Tuholske et al., 2021). Urban flooding has resulted in loss of human life, as well as lasting damage to health, livelihoods, and property. The Intergovernmental Panel on Climate Change (IPCC) also finds that "urban infrastructure, including transportation, water, sanitation and energy systems have been compromised by extreme and slow-onset events, with resulting economic losses, disruptions of services and negative impacts on wellbeing," (Galvovic et al., 2022, pg. 6). Already, climate change has wreaked untold difficulties upon urban centers, yet the trials and tribulations cities currently face are only expected to intensify as the climate crisis worsens over the coming decades. This is particularly true for urban centers in countries across the Global South, which are disproportionately vulnerable to the effects of climate change due to geographic, economic, and institutional circumstances (see Figure 1; Chen et al., 2023).

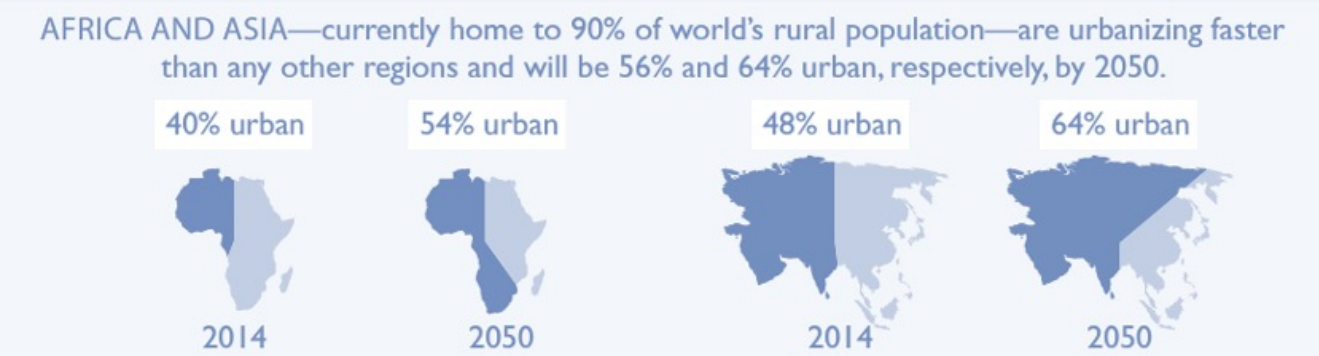
Figure 1. Climate vulnerability is higher across the Global South



Source: ND-GAIN.

The challenge of resilient urban development in the Global South is further heightened by the rapidity of urban growth. In fact, by 2050, cities are projected to accommodate over 70 percent of the world's population, with over two thirds of urban population growth concentrated in Sub-Saharan Africa and India (UNPD, 2018). Not only is the pace of urbanization substantially faster than the historical precedent – with "full urbanization… [occurring] in a span of about 30 years as opposed to…100-150 years [in today's developed countries]" – but it is also occurring at comparatively low levels of income, productivity, and infrastructural development (see Figure 2; Henderson, 2010, pg. 516). Many cities are sorely underequipped to accommodate the influx of residents, particularly as climate change amplifies the economic, social, and environmental challenges of rapid urbanization. Cities across the Global South are already straining under urbanization pressures, which threaten to undermine social cohesion, urban productivity, economic growth, and, ultimately, urban resilience. Consequently, unsustainable urbanization "could make the world's society and economy increasingly vulnerable to the impacts of climate change…,[particularly] urban centers…in developing countries," (UNFCC, 2017, pg. 3).

Figure 2. The pace of urbanization is increasing



Source: USAID (n.d.).

The importance of cities in the battle against climate change, coupled with the compounding challenges posed by rapid urbanization, necessitates new and innovative solutions to ensure sustainable urban growth and promote resilience, particularly in the Global South. New city construction – a growing phenomenon across the Global South, especially in East Asia, the Middle East and North Africa, and Sub-Saharan Africa – has been offered as a climate adaptation solution but has not been meaningfully expanded upon (Klaus, 2023a; Klaus, 2023b). Charter cities, or "new cities with new rules" may offer a viable strategy to promote resilience, complementary to efforts to upgrade existing cities (Mason and Lutter, 2020, pg. 2).[2] In fact, charter cities can help direct urban growth, while providing the planning and good governance necessary to effectively manage rapid urbanization and leverage it into economic development.[3] More specifically, charter cities can support resilience across the Global South in at least three important ways:

1. Charter cities can help direct urban growth away from climate-vulnerable zones through strategic location decisions. Pre-emptive urban expansion through satellite cities in in-migration hotspots can also help decrease exposure to changing environmental conditions.

2. Charter cities can introduce stronger built systems, rooted in sustainable foundations. Good urban planning and climate-conscious infrastructure in new cities can improve the built absorptive capacity of the city while also generating positive economic and social feedback loops within the urban system.

3. Charter cities can instigate administrative, regulatory, and institutional reforms that not only enable economic development, but also help improve processes for long-term planning and adaptive decision-making.

However, the creation of a new city is not without its own substantial challenges. Even from the outset, identifying a greenfield location which is well-connected and unlikely to be negatively impacted by climate change is a daunting proposition (see Box 2). New city construction is also undeniably expensive and may meet significant political resistance, even if it does not undermine existing elite entrenchment. There is a serious risk of creating exclusive elite enclaves which further exacerbate economic, social, and environmental inequalities. Furthermore, planning, implementation, and construction are likely to face significant obstacles and set-backs.

This white paper will explore the three major ways in which charter cities can support urban resilience in the Global South, above and beyond the benefits of urban growth alone, while taking seriously the immense obstacles for new city construction. Despite the challenges, charter cities present an opportunity to

[2] See Box I for more information on charter cities. Note that the charter city model advocated here is not the same as the model originally introduced by economist and Nobel laureate Paul Romer. Romer advocated for a charter city model wherein the city would be administered by a guarantor country which already enjoys good governance and high administrative capacity. However, due to the neocolonial nature of this model, it is not desirable and likely to be politically unpopular. Instead, governance of the charter city could be negotiated through a public-private partnership between the developer and the host country, simultaneously allowing for devolved governing authority, while allowing the city to remain under the sovereignty of the state. This is explained in more detail in Box I.

[3] It is important to note that this definition of 'new cities' is not limited to greenfield development sites. Included in this definition are also deep overhauls of pre-existing cities. More specifically, this blog takes the definition for a 'new city' which includes the following criteria: 1) a new top-down master plan, 2) planned population of over 100,000; 3) explicit framing as a new city; and 4) construction of a school.

construct productive, well-governed, climate-conscious cities from the ground up. Not only does this hold immense potential to improve the livelihoods of the billions of people who will be living in urban centers by mid-century, but it can also support national, regional, and international climate adaptation through development and innovation. Indeed, charter cities can help us harness the inherent virtues of cities to propel us into the future.

The rest of this paper proceeds as follows: Section 2 defines and elucidates the concept of resilience; Sections 3 explains how charter cities can promote urban resilience through strategic location, sustainable foundations, and adaptive governance; Section 4 concludes.

Box 1. What are charter cities?

Charter cities are "new cities with new rules," (Mason & Lutter, 2020, pg. 2). More specifically, charter cities are new cities with special jurisdiction to implement deep regulatory and administrative reforms to improve economic governance. Because charter cities are geographically limited, pursuing such reforms for a city is likely to be more politically tractable than substantial national-level reform.

For example, charter cities may be delegated authority to reform business and property registration processes, land use administration, urban service provision, immigration, and/or tax administration. Successful implementation of such reforms can help establish a stable business environment which is conducive to foreign and domestic investment, and which enables local residents to more easily start a business, find employment, or register property.

By coordinating the efforts of various charter city stakeholders – including private developers, governments, multilateral institutions, and more – it's possible to create well-governed cities that generate economic prosperity. In practice, the governance process may be negotiated through a public-private partnership (PPP) between the host country and the real estate developer, who will then retain a vested interest in the success of the city.

The governance structure will ultimately differ depending on local needs, context, and actors, among other influential dynamics. However, one possible structure is for the city to be managed by a "city council with seats appointed by the city developer, the host government, and potentially other [relevant] third parties," (Mason & Lutter, 2020, pg. 18). Service provision – such as maintenance of infrastructure, water management, and electricity – may then be contracted out to private sector actors, as is becoming increasingly common.

Box 1 (Continued). What are charter cities?

Charter cities are not a new idea; examples include Shenzhen, Hong Kong, Singapore, and Dubai, which each employed 'new rules' within a delimited geographic zone to leverage urban growth for economic prosperity. Charter cities thus "present an opportunity to ignite long run, inclusive economic growth, while…providing a model of regulatory reform and administrative capacity building for host country governments," (Mason & Lutter, 2020, pg. 5-6).

2. What is resilience?

Before proceeding, it is prudent to clarify how the term 'resilience' is defined in this paper. It is a notoriously vague and elusive concept, with differing conceptualizations depending on the perspective and discipline. Crucially, Clutter (2016) also makes the important point that we must ask two additional questions when discussing resilience: "Resilience to what? Resilience for whom?" (pg. 110). This paper is specifically concerned with resilience to climate change, including both long-run changes and shocks, such as disasters and extreme weather events. The second question requires a more nuanced discussion. This paper is interested in climate resilience on two margins: on the societal level and on the urban level, with a specific focus on cities in the Global South. These two concepts are related, insofar as resilient cities confer resilience to society as whole; however 'urban resilience' may be considered a sub-group of 'societal resilience.' There is a large literature on how cities support resilience for human civilization at large, which was briefly covered in Section 1. A more detailed discussion is outside the scope of this paper. Instead, the remainder of this paper is concerned primarily with the specific definition of 'urban resilience' and the interrelated processes that allow cities, as complex systems, to cultivate resilience.

