



The case for collaborative urban adaptation



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Reframing urban adaptation as a shared imperative, rather than a response to individually experienced risk, is essential for fostering sustainable and resilient cities in the face of climate uncertainty. Collaborative adaptation entails the negotiation of differential contributions of diverse actors with distinct exposure to risk. Collaborative adaptation demands investments in trust-building, leveraging shared narratives of belonging, and foregrounding differential responsibilities in fostering equitable and effective adaptation strategies.

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The news media inundates us with stories of devastating climate tragedies: Elderly couples, mothers and children dying trapped in flooded homes in Valencia, Spain; historic homes of both cultural and personal value burned to ashes in Los Angeles; city managers caught unprepared, having not been able to make the critical adaptation investments needed to ensure infrastructure is robust to the climatic crisis, or to help protect residents and their property, in time. These crises generate waves of public distrust and accusations, as citizens and public agencies scramble to assign blame for the loss and tragedy. Yet alongside distrust, such crises also awaken waves of solidarity and collective action, as urban residents, businesses, and leaders confront both affectively and materially what it means to be part of a city and respond to close and distant neighbors. Trust and distrust, self-interest and solidarity define the milieu of urban climate change adaptation. On the one hand, perceived failures of public urban managers to respond efficiently and effectively to the complex unfolding of compound climate hazards can undermine government legitimacy. On the other hand, the solidarity and collective energy unleashed in response to urban climate tragedies reveal an untapped source for catalyzing collaborative urban adaptation.

Our understanding of adaptation is grounded in the theoretical assumption that adapting entities – an individual, a social group, an enterprise, a city government – are motivated to act by their direct experience or anticipation of risk to their assets, livelihoods, or attributes for which they are responsible¹. Prevalent analytical approaches to autonomous adaptation, for example, stem from insights from Protection Motivation Theory and from frameworks in which risk perception plays a central role in motivating action^{2,3}. The concept of *collective adaptation* – actions of a group of individuals acting together to reduce a sense of common risk – is similarly based on the idea of subcultures of shared exposure and risk-based identities^{4,5}. Planning for adaptation by municipal public agencies, as the entities responsible for orchestrating adaptation at the city-scale, is also grounded in an assessment of risk to public municipal infrastructure, public assets, and to specific urban constituents⁶.

Nevertheless, effective adaptation at the city-scale often demands contributions by more than those specific populations who have identified a shared vulnerability and the public agencies that have the formal obligation to protect them and enhance system-level resilience. Urban adaptation often requires mobilizing broader *collaborative* social action enrolling not only those directly exposed and vulnerable to climate risk (and thus presumably motivated to respond), but also those who, to the contrary, are disengaged or perceive themselves as invulnerable to climatic shocks. Collaborative adaptation, to subtly distinguish it from the notion of collective adaptation, involves intentional actions by populations *across vulnerability gradients*, supporting a common, city-scale adaptation goal. Framing urban adaptation as a collaborative endeavor, involving investments by vulnerable and less-exposed populations alike, represents an important discursive shift: It explicitly recognizes that some subgroups will perceive little climatic risk to their own property, livelihoods, or activities, and thus have limited motivation to contribute to adaptation initiatives. Yet, because of their consumption patterns, land use, or political-economic influence, their effort is needed to enable more transformative urban adaptation pathways.

Cities around the globe are actively pursuing adaptation planning and increasingly are engaging with frontline communities to enhance procedural and distributive justice in such efforts^{6,7}. Urban adaptation planning rightly should focus on those most vulnerable, but this focus should not inadvertently imply that others do not have a role to play. Conceptually, adaptation continues to be framed in relation to the need for local government and frontline communities to address (uneven) experienced and anticipated risk, rather than as a collaborative responsibility requiring the contributions and actions of even those segments of the population who perceive little climatic threat.