In fact, there is a widespread tendency among most policymakers to ignore the innate complexities of urban resilience in favor of more functional conceptualizations. Oftentimes, policymakers define urban resilience in strict engineering terms. They are primarily concerned with decreasing exposure, ensuring that buildings and infrastructure can withstand external shocks, and "bouncing back" after disaster (Meerow & Stults, 2016, pg. 16). This perspective is useful for highlighting the importance of 'exposure' for a city's overall level of 'vulnerability.' Not only is it crucial to build resilience from within the urban system, but it is also prudent to decrease the likelihood of being exposed to external shocks in the first place. High levels of exposure ultimately undermine resilience by overwhelming the urban system's capacity to continuously absorb shocks and effectively adapt processes. This has important implications for cities, which often face high levels of exposure to climate shocks due to coastal/riverine location and their extensive paved surfaces. Despite this crucial insight, we still must move past 'engineering' conceptualizations of resilience, which tend to relegate understanding to the prevention and mitigation of human and economic losses in the face of disaster.

Certainly, decreasing exposure and increasing disaster tolerance are important for urban resilience, but it fails to address the true dynamism of human-environment interactions within the city. In fact, in academic theory, "the trend seems to be away from static, engineering resilience with its emphasis on robust systems towards…more flexible and adaptive forms of resilience," (Meerow & Stults, 2016, pg. 16). The 'systems' approach to resilience, which has become increasingly popular in academic literature, finds its roots in the work of pioneering ecologist C.S. Holling. Holling's discovery of "multiple basins of attraction in ecosystems" led social and environmental scientists to reconsider notions of "non-linear dynamics, thresholds, uncertainty and surprise, how periods of gradual change interplay with periods of rapid change and how such dynamics interact across temporal and spatial scales," (Folke, 2006, pg. 253). Consequently, resilience is coming to be increasingly understood as a process that is constantly in flux.

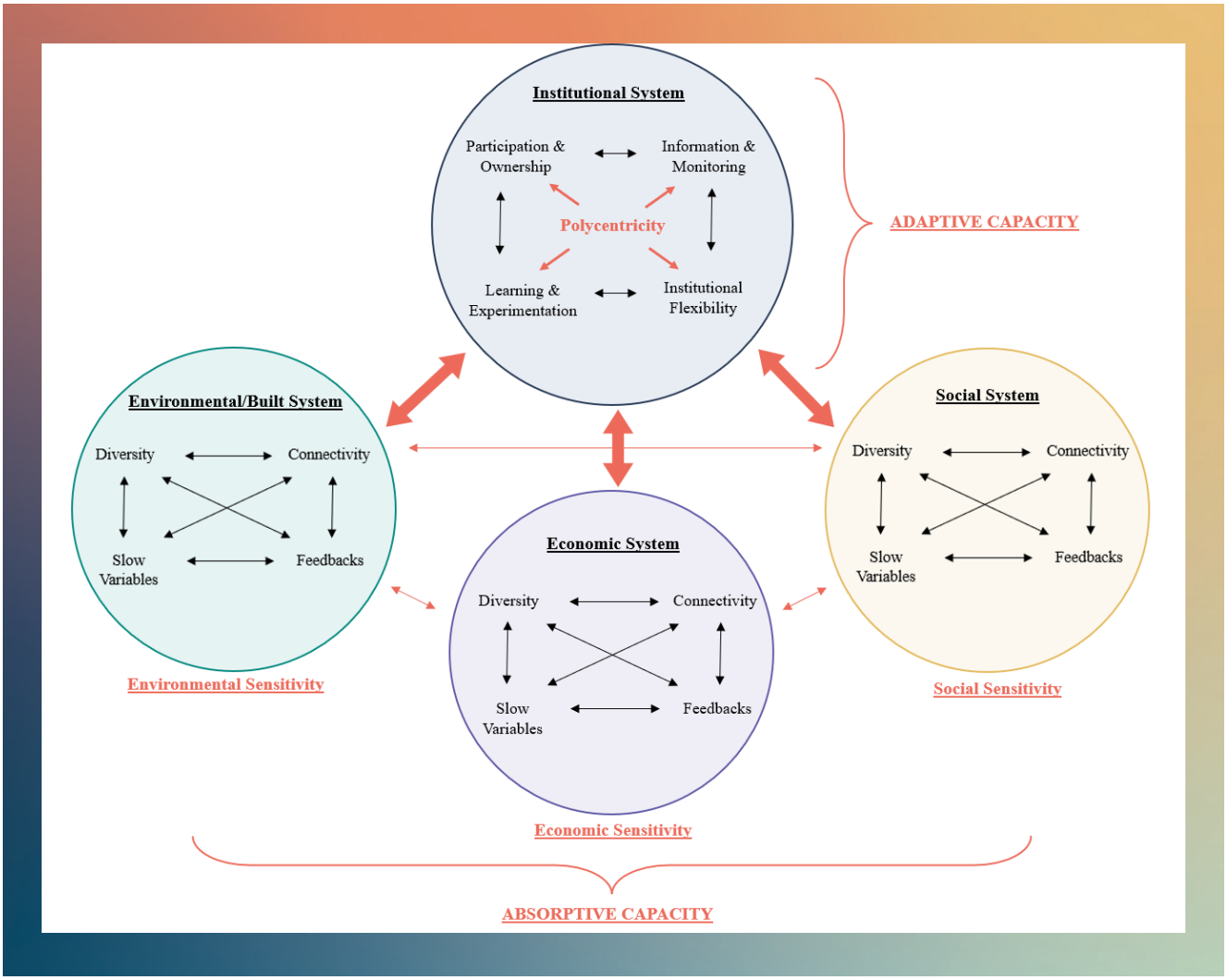
This new perspective "shifts policies from those that aspire to control change in systems assumed to be stable, to managing the capacity of social-ecological systems to cope with, adapt to, and shape change," (Folke, 2006, pg. 254). Fundamentally, this conceptualization "embraces change as a basic feature of the way the world works and develops, and therefore is especially appropriate at times when changes are a prominent feature of the system," (Chapin et al., 2009). Most importantly, this approach highlights the ability of humans to "transform their social-ecological environments," (Kofinas, 2009, pg. 82). Of course, humans have the capacity to influence our systems and environments in both positive and negative ways. Cities, however, are perhaps the best examples of humanity's capacity to forge new environments that better serve our own needs.

Following in this tradition, the definition of urban resilience employed in this paper comes from Meerow, Newell and Stults (2016) and is defined as follows: "urban resilience refers to the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity," (pg. 39). This approach requires that we view cities as densely settled complex adaptive systems whose environmental/built, economic, social, and institutional components interact in ways that cause the system to adjust in response to changes in conditions (Grove, 2009). If we are to address the compounding problems of rapid urban growth and climate change, it is essential to recognize that these components are intrinsically integrated, interactive, and co-evolutionary (see Figure 3). Exploring the connections within and between these components, as well as their relationship to institutions, can inform good governance and help increase resilience.

As illustrated in Figure 3 below, academic scholarship often distinguishes between two components of resilience, which can be applied to the urban context: absorptive capacity and adaptive capacity. Absorptive capacity – or "sensitivity" – is the ability of a system to withstand perturbations or external shocks without losing form or function. The factors influencing the absorptive capacity of social-ecological systems (SES) are generally well-documented. In their comprehensive review of the recent academic literature, Biggs et al. (2012) identify four main properties which influence adaptive capacity: (i) diversity and redundancy; (ii) connectivity; (iii) slow variables; and (iv) feedbacks (see Table 1 for more in-depth explanation). These properties and processes determine the urban system's overall robustness. As such, they constitute the "system to be governed [and are distinct from] the governance system," (Biggs et al., 2012, pg. 424). Indeed, governance and management institutions vitally bolster or undermine the absorptive capacity of the urban system, but they constitute a unique component in the overall system.

Formal and informal institutions crucially determine a system's adaptive capacity, defined as "the capacity of actors, both individuals and groups, to respond to, create, and shape variability and change in the state of the system," (Chapin et al., 2009, pg. 23). In fact, the burden of adaptability falls exclusively on human actors because of their unique capacity to learn, experiment, and plan for the future (Chapin et al., 2009). As Bettencourt explains, "cities, of course, do not really have their own dynamics; they depend on decisions made by people, corporations, governments, and others," (pg. 287). This places renewed importance on the role of institutions – both formal and informal – in managing and cultivating resilience. Scholars generally agree that an adaptive, multi-level governance system requires at least four basic attributes: (i) sufficient balance between flexibility and stability; (ii) a high degree of participation and broad inclusion; (iii) in-depth information and consistent monitoring; and (iv) continuous learning and experimentation (see Table 2). Crucially, there are no panaceas for how institutions should be structured to yield these attributes (E. Ostrom et al., 2007).

Figure 3. Conceptual model of resilience



Source: Author. Adapted from Biggs et al. (2012).

Table 1. Components of urban absorptive capacity

Component	Definition	Environmental / built system	Economic system	Social system
Diversity and redundance	"[Diversity refers to] variety (how many different elements), balance (how many of each element), and disparity (how different the elements are from one another) … [Redundance refers to] replication of particular elements or pathways in a system"	Biodiversity, ecosystem services, green and grey infrastructure	Sector diversification, firms, occupations, cities	Cultural groups, civil society organizations, bonding social capital
Connectivity	"[Connectivity refers to] the extent to which resources, species, or social actors disperse, migrate, or interact across…'landscapes'"	Species interactions, corridor links	Transport systems, information and communication technologies	Bridging social capital
Slow variables	"Slow variables determine the underlying structure [of the system]"	Soil nutrient flux, atmospheric and climate conditions	Sector composition, human capital	Norms, values, traditions, societal trust
Feedbacks	"Feedbacks occur when a change in a particular variable, process, or signal either reinforces (positive feedback) or dampens (negative feedback) subsequent changes of the same type"	Soil nutrients and biodiversity co-stabilize	Transportation improvements support productivity, leading to economic growth and further improvements	Neighborhood associations strengthen social capital and trust, leading to greater participation

Table 2. Components of urban adaptive capacity

Component	Explanation	Example	Relation to governance
Flexibility and stability	Bottom-up, multiscale institutions can transform their structure, function, or implementation methods, while sitting within a stable normative framework of overarching rules	Inadequate municipal capacity to respond to disaster is strengthened by local NGOs and neighborhood associations	Nested institutions and actors are responsive and adaptable, yet subject to overarching rules; prevents over-optimization
Information and monitoring	Institutions effectively collect and aggregate dispersed, highly-specialized information which is used to "guide and coordinate large-scale human activity"	An NGO is contracted to collect information on and monitor flooding and watershed health in affected neighborhoods	Better enables information collection and monitoring by local actors with contextualized knowledge
Participation and inclusion	Diverse groups and actors actively participate in and coordinate through formal and informal institutions to more effectively and equitably meet the needs of heterogenous interests	Diverse groups and actors are consulted, participate in the drafting of, and help implement plans for urban expansion	Fundamentally dependent upon the active participation of diverse groups and actors
Learning and experimentation	Institutional system learns from failures and successes to not only generate better policy, but to transform its very structure or functions to better anticipate future developments	Failure during flood leads to more robust disaster planning and the creation of new response mechanisms	Perpetually learning, creating space for policy experimentation, with layers of institutional insulation

Understanding cities in this way – as complex, adaptive systems which are bound by physical limitations – lends itself to a more wholistic conceptualization of urban resilience. This, in turn, is useful for identifying operational strategies that can help bolster urban resilience. Three main questions emerge:

First, how can the overall exposure of the urban system be decreased? This question stems from the engineering approach, which is explicitly concerned with the infrastructural integrity of the city under threat of external shocks.

Second, how can the absorptive capacity of the city's nested and interactive built, economic, and social components be increased? When attempting to answer this question, the literature suggests that there are at least four additional questions to keep in mind:

- Will increasing diversity or redundancy help improve the system?
- Are the connections between agents in the system insufficient, or arranged in such a way that increases the likelihood of system failure?
- What slow variables are shaping the underlying trajectory of change?
- What feedbacks can be harnessed to direct change?

Third, how can the city's adaptive capacity be increased by improving institutional quality? Just as with absorptive capacity, the literature suggests there are sub-questions that can shape our inquiry:

- Are the overarching rules in the system constraining institutional flexibility or is the system overly volatile, requiring clearer overarching rules?
- Are there information barriers or distortions in the system and are local actors empowered to act upon contextualized knowledge?
- Are diverse groups actively involved in the rule-making process?
- Does the system have processes which enable policy iteration and improvement?

This may seem like a daunting list of questions, but in fact, they provide a useful conceptual framework for considering how to increase resilience in almost any system, not only cities. As such, they will serve as the launching point for the rest of this paper.

3. Charter cities and urban resilience in the Global South

This section considers the ways in which charter cities can support climate-resilient urban development. As discussed in Section 2, there are three essential questions to consider when discussing ways to increase urban resilience: (1) how can exposure be decreased; (2) how can built, economic, and social components be strengthened; and (3) how can institutional quality be improved? Charter cities can address each component. First, charter cities can help decrease the exposure of urban systems to disaster and extreme weather events through strategic location decisions. Second, charter cities can directly increase absorptive capacity, relative to the haphazardly built and overcrowded cities which are typical across the Global South, by introducing stronger built systems rooted in sustainable foundations through good, dense urban planning and climate-conscious infrastructure. Finally, charter cities can help establish good governance, improving the adaptive and transformative capacity of urban systems.

a. Decreasing exposure through strategic locations

Key takeaway: Directing urban growth away from climate-vulnerable zones and pre-emptive urban expansion in in-migration hotspots can help decrease exposure to changing environmental conditions and extreme weather events.

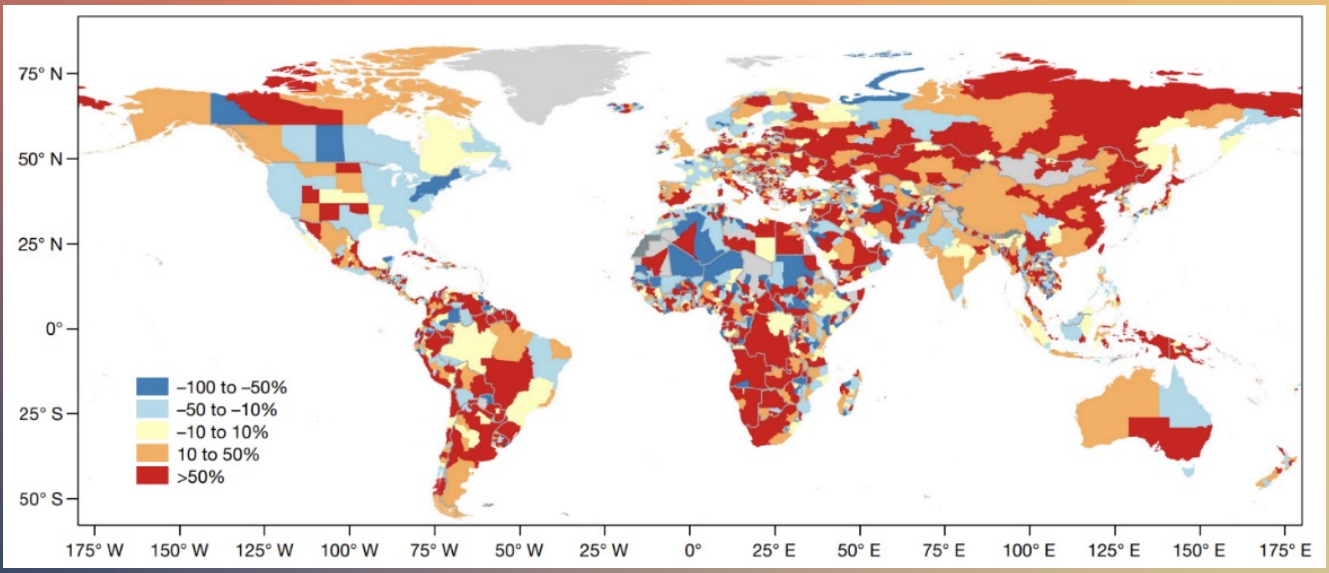
In a survey of global cities, one feature stands out: coastal or riverine location. The primary reason for this is well-understood. Cities have historically proliferated in these areas due to trade route accessibility, which helps foster economic growth and development. However, this geographical advantage comes with inherent risks. Costal and riparian cities face heightened vulnerability to the impacts of climate change, including rising sea levels, storm surges, and flooding. As these environmental challenges escalate, the expansion of cities in hazardous zones poses a growing threat to residents, especially in haphazardly built and poorly provisioned peripheral settlements. Charter cities offer a unique opportunity to direct urban growth and expansion away from these high-risk zones. By strategically locating new urban centers in safer areas, charter cities can help decrease the likelihood of exposure to climate-related hazards, safeguarding communities against environmental changes and extreme weather events.

A growing city-climate conundrum

Cities are rapidly expanding into areas that are highly susceptible to climate-related risks. According to findings from the IPCC, "projected climate risks [for coastal cities] will increase with (i) exposure to climate- and ocean-driven hazards manifest on the coast, (ii) increasing vulnerability driven by inequity, and (iii) increasing exposure driven by urban growth in at-risk locations," (Glavovic et al., 2022, pg. 2177). In fact, a recent study by Rentschler et al. (2023) underscores this trend, finding that urban centers are expanding most rapidly in flood-prone areas (see Figure 4). The authors find that a greater percentage of urban built area (20%) is now located in zones with medium or high flood hazard compared to 1985 (17.9%) (Rentschler et al., 2023, pg. 89). Expansion in high flood-hazard and the highest flood-hazard zones outstrips the average pace of global urban expansion, at 105.8% and 121.6% respectively, compared to 85.4% (Rentschler et al., 2023, pg. 89). Alarmingly, the authors also find that "flood-exposed growth has been especially rapid in middle-income countries… and low-income countries may risk following this trajectory in the future," (Rentschler et al., 2023, pg. 91).

Additionally, as climate change continues to "reshape the comparative advantage of regions," migration to cities is also expected to increase due to the declining viability of many rural livelihoods, particularly agriculture (Adger et al., 2020, pg. 396; Rigaud et al., 2018; see Box 2). Rigaud et al. (2018) explain: "Households may send one or more members to cities or other rural areas in search of an alternative livelihood, or they may abandon farming or other rural livelihoods altogether, as has happened in rapidly urbanizing countries such as China," (pg. 26). This presents a significant conundrum: cities are particularly vulnerable to the impacts of climate change, yet they are expected to act as a crucial lifeline for millions engaging in occupational and spatial adaptation due to climate change. It is crucial to empower cities to serve as "supportive environments…of low risk and high opportunity" for migrants (Clement et al., 2021, pg. xxx).