In contrast, the discursive framing of mitigation typically invokes individual and collective responsibility for the planetary burden of greenhouse gas emissions as a means of compelling individual contributions to collective action. Yet, by discursively tying the direct experience of risk with adaptation, and broader responsibility with mitigation, we may be missing

key levers for climate action. The focus on addressing the specific risks of specific places and populations can imply that there is little personal responsibility for supporting the adaptation of “vulnerable others”. It further suggests that there is little action that *should* be taken by those who do not perceive themselves or their immediate neighbors to be directly vulnerable. Nevertheless, as the human tragedy of the L.A. fires painfully reminds us, cities are dynamic relational systems. Complex interactions among social groups, the biophysical world, and the built environment unfold in a myriad of decisions – of property owners, city councils, businesses, land investors, public agencies, and residents of all sorts – pursuing their distinct agendas, dreams, and ambitions, that cumulatively and interactively shape our vulnerability⁸. All these actors and their relations are thus potentially instrumental in collaborative adaptation, here defined as forms of adaptation that depend on the contributions of diverse individuals, entities, and social groups who are differentially vulnerable to climate threats acting in consort to pursue adaptation in and for the city as a whole.

Reframing adaptation – and particularly urban adaptation – as an activity that must involve more than those populations who are identified as vulnerable is important for several reasons. First, the complex social-environmental-technical interdependencies in urban systems that enable significant efficiencies in resource flows and service provisioning also entail substantive vulnerabilities⁹. For too long, adaptation has been conceived of as something the vulnerable need to do to protect themselves, i.e., a private action for a private benefit, rather than a broader social obligation to facilitate a public good. Even in the early days of research on adaptation and adaptive capacity it was often assumed that the relatively wealthy, industrialized nations would be less sensitive to climate shocks, and thus less in need of adaptive action: adaptation was for others, elsewhere – largely conceptualized to be “marginalized” populations of the Global South.

The false sense of “adapted-ness” for some – e.g., those who can (at least for now) comfortably pay for their air-conditioned homes, or who can still afford the rising insurance rates of high-amenity coastlines – may be reinforcing a notion that adaptation is for others to pursue with private means, or at best, part of the social safety net for the disadvantaged. Even the notion of community-based¹⁰ or collective adaptation¹ can inadvertently imply that sustainable and equitable adaptation ultimately stops with the imperative of involving vulnerable groups in understanding their own capacities for resilience and in the design and distribution of appropriate interventions⁷. Yet, it is increasingly clear that urban climate vulnerability is not just about distant or even proximate “others”, it is about all of us, despite the clear disparities in risk burdens and capacities.

Second, the public and private entities in which public trust for climate protection is often placed are reaching critical limits. Across the globe, cities face challenges in finding the funding and technical capacity for the longer-term, larger-scale investments needed to build robust public infrastructure in the face of increasing climate uncertainty. Globalization has complicated the web of vested interests in geographies of high climate exposure and diluted the connection of investors and residents to specific places and their future¹¹. The complex mosaic of private property, international finance, and population mobility in urban and increasingly rural areas makes it particularly challenging for public entities to leverage the power they need to shape adaptation trajectories towards public ends¹². And as private providers pull out of high-risk areas, insurance is increasingly difficult to find or afford for both urban managers, businesses, and residents.

Third, as climate change tests the limits of existing institutions, climate change is also affecting urban communities once considered safe from extreme events, and even privileged social enclaves experience losses. For those who have never relied on institutional climate protections – e.g., those living without insurance, or in informal peri-urban settlements lacking municipal services – these failures are familiar. But for those who have come to take for granted such protections, such losses can lead to an unexpected rupture in public trust. As urban residents’ confidence in public and private institutions to keep up the illusion of an “adapted” system falters, those who have the capacity and resources to protect themselves and their interests will do so. These private, autonomous adaptations may well be innovative,

creative, and ultimately successful in managing risk. They may also produce unexpected and complex positive and negative externalities. As has been documented in relation to the 2018 drought in Cape Town, some of these autonomous actions may end up creating gated, climate-protected enclaves of privileged “adaptedness”¹³, which, in turn, threaten the sustainability of remaining public institutions and infrastructure¹⁴. In other cases, these responses may generate positive spillovers, for example, by introducing new technological solutions that can be scaled, or resulting in incidental vulnerability reductions for unintended beneficiaries¹⁵.