Figure 4. Flood-safe growth versus flood-exposed growth



Source: Rentscler et al. (2023).

Charter cities and climate-safe urbanization

The IPCC lays out a comprehensive approach to reducing the risks faced by coastal cities and settlements. They offer six strategies: "(i) vulnerability reducing measures, (ii) avoidance (i.e., disincentivizing developments in high-risk areas), (iii) hard and soft protection, (iv) accommodation, (v) advance (i.e., building up and out to sea) and (vi) retreat (i.e., landward movement of people and development," (Glavovic et al, 2022, pg. 2165). In other words, cities can either build protective/absorptive infrastructure or establish settlements in less climate-vulnerable areas. Many cities have started to engage in retrofitting, construction of protective infrastructure, and development of disaster preparedness plans. However, establishing new cities in less climate-exposed locations is a comparatively under-explored adaptation strategy. Nonetheless, relocation of human settlements – or "retreat" as it called by the IPCC – holds immense potential as an adaptation strategy.

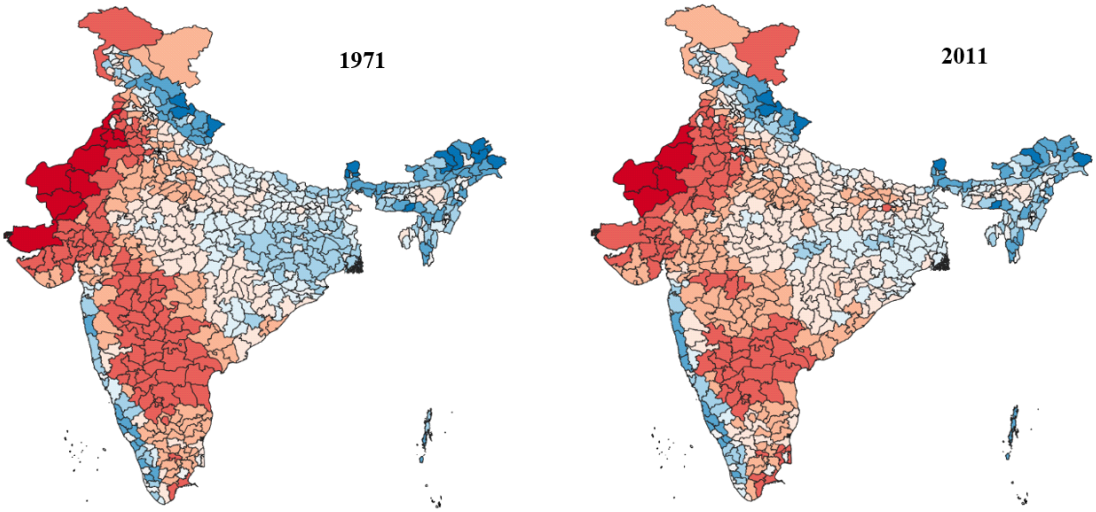
The creation of new cities can not only direct households towards areas less prone to flooding, but, crucially, it also expands the location options available to households who currently face the difficult choice of risking safety for economic opportunity. Providing urban alternatives can be particularly impactful in countries with unbalanced urban growth and mobility constraints, which can occur when one mega-city dominates all others due to underinvestment in secondary and tertiary cities. The growth of smaller cities also helps increase urban redundancy, whereby if one city experiences a decline – either due to climate disaster or other outside forces – the other cities are in a strong position to absorb residents seeking to relocate. However, under-provision of cities is particularly frequent in Sub-Saharan Africa (Rama and Li, 2023). Although some countries, such as Kenya and Malawi, have started to recognize their importance, these burgeoning cities remain largely ignored. Consequently, concerted efforts to further secondary and tertiary city development – especially by implementing large scale urban planning and infrastructure initiatives – have immense potential to support resilient urban development.

Box 2. Patterns of urbanization in India from 1971-2011

Choosing the location for a charter city is an immensely difficult task, made even more challenging by inclusion of climate considerations. Nonetheless, in choosing the site for a new city, developers must consider how climate change will impact patterns of migration, urbanization, and city growth.

It is crucial to recognize that not all regions have been, or are projected to be, equally impacted by climate change. While some areas may experience increasingly adverse climatic conditions, others may benefit from milder conditions. As such, urbanization patterns may be impacted by climate change in two important ways: regions experiencing increasingly adverse climatic and meteorological conditions may see a higher proportion of the population concentrated in urban areas as rural residents are "pushed" to find off-farm employment; and regions experiencing climatic changes more amenable to agricultural productivity may see urban population gains in nearby cities as the entire region grows and thrives.

Moisture map of India, 1971–2011



Source: Author's calculations using data from Willmott and Feddema's Moisture Index and the 2011 Census of India. This map shows the average Moisture Index score for each district. Districts that are dark red have lower moisture scores, representing drier conditions. Districts that are dark blue have higher moisture scores, representing wetter conditions. The 1971 map is displayed on the left and the 2011 map on the right. Districts in gray have no gridded observations in Willmott and Feddema's data archive.

Box 2 (Continued). Patterns of urbanization in India from 1971-2011

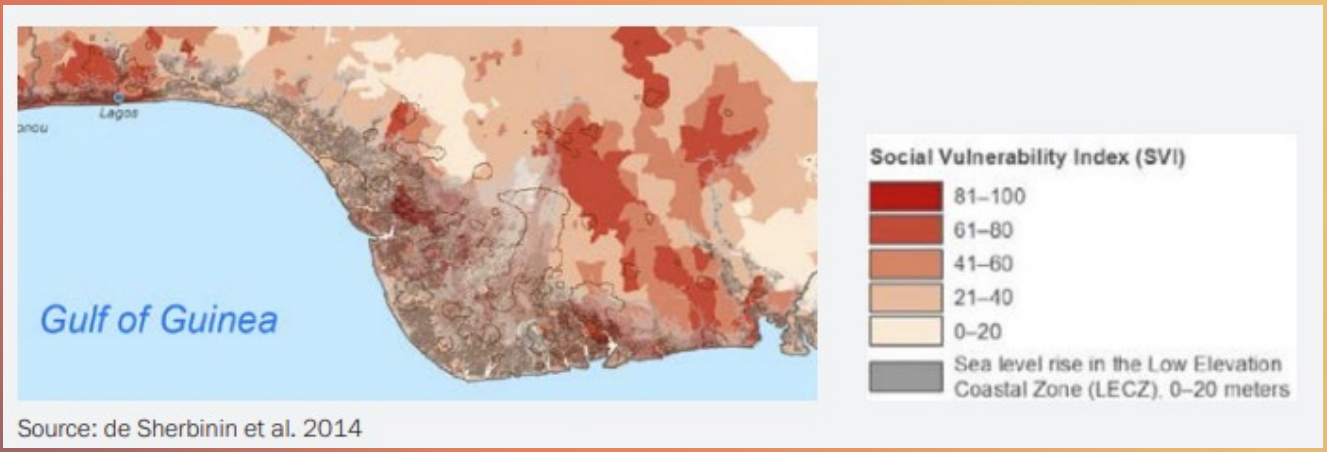
Take, for example, the experience of India over the 40-year period from 1971–2011. Districts which experienced declines in climatic moisture, or 'drying,' experienced more rapid urbanization compared to those that experienced gains in climatic moisture. However, the urban population did not grow significantly faster in drying districts; rather, the rural population simply grew at a slower rate. Furthermore, individual cities located in districts that experienced increased moisture saw more rapid population growth compared to those in drying districts. This suggests that households may be more likely to migrate to climatically favorable regions over local rural-urban migration. In this way, regions experiencing gains due to climate change, and particularly cities located within those regions, may be more likely to face significant population pressures, increasing the vital need for concerted efforts to successfully manage migration in-flows.

Source: Klaus (2023c).

In tandem with these efforts, establishing satellite charter cities – cities located near but separate from large metropolitan areas – can also help alleviate urbanization pressures on rapidly growing cities, especially in climate-induced in-migration hotspots. As discussed in Box 2, cities in regions experiencing climatic moisture gains due to climate change may be more likely to face substantial population pressures due to natural growth and in-migration (Klaus, 2023c). Satellite charter cities can help alleviate these pressures by distributing population growth and reducing infrastructure strain. Taking climatic conditions into account, it may be possible to pre-emptively establish satellite charter cities near large urban centers located in less-vulnerable regions to help decrease exposure to extreme events. This approach can facilitate "well managed 'in-migration' [and] create positive momentum…in urban areas which can benefit from agglomeration and economies of scale," (Rigaud, 2018, pg. xxii). Ultimately, the strategic establishment of new cities presents opportunities to avert large-scale reactive relocation in the future, which would likely cause significant social and economic strife. By proactively building cities in areas which enjoy fewer climate risks, yet still are well-integrated into global supply chains, it may be possible to foster the early growth of tomorrow's climate-safe cities.