A shift in thinking about the full scope, roles, and responsibilities entailed in urban adaptation is needed. Karen O’Brien and Linda Sygna¹⁶ identify three spheres of action for transformative change: the personal, the practical, and the political. By highlighting the core function of personal action, they underscore the importance of internal, cognitive, and emotional relations in transformative processes. Linda Shi and Susi Moser¹⁷, writing specifically about the imperative of transformative adaptation in urban systems, also place change in values, mindsets, and worldviews as foundational. Social-ecological research has picked up on insights from environmental psychology to foreground the role of individuals’ mental models in shaping human-environmental relations¹⁸, and, in particular, relations to risk¹⁹. Urban systems both shape and are shaped by the mental models of those who reside within them²⁰. Shared mental models of how cities work, what makes them vulnerable, and who or what is ultimately responsible for specific urban dynamics become meta-narratives. These meta-narratives, in turn, generate and reinforce rationales for public and private decisions taken in urban spaces, giving rise to the socio-political as well as physical infrastructure that shape urban dynamics. In Mexico City, for example, the dominant narrative that unregulated urbanization occurring on the southern watershed was a primary source of the city’s water woes has led to an ineffective focus of public policy on land use on the urban periphery²¹.

Inaccurate or misleading narratives are more likely to persist where populations have limited grasp of the social-ecological-technical system interactions in which they live. Aminpour and colleagues²², comparing the mental models held by urban coastal vs. rural residents, found that urban residents’ models of human-environment interdependencies were more simplistic and reductionist, indicating limited systems understanding, labeling this deficiency as “urbanized knowledge syndrome”. Importantly, they associated this syndrome with relatively less evidence of pro-environmental behaviors. Systems thinking, and specifically situating one’s own actions and responsibilities in relation to those of others, is a critical component of pro-social and pro-environmental behaviors. Cultivating human-‘more than human’ relationality is increasingly considered fundamental to achieving planetary sustainability²³. Ironically, risk protections afforded by urban managers, institutions, and by urban infrastructure can serve to stunt system thinking: out of sight, out of mind. Wealth disparities across urban systems can thus lead to highly differentiated perceptions and experiences of risk, despite a shared urban system. Globalized urban centers, in which property and investment capital are often owned and managed by spatially distant actors, present particular challenges to fostering a sense of system embeddedness and place attachment that may be necessary for adaptive action.

Despite these challenges, the time is now for cities to begin to invest in cultivating the narratives that will support more collaborative adaptation. Fostering system thinking among urban residents is critical. This means not only making the critical flows of resources that make cities function tractable to residents, but also helping urban authorities, residents, property managers, and businesses understand adaptation as an emergent, systemic property of their individual efforts and actions. Participatory approaches drawing on agent-based modeling²⁴, or involving city managers and residents with widely divergent risk experiences in the application of ‘serious games’^{25,26} can help illustrate the salience of collaboration to achieve more equitable and system-level outcomes. For example, what does planting a tree do for urban heat mitigation? What happens if your whole neighborhood invests in urban afforestation? At what point or threshold does your individual action make a concerted difference, and for whom? Public-oriented

modeling exercises not only can serve to foster a grasp of system dynamics for residents but also can help city managers decide what physical spaces and what specific populations can and should be engaged to help achieve public adaptation goals²⁷.

Cultivating a sense of distributed responsibility should accompany efforts to enhance system thinking. Urban authorities may shy away from messages of responsibility, fearing that doing so suggests a deficiency of public capacity that might turn away capital investment or antagonize private residents and businesses. Yet this reluctance can also translate into communication failures, where the real risks a city faces in terms of potential climatic losses are not effectively conveyed to residents²⁸, or the true costs of adaptation action result in backlash²⁹. Harnessing the communicative power of the arts – particularly the power of public art – may be one way cities can enhance system understanding and leverage affective connections of individuals to each other, the urban space, and its future. The Cooling Murals project of Yale University in New Haven, Connecticut, appears to do exactly this. Public murals, involving local artists, property owners, and heat-affected neighborhoods, painted in novel paints that have cooling effects, both serve as a climate communication tool and a public-oriented adaptation strategy (<https://cooling-murals.yale.edu/>). While focusing such efforts on frontline communities serves as recognition justice, validating the experiences of frontline communities, there is also a need for communication with less vulnerable neighborhoods whose consumption patterns and land use are instrumental in achieving urban adaptation goals. Just as we invest resources in understanding what trees are best to cast shade, and how much they contribute to lowering temperatures, we also need to be assessing systematically the power of distinct modes of communication and public engagement in shaping narratives, connecting people across socioeconomic and cultural divides as well as to place, and mobilizing pro-social behaviors. Urban residents are often surveyed about their opinions and support for urban initiatives or neighborhood investments, but it is not always evident how they perceive their attachments and obligations to the city, nor how interventions like art in the built environment help shape those perceptions.