Nigeria offers one example of a country that has attempted to attract citizens to a new, less climate-vulnerable city. With Lagos – Nigeria's dominant mega-city of over 15 million people – grappling with the strains of rapid population growth, the government commissioned the planning and construction of a new capital city, Abuja. Since the government relocation in 1991, the city has grown quickly, swiftly ascending to Nigeria's fourth most populous city with a total of nearly 4 million residents. Although the impetus for the project was not explicitly climate-focused, the new city – with its central location, comparatively mild climate, and lower flood susceptibility – offers households an attractive alternative to flood-prone Lagos (see Figure 5). In fact, Rigaud et al. (2021) find that Lagos is "expected to experience a notable decline in net climate migration," while the "north-central zone receives more migrants than other zones…[due] to the emergence of Abuja as a federal capital city," (pg. xxii & pg. 12).

Figure 5. Vulnerability along Nigeria's coastline



Source: Rigaud et al., 2021.

However, the new city of Abuja has not been without its share of challenges. The city's design and construction have cost billions of dollars, yet still the implementation of the original master-plan is incomplete, leading to urban sprawl and minor flood vulnerability. Government relocation nearly did not happen due to political opposition. The cost of living also remains comparatively high and out of reach for many Nigerians. Nonetheless, the city and its sub-nodes are still some of the fastest-growing urban areas on the planet, which is evidence of demand for productive cities in less climate-vulnerable regions. Strategically placed new cities such as Abuja have immense potential to balance urban growth and generate economic opportunities in areas with lower exposure to climate risks. This not only helps households engage in safer occupational and spatial adaptation, but it also protects the growth of productive urban centers in the long run.

Overall, there is a compelling case to made that there is a marked under-provision of cities in climate-safe locations, particularly across the Global South. This not only constrains the migration options available to households being impacted by climate change, but it also directs them toward vulnerable locations. By proactively establishing charter cities in safe locations, urban exposure to climate hazards may be reduced, while creating more economic opportunities for households. Although "increased attention is being given to pre-emptive resettlement and the potential pathways and necessary governance, finance and institutional arrangements to support this strategy," even more attention is merited (Glavovic et al., 2022, pg. 2175).[4] It is imperative that policymakers, urban planners, and communities collaborate to realize the full potential of new city construction. Doing so can serve as a pivotal tool for climate adaptation and sustainable development amid an uncertain future.

b. Increasing absorptive capacity through sustainable urban foundations

Key takeaway: Good urban planning and climate-conscious infrastructure in new cities can improve the built absorptive capacity of the city, while also generating positive feedback loops in coevolutionary economic and social components within the urban system.

[4] Devolved governing authority and charter cities may provide such a viable institutional arrangement (see Section 3.C).

Climate change will inevitably impact every city on Earth. From bustling coastal hubs to teeming inland metropolises, urban areas of every shape and size must be prepared to withstand extreme weather events and adjust to climatic changes. Although strategic relocation and expansion can help minimize exposure, it is also crucial to increase cities' tolerance to external shocks by building absorptive capacity. Urban resilience is critically affected by the quality of their built environment. While robust infrastructure is crucial for weathering climate hazards, the very layout of the city fundamentally affects its capacity to absorb and process shocks. However, many cities today – especially in the Global South – suffer from infrastructure deficits and unsustainable urban sprawl. Charter cities offer new opportunities to implement good urban planning principles and integrate climate-conscious infrastructure into the foundation of the city. Not only can these interventions increase the built/environmental absorptive capacity of the city, but they can also generate positive feedback loops in the economic and social components which jointly underpin the urban system. By thinking more holistically about how the built environment influences and interacts with environmental, economic, and social processes, charter cities can foster urban resilience from the initial stages of city development.

Urban form and resilience

Urban resilience is closely linked to urban form. A good, dense urban plan can help make a city more economically productive, decrease per capita emissions, facilitate social interactions, increase access to education and amenities, and support an infrastructurally sound built environment for residents. However, many cities, particularly in the Global South, are rapidly expanding outwards rather than inwards or upwards, a phenomenon known as 'pancake' growth (Lall et al., 2021). This low and wide urban sprawl is largely due to the fact that cities across the Global South are experiencing significant population gains, without accompanying productivity and income gains. This undermines demand for expensive floor space in the city center and inhibits "vertical layering" (Lall et al., 2021). In cities where urban sprawl is "not managed well, cities will become unlivable," (Lall et al., 2021, pg. xi).

This is particularly true for low-income households living in informal settlements in the urban periphery. As of 2018, over one billion people worldwide were living in slums. By 2050, this number is expected to increase to three billion, with climate migration undoubtedly contributing to this growth (Barbiere, 2017; Cities Alliance, 2009). Although they provide a critical economic lifeline for many residents, unplanned slums – which are often characterized by poor service provision, weak infrastructure, sparse economic resources, and high risk of exposure to extreme weather events – have high levels of climate vulnerability. Furthermore, informal urban sprawl not only increases environmental degradation, but it also heightens mobility constraints for workers (Bertaud, 2018). This further undermines household resilience by limiting access to economic opportunities in other areas of the city, especially the city center. In this way, the very morphology of the city has a direct impact on micro-level economic resilience. Efforts to improve the built absorptive capacity of urban systems must consider these diverse infrastructural and spatial experiences within the city.

Nonetheless, large-scale infrastructure retrofits are costly, cumbersome, and require a high degree of coordination. The billions of dollars that have already been poured into retrofitting and slum upgrading projects do not even begin to chip away at the $4.1-4.5 trillion of infrastructure investment needed annually, nor the $120 billion of additional adaptation costs (Lall et al., 2021, pg. 15).[5] Often, "cities become 'locked-in' to particular patterns of energy and resource use – constrained by existing infrastructural investments, sunk costs, institutional rigidities and vested interests," (Eames and Dixon, 2013, pg. 2). In fact, "urban infrastructure is [so] difficult to modify…[it] often remains in situ for more than 150 years," (McCartney, 2024, pg. 8; Lall et al., 2021). This makes the importance of good urban planning and climate-conscious infrastructure more imperative: failure to build sustainably now could have resounding effects over the long run.

Sustainable foundations in charter cities

While it is extremely important to equip existing cities with the infrastructure necessary to better withstand the effects of climate change, new charter city construction presents an opportunity to build better cities from the ground up. Urban planning has a clear role to play in directing urban expansion, both at the periphery and beyond. For example, pre-emptive urban expansion through new satellite charter cities can help lay sustainable, resilient infrastructural foundations for growing cities. Policies to promote orderly, efficient urban expansion – such as pre-laying arterial roads and public facilities – can help minimize urban sprawl and lay a strong base for future growth (Lamson-Hall, 2021). Getting the urban plan and basic infrastructure right at the early stages of city development can yield "disproportionate [benefits] over the life of the investment," (Lall et al., 2021, pg. 13). Lall et al. explain:

> "To support the market forces that drive urban economic agglomeration, productive job creation, and income growth, governments can give priority to policies and investments that coordinate infrastructure investment with land management under forward-looking plans. In addition, governments can provide public goods and amenities that directly enhance livability," (pg. 14).

This is precisely what new cities have the potential to do: provide large-scale, packaged infrastructure investments that ultimately improve the quality of life for urban residents.

Crucial to this effort is the emphasis on enhancing livability, which includes sustainability and resilience. Green infrastructure, urban ecosystem services (UES), and nature-based solutions (NBS) can be particularly effective towards this end.[6] Parks, green corridors, renatured rivers, urban forests, bioswales and retention areas, green roofs and living walls, urban farming and gardening, and inland wetlands provide a multitude of practical benefits for the cities they serve: excess water absorption during periods of intense rainfall, 'heat island' mitigation,

5 Retrofitting, in this context, can be defined as the "directed alteration of the fabric, form, or systems which comprise the built environment in order to improve energy, water, and waste efficiencies," (Eames & Dixon, 2013, pg. 1). However, it is important to add 'disaster tolerance' to this list of efficiencies. Additionally, the focus of this paper is primarily adaption, not mitigation. There is an important conversation to be had on the emissions caused by urban construction (especially concrete) and energy leakage. These topics, while vitally important, are left to other studies.

6 Nature-based solutions (NBS) are a type of green infrastructure that harnesses natural or modified ecosystems to provide an array of services and benefits to society.

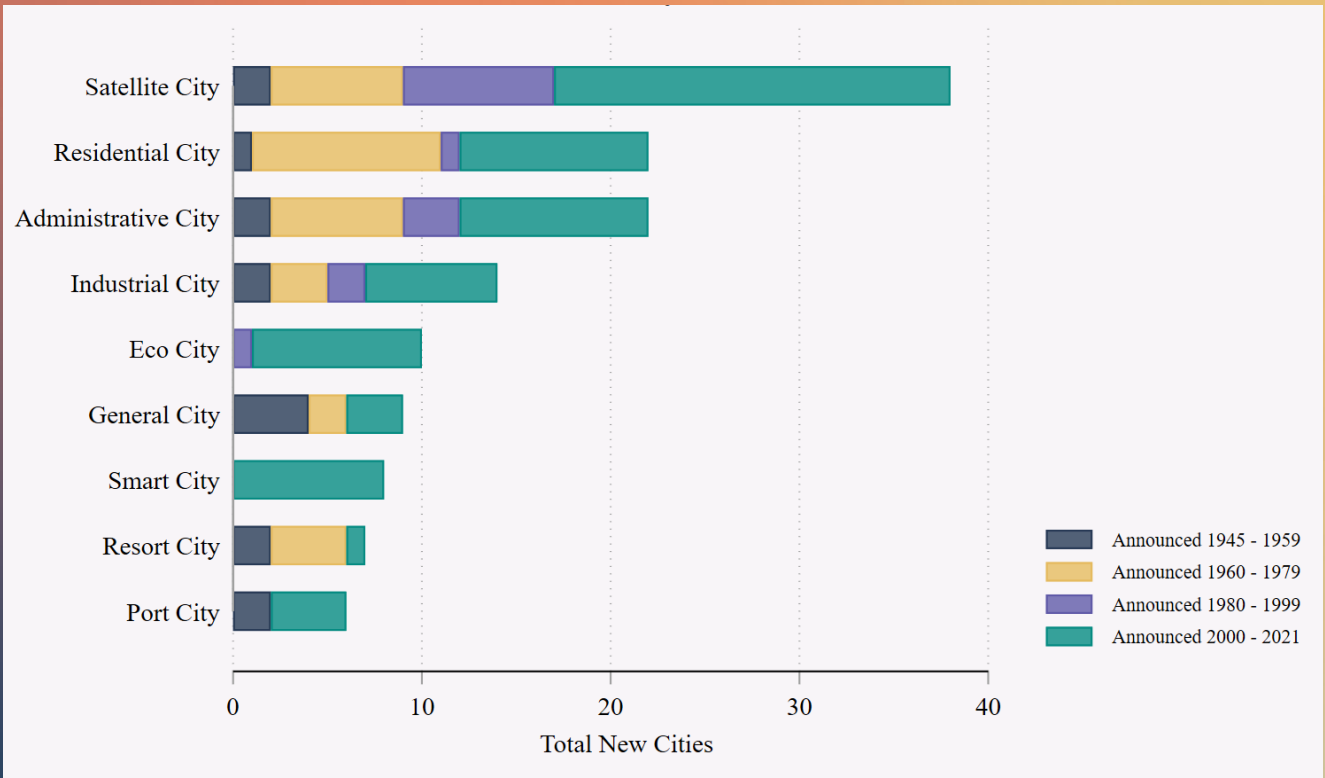
air pollution reduction, biodiversity preservation, and environmental protection (Gomez-Baggethun et al., 2013; Aram et al., 2019; McPherson, 2011). For example, in the city of Freetown, Sierra Leone, the rapid expansion of slums into surrounding forested mountainsides heightened vulnerability to landslides. During heavy rainfall in 2017, a crumbling mountainside collapsed, killing and wounding thousands of residents in the settlement below. In the aftermath of the incident, the government of Freetown turned to large-scale tree planting to help secure the degraded mountainsides and prevent future landslides. In this way, green infrastructure can complement traditional gray infrastructure to increase redundancies in the built environment which enable the city to absorb climate-related shocks more effectively.

Moreover, green infrastructure and NBS can also provide a myriad of intangible, cultural-social services. As Gomez-Baggethun et al. (2013) explain, "green spaces in urban areas provide multiple opportunities for physical exercise, improved mental health, and cognitive development…urban ecosystems also play an important role in sense of place," (pg. 238). These spaces can double as both formal and informal community meeting grounds, providing space for the organized and spontaneous interactions that help strengthen social capital. Consequently, the built environment can have a direct impact on social connectivity, the diversity of interaction, and the formulation of social norms in neighborhoods, ultimately reinforcing the cultivation of social resilience.

Some new cities are already experimenting with climate- and environment-conscious design. Pioneered in the master-planned city of Curitiba, Brazil in the 1960s, so-called "eco cities" aim to create a sustainable and livable environment for residents while reducing their impact on the planet. The number of cities explicitly framed as eco cities has increased substantially since 2000, marking the emergence of a new trend in city design and construction. However, whether this trend constitutes a substantial shift in the planning of new cities ultimately remains to be seen in many cases. Sometimes, developers simply label their projects as 'environmentally conscious' to attract investment, without significant substantive action. In fact, "there is little evidence that sustainability concerns have impacted significantly the rapid urbanization seen in [contexts such as China and the Gulf States]," where "eco-city developments" have become popular (Eames & Dixon, 2013, pg. 2). Additionally, the "creation of new eco-friendly cities must be an equitable, inclusive project, otherwise the very goals of the project will likely be undermined by severance of social and cultural ties."[7]

[7] Unable to find citation for this quote. In my notes, it is attributed to the IPCC. This only serves as more evidence for the importance of keeping citations straight as one writes.

Figure 7. New city developments by explicit focus



Source: Author's calculations using data from the New Cities Database (2023).

One example of a particularly successful new, master-planned eco city is Rajarhat New Town, India, a satellite city located outside Kolkata and explicitly designed with the "objective of developing an eco-friendly green dotted city," (HIDCO, 2020) (see Box 2). Fumba Town, in Zanzibar, Tanzania also offers a promising model for how to integrate permaculture into the very built foundation of urban life. Green corridors, ponds, open green spaces, and urban gardens help decrease heat exposure throughout town, while providing shaded spaces for community gatherings and markets. Furthermore, not only does the town boast a wide variety of native plants, but it is also a pioneer in sustainable building, with plans to build the world's largest cross-laminated timber tower over the next seven years.

Ultimately, the future of urban development hinges on our ability to integrate sustainability, resilience, and inclusivity into the fabric of our cities. From retrofitting existing infrastructure to designing new eco-friendly urban centers, the choices we make today will reverberate for decades. Charter cities can play a crucial role in bolstering resilient urban development by prioritizing good urban planning and investing in climate-conscious infrastructure. By considering how urban form impacts environmental vulnerability, economic productivity, and social connectedness, we can create cities that not only withstand the tests of time and climate but also nurture vibrant communities and ecosystems. The path to resilient cities lies in holistic, forward-thinking approaches that prioritize the well-being of both present and future generations.

Box 3. Rajarhat New Town, Kolkata – India's premier 'eco city'

Rajarhat New Town is a master-planned eco-smart city located in the northeastern state of West Bengal, India, just outside of Kolkata. Its primary objective is to alleviate growing population and housing pressures on Kolkata, the urban nucleus of West Bengal.

From the outset, Rajarhat New Town was designed to be "a self-sustaining [eco-friendly] city with revenue gathering assets," (HIDCO). The 3,075-hectare master plan for the city includes a central business district and several IT parks to help foster the growth of information technology (IT) services, commercial businesses, industries, and trade. The plan also features educational institutions, cultural centers, and open green spaces to help promote community ties and support sustainability efforts. Located on 480-hectares within New Town, Eco Park serves as an "ecological garden" and green haven; it has quickly become a popular tourist destination (HIDCO). The city is also situated above protected marshlands, which help absorb excess water during periods of intense precipitation.

Since construction began in 2007 under the New Town Kolkata Development Authority (NKDA), Rajarhat New Town has grown rapidly. The city has attracted several high-profile firms to a 200-acre area of land which is slated to become the Bengal Silicon Valley Tech Hub. With the project expected to attract over $12 billion in investment and generate 50,000 new jobs, Rajarhat New Town is positioning itself as a leader in the tech ecosystem.

However, the city faced many obstacles in the initial phases of development. The land assembly process – often the most contentious stage in new city development – proved to be particularly lengthy and complex. West Bengal's state government took the lead in acquisition, using "land monetization as a means of accumulation" and "land transfers [to developers] as a means to incentivize the creation of new urban spaces." Former government authorities claim that the process was largely peaceful, smoothed by concerted efforts to include, compensate, and re-settle residents impacted by the acquisitions (Chen et al., 2009; Mitra, 2002).

Box 3 (Continued). Rajarhat New Town, Kolkata – India's premier 'eco city'

However, some farmers claim that they were forced from their land during a state-sponsored land grab and poorly compensated (Hindustan Times, 2010). In fact, evidence suggests that the state acquired land from farmers for approximately $107-129 per acre, then sold it to developers for about $12,903 per acre, who in turn, made profits around $320,000-$430,000 (Sengupta, 2012). Ultimately, "the farmers received 1% of the profit of the government or 0.0001% of the developers' profit," (Sengupta, 2012, pg. 368). Discontent came to a head in 2006, when the state government attempted to acquire an additional 997 hectares of land in the district of Singur for the Dankuni Township Project. Villagers rallied to protest the acquisition and the plan was eventually scrapped.

In this way, heavy-handed state intervention in land acquisition, poor compensation and unjust treatment of landowners undermined the early growth of Rajarhat New Town. While it is undeniable that the city has subsequently experienced remarkable success, it is also essential to recognize the issues faced in the early stages of its construction to inform land acquisition processes and equity considerations for future new city developments.

c. Improving adaptive and transformative capacity through good governance

Key takeaway: Charter cities can instigate administrative, regulatory, and institutional reforms that not only enable economic development, but also help improve processes of long-term planning and adaptive decision-making.

A capable, flexible, and well-informed governance system is perhaps the most crucial component of resilience. Because institutions implement the policies and practices that either bolster or undermine the absorptive capacity of the environmental/built, economic, and social systems that compose urban life, they are the loci of adaptative capacity. It is also an underappreciated fact that a good business environment is crucial to creating a resilient urban system. A productive urban economy allows for inward and upward expansion, rather than outward sprawl. It also enables effective mobilization of infrastructure investment, better public services, higher levels of innovation, and greater cooperation. In this way, "economic and physical evolution go hand in hand…[so] cities need integrated legal and regulatory frameworks that will enable both economic and spatial development," (Lall et al., 2021, pg. 14). Charter cities can help usher in the administrative and regulatory environments necessary for resilient development, particularly regarding economic governance. By allowing for innovative institutional

arrangements, charter cities can also help experiment with building urban governance systems that are more capable of balancing high-level vision with changing local conditions.

The scourge of weak governance

Governing a city is no easy task. The density, diversity, and dynamism of the city places unique pressures on institutions. These pressures tend to be even greater in cities across the Global South, which are simultaneously facing growing climate stressors and rapid expansion. The eminence of these challenges requires governments equipped with the capacity to monitor and anticipate climatic changes, migration, population growth, and urban expansion. The ability to coordinate and implement policy responses in the wake of disasters or other external shocks is also vital. Climate change will only exacerbate these issues and increase demand for highly efficient, adaptive governance.

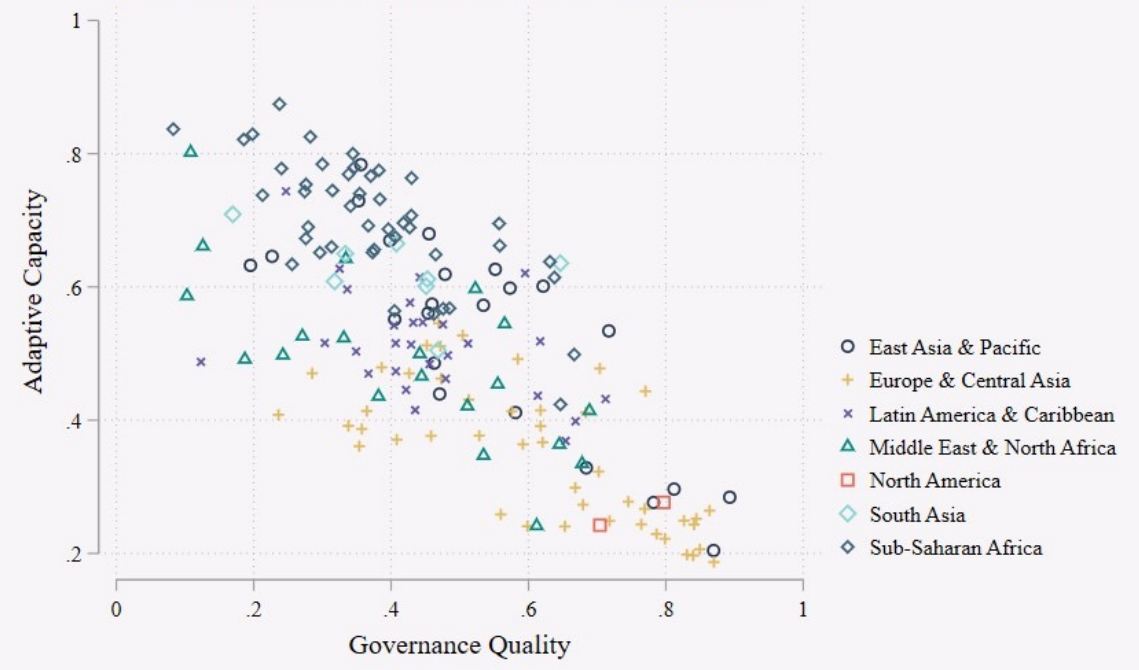
Generally, cities in the Global South face higher levels of exposure to climate change and have lower levels of adaptive capacity, largely due to persistently weak governance. Issues such as "land use management conflict and other pressures including informal land uses, unregulated and/or inadequate infrastructure/building development, public health priorities, inadequate income diversification, low education levels, and political marginalization" play a particularly significant role in undermining resilient development (IPCC, 2022, pg. 2178). In fact, there is a clear negative correlation between adaptive capacity and both quality of overall governance and economic governance (see Figures 8 and 9; see Box 4 for more information on how these indicators are measured).[8] Figures 8 and 9 also show that countries in Sub-Saharan Africa and South Asia, in particular, tend to have lower governance and economic governance scores than countries located in Europe, Central Asia, and North America.

Governments across the Global South often lack the financing, stability, and established administrative procedures necessary to maintain a high standard of governance and an attractive business environment. Given the gravity of the challenges coming to bear on cities in the Global South, there is clear need to replace "traditional institutional and social structures with modern ones centered in a formal legal apparatus, and massive local and intercity infrastructure investments…all in a short span of time," (Henderson, 2010, pg. 516). However, the persistence of weak governance in many developing countries endures despite (or, in some cases due to) countless efforts at institutional reform.

Pritchett et al. (2010) argue that such countries are caught "state capability traps" wherein the capacity of the state to implement policies is severely constrained and improving very slowly (pg. i). The authors find that "at their current pace of progress, countries like…Liberia would take hundreds (if not thousands) of years to reach the capability of a country like Singapore and decades to reach even a moderate capability country like India," (Pritchett et al., 2010, pg. i). This stagnation is attributed to the tendency for new governing institutions to undermine emergent forms of organization and disincentivize innovation. The result is a prioritization of form over functional effectiveness. Moreover, entrenched elites often benefit from maintaining the status quo, perpetuating ineffective systems that serve their interests at the expense of broader society.

[8] ND-GAIN uses the World Bank's Doing Business indicators, which were discontinued in 2020 due to data tampering. Investigations reported that these irregularities were limited to Azerbaijan, Saudi Arabia, China, and the United Arab Emirates – evidence of doing shady business. These issues also affect ND-GAIN's economic governance measure.

Figure 8. Governance quality and adaptive capacity



Source: Author's calculations using data from the ND-GAIN (2023).

Figure 9. Economic governance quality and adaptive capacity

Source: Author's calculations using data from ND-GAIN (2023).

Box 4. Components of the ND-GAIN Country Index

The Notre Dame Global Adaptation Initiative (ND-GAIN) includes three measures composed of various indicators in their calculations for national-level climate adaptation "readiness":

- Governance readiness: "the stability of the society and institutional arrangements that contribute to investment risks," noting that "high governance capacity reassures investors that the invested capital could grow under…responsive public services."
    - Includes (i) political stability and nonviolence; (ii) control of corruption; (iii) regulatory quality; and (iv) rule of law. All indicators are taken from the World Governance Indicators.
- Economic readiness: "the investment climate that facilitates mobilizing capital from [the] private sector."
    - Indicators taken from the World Bank's Doing Business Index
- Social readiness: "social conditions that help society to make efficient and equitable use of investment and yield more benefit from the investment."
    - Includes (i) inequality, measured as the poorest quintile's share in national income; (ii) information communication technology infrastructure; (iii) tertiary education; and (iv) patent applications per capita.

ND-GAIN also constructs a multi-faceted indictor for "adaptive capacity" which includes 12 individual measures: agriculture capacity (fertilizer, irrigation, pesticide, tractor use); child malnutrition; access to reliable drinking water; dam capacity; medical staffs (physicians, nurses, and midwives); access to improved sanitation facilities; protected biomes; engagement in international environment conventions; quality of trade and transport-related infrastructure; paved roads; electricity access; and disaster preparedness.
Source: Chen et al. (2023).

"New cities with new rules"

By establishing pockets of effectiveness where good governance is substantively implemented, charter cities can provide the necessary artifactual structure for sustainable urban development. Empowering cities with significant decision-making authority enables the "rapid creation of a capable government, which can provide the rule of law and public goods necessary to support markets and inclusive economic growth," (Lockart et al., 2021, pg. viii). Devolving power to the city level also reduces information barriers between policymakers and on-the-ground realities. This is particularly important for effective disaster preparedness, during extreme weather episodes, or in the aftermath of disaster. When compared to the nation-state, cities – especially new cities – offer a relatively "small entry point for effective development," (Pritchett et al., 2010, pg. 6). As such, charter cities can help "avoid the public choice problems that often stymie reforms in existing jurisdictions without radically changing the rents enjoyed by elites…[allowing] for deeper institutional change than would otherwise be politically feasible," (Mason & Lutter, 2020, pg. 4). As charter cities iterate on their regulatory frameworks and processes, successful policies can be scaled to the regional or national level, instigating widespread reform based on proven strategies tailored to the local context.

For instance, granting charter city authorities control over land administration holds promise for significant improvements in land governance. By empowering them to maintain cadaster records, streamline land use planning, and establish 'one-stop-shops' for land titling and registration, charter cities can help address long-standing issues of inefficiency, complexity, corruption in land governance. Because land administration and titling initiatives are often notoriously complex, culturally sensitive, and socially fraught endeavors, countless development initiatives focused on land administration have been unsuccessful. However, city-level reform can not only enable the construction of more productive, resilient cities, but it can also help jumpstart gradual processes of widespread land reform by starting small and scaling conscientiously.[9] Setting contextually grounded land administration practices from the very beginning of city development can generate positive environmental, economic, and social effects (see Box 5).

Crucially, another key strength of charter cities lies in their flexibility to adopt institutional forms and policies that enhance performance and resonate with local political legitimacy and cultural norms. Rather than adhering to standardized institutional models, charter cities provide fertile ground for institutional experimentation. For example, charter city developers may choose to pursue a private-public partnership (PPP) model, whereby the developer works with the sovereign government to set up a special jurisdiction and maintains some influence in governance decisions. Under such an arrangement, city managers are incentivized to provide good governance because they gain from rising land values. Not only does this encourage city developers to plan for long-run growth – including consideration of climate risk – but it also creates space for innovative governance. For example, one of the most comprehensive PPP arrangements for city governance was pioneered in Gu'an, China by the China Fortune Land Development Co. (CFLD). Under contract with the local government, CFLD took on responsibility for city planning, infrastructure development, service provision, administration, and industry solicitation. The local government simply had to approve and supervise on a contractual basis. This model has proven remarkably successful, with Gu'an becoming the wealthiest county in Hebei Province.

[9] Of course, land acquisition, registration, and titling for a charter city can also be undermined by a failure to appreciate the social and cultural dimensions of land. The experience of Rajarhat New Town (discussed in Box 3) provides clear evidence of this fact. The small scale does not remedy the injustice of the inequitable state-led land acquisition process that many famers were forced to endure, which also undermined the city's expansion. Ultimately, land issues have far-reaching implications, which are difficult to disentangle regardless of the scale. Charter cities offer one way to gradually implement land-related reforms.

Some iterations of the charter city PPP model can be particularly effective for creating flourishing adaptive polycentric systems.[10] Under a common city-level set of regulatory and administrative norms, multiple private sector firms may be contracted out to provide specialized goods and services, such as road construction, clean water supply, or electricity provision. In such a system, "the producer can held accountable for maintaining affairs within certain tolerances, and the agency [or developer] responsible for providing the service can ascertain the adequacy of performance," (Ostrom et al., 1961, pg. 834). Firms will be incentivized to obtain deep knowledge of the local context and changing conditions to maintain adequate service provision, harnessing the innate ability of the market to aggregate information about how to supply public goods and services. This allows for responsive, adaptive decision-making on the part of firms responsible for providing public services. The governing entity may also devolve certain contracting powers, so that different neighborhoods or precincts have the capacity to choose their public service producers. This approach to urban development can give rise to quasi-market conditions where there is competition between various charter city jurisdictions – or even neighborhoods within a single charter city – to attract residents through high quality of governance and service provision.

However, charter city authorities must be keenly aware of the limitations of various PPP arrangements. For one, failure to democratically include residents in governance decisions can lead to poor outcomes and lack of accountability. There is also a risk of creating expensive, profit-driven enclaves that perpetuate social exclusion, undermining inclusivity and sustainability. Without robust mechanisms for inclusive decision-making and equitable resource distribution, charter cities could inadvertently deepen socio-economic disparities. In charting the course for resilient and prosperous urban futures, charter cities must strike a delicate balance between innovation and accountability, between private sector efficiency and public sector responsibility, and between economic growth and social equity.

Ultimately, the administrative, regulatory, and institutional reforms pioneered in charter cities can have direct implications for resilience. For one, charter cities can create a clear system of overarching rules that support a strong business environment, establish clear administrative procedures, incentivize adaptive policymaking, and enable institutional flexibility. Crucially, this system of overarching rules can be substantively different from the host nation, allowing for the emergence of urban pockets of effectiveness that also generate significant economic returns for the national entity. Moreover, charter cities can create space for continued iteration and improvement of policy interventions, service provision, and institutional arrangements. Such experimentation can also benefit the host country, providing incubation grounds for initiatives that may be scaled to the national level. Overall, charter cities can not only help overcome institutional constraints to economic growth, but they can also push the boundaries on how governing bodies are arranged and operate. These new approaches are critical for understanding how institutions can more effectively adapt to changing external circumstances, especially climate change.

[10] Ostrom et al. (1961) offer a comprehensive definition for polycentric: "Polycentric connotes many centers of decision-making which are formally independent of each other. Whether they actually function independently, or instead constitute an interdependent system of relations, is an empirical question in particular cases. To the extent that they take each other into account in competitive relationships, enter in various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts, the various political jurisdictions in a metropolitan area may function in a coherent manner with consistent and predictable patterns of interacting behavior. To the extent that this is so, they may be said to function as a 'system'," (pg. 831).

Box 5. Charter cities and land governance

The establishment of strong land administration systems is upstream to almost all efforts to support the climate resilience of households, cities, and nations. More specifically, effective land administration supports climate resilience in at least three particularly important ways: by improving household adaptive capacity through tenure security, by informing disaster preparedness and sustainable urban planning, and by creating an enabling business environment to attract private investment in climate-smart infrastructure projects and eco-tourism. Creating efficient land administration systems has important implications for resilience and should be at the forefront of the policy agenda for climate adaptation.

Eliminating tenure insecurity improves household resilience in many ways: by enabling households to increase savings and build wealth; by allowing individuals to use land as collateral to obtain credit (World Bank, 2023); by ensuring that households can evacuate their land and maintain ownership (Kukkonen & Pott, 2019); and by encouraging personal investment in sound property management. At the individual level, poor land administration – such as complex property registration processes and inaccessible land dispute resolution mechanisms – negatively impacts adaptability by exacerbating tenure insecurity. In fact, there is a significant, negative correlation between countries' quality of land administration and the prevalence of tenure insecurity among the population (Prindex, 2020). In this way, improving land administration systems may help reduce tenure insecurity and enable households to prepare for and insulate themselves against climate disasters more effectively.

Another important component of land administration is keeping complete and accurate cadaster records. This has important ramifications for climate resilience because it allows for disaster preparedness and climate-conscious urban planning. Kukkonen and Pott (2019) explain that, "up-to-date and spatially accurate cadaster records allow targeting evacuation and other response activities, while they also enable the establishment of insurance schemes for compensating people's losses." Similarly, precise cadaster records and robust land administration systems are essential for sustainable urban planning. The OECD (2018) explains that, "spatial planning frameworks [may help] redirect development away from high-risk areas." Hong Kong's plans to build an advanced drainage system and a dual-use retention lake also offers an example of how climate-resilient urban planning may be informed by accurate cadaster records.

Box 5 (Continued). Charter cities and land governance

Finally, organized land administration is essential for attracting investment in climate-smart infrastructure projects and eco-tourism initiatives. The OECD (2018) explains that mobilizing private investment is essential to fulfill climate-resilient infrastructure financing gaps, yet, "several barriers may constrain the bankability [of such projects] … [including] high real and perceived risks, weakness in the enabling environment, [and] poor project preparation." Efficient land systems and accurate spatial records may allow for greater transparency in the risks associated with infrastructure projects and inform well-planned proposals. Similarly, investment in eco-tourism – which has the potential to generate significant returns, contribute to development, and protect vulnerable ecosystems – may be increased by improving project transparency, streamlining business and property registration processes, and effectively managing valuable, protected lands (World Bank, 2020).

Despite the important role which efficient land administration plays in climate resilience, land systems in many countries across the Global South – who will likely bear the forefront of climate change – are sorely lacking. In fact, nations that tend to have the lowest land administration scores and the highest tenure insecurity also face the greatest risk of vulnerability to climate change. In such circumstances, not only does improving land systems offer a particularly far-reaching policy solution for increasing climate adaptability, but it may also be relatively cost-effective. In fact, new methods – such as the use of aerial imagery and/or community participation in cadaster construction – are "fast, cheap, complete, and reliable," (World Bank, n.d.). In this way, the development of strong land administration systems offers an impactful and viable policy strategy for countries – particularly low-income countries – in pursuit of climate adaptability and resilience.

Conclusion

Cities around the world, but particularly in the Global South, are under increasing pressure. Climate change is compounding the unique demographic, economic, social, and environmental challenges with which urban centers must continuously contend. These challenges are further heightened by the rapidity of urban growth across the Global South. At the same time, the promises of the city – economic growth, innovation, sound infrastructure, public services, adaptive governance – make urban centers critical to climate change adaptation efforts. Building resilient, productive, equitable cities is thus one of the most important issues facing our world today. However, current efforts are falling short. Urban growth in hazardous locations is increasing potential exposure to extreme weather events, especially flooding. Rampant urban sprawl and infrastructure deficits decrease the city's ability to absorb climate shocks by undermining the quality of the built environment, economic productivity, and social capital. Poor governance dampens the city's capacity to process and adapt to external shocks by inhibiting economic development and innovative policymaking. Needless to say, these are daunting challenges.

Although it is also crucial to improve existing cities, charter cities offer new opportunities to build climate-resilient cities from the very early stages of urban development. More specifically, charter cities can support resilient urban development in at least three important ways. First, charter cities can help direct urbanization towards strategic locations that face fewer climatic and environmental hazards. Second, by creating new opportunities to build cities based on good urban planning principles and climate-conscience infrastructure, charter cities can help foster cities with strong built, economic, and social systems. Finally, charter cities can instigate the regulatory, administrative, and institutional reforms that enable economic growth and adaptive policymaking. In this way, charter cities can complement existing cities by diversifying location, alleviating urban population pressures, fostering complementary economic sectors, and enabling policy experimentation which can be used to inform broader adaptation efforts.

Overall, charter cities can help harness the innate potential of cities to drive human prosperity in the era of climate change. However, this is not to say that charter city development is without its own challenges. More research is needed on how to build affordable housing in new cities, which are often out of reach for most households in the Global South. Scale is a crucial component, but prefabricated housing and innovative financing solutions should be further explored as well. The benefits of green infrastructure in cities also deserve more scholarly attention. Finally, research on private and networked governance in cities remains fairly nascent; additional work is needed on the promises and pitfalls of these institutional arrangements. Given the trajectory of urban growth around the world, it seems likely that we may be entering a period marked by urban experimentation, where these questions and others are answered through real-world successes and failures. Charter cities will play a crucial role in this experimentation by allowing us to iterate on models for the cities of the future. Indeed, the long-run flourishing of mankind is, in many ways, intricately bound to the evolution of the city. It is time to let a thousand new cities bloom.

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