Motivating individuals to contribute, differently but collaboratively, to urban adaptation is grounded in relations of trust. From the perspective of the individual, there are large uncertainties over the extent to which their individual behavior or investments in their property ultimately affect the adaptiveness of the urban system. Communicating the results of modeling work that illustrates system interactions and individual contributions can help, but such knowledge will do little in contexts of degraded public trust. Trust among urban actors – public and private – is built slowly through the day-to-day experience of urban service provisioning and public sector attention to the differential needs and capacities of populations across the urban space^{3,30}. Trust reinforces public sector legitimacy, and legitimacy is built through consistent realization of public obligations and services³¹. Urban social contracts – expectations associated with differential responsibilities, roles, and rights associated with risk and its mitigation -- exist among and across all urban actors: public authorities, residents, and businesses³². Ironically, climate shocks often cascade through urban systems via disruption in the flow of critical services³³, thus underscoring the need for strong relations of trust as a prerequisite for effective collective adaptive response. Where fissures in public-private relations already exist, climate disruptions are likely to drive urban residents to prioritize their own interests in the face of public system failures, reinforcing zero-sum narratives. In contrast, where trust is high, cities and residents can more easily navigate the difficult decisions that climate change will pose for urban life: what uses of property are adaptive, what behaviors are resilient, and how resources should be best allocated to collaboratively manage future uncertainties and address underlying vulnerabilities. Trust enables a willingness to make hard choices and a willingness to make those choices obvious.

Maintaining trust is particularly difficult without explicit attention to efficacy and equity. Residents and businesses who are intentionally dedicating their own resources in collaborative support of urban adaptation will want to know whether those efforts are being effective, and

who, in the end, is benefiting from their efforts. Empirically demonstrating “win-wins” can be elusive. Yet, there are cases to be made in which adaptation innovations made by corporate actors can serve as testbeds for exploring the potential of urban scaling of adaptations. Private enterprises in Cape Town, South Africa, for example, responded to the 2017-18 drought by putting in place a wide range of innovative water conservation and water provisioning systems¹⁵. Large industries in Phoenix, Arizona, are also now responding to pending water shortages through investments in state-of-the-art water technologies. Non-profits, civil society groups, and informal entrepreneurs are also sources of innovation and experimentation in climate- and context-sensitive solutions^{34,35}. In many cities, for example, activities such as garbage collection and recycling are managed by complex social networks associated with the informal economy^{36,37}. Informal settlements and unincorporated communities have also, by necessity, invested in diverse modes of water delivery, sanitation, and even energy production to address unmet needs³⁸. The lessons from such private urban experiments could be valuable for cities’ efforts to build the resilience of critical infrastructure systems through modularity and decentralization³⁹, but require careful negotiation to ensure the distribution of risk and responsibilities is equitably shared across public and private groups¹⁵.

In short, while the risks and impacts of climate change are unevenly distributed, and the capacities to respond effectively to the climate threat are even more disparate, adaptation needs both collective and *collaborative* action. Cities are nebulous constructs. They are systems of resource flows and vibrant activity, composed of diverse actors – many with only tenuous ties to the geography and future of the urban space. Who belongs, and how they sense they belong, is constantly shifting, challenged by the varied influence of distal financial, political, and social ties. There are increasing efforts to generate collective action at a neighborhood scale, for example, in support of enhancing tree cover in a vulnerable neighborhood, or in response to relocating homes away from a frequently flooded riverbank. Nevertheless, generating a collaborative commitment to an “adaptive” city at the city-scale requires distinct attention, novel governance, and new narratives. Efforts to invoke responsibility and mobilize private investments in public adaptation are not signals of public sector deficiencies or failures in social contracts. Rather, urban adaptation is, at least in part, collaborative, simply because every sector, every population, and any individual faces limits to what can be done alone, and the adaptation of the few is essential for the adaptation of the whole.

Data availability

No datasets were generated or analyzed during the current study.

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H.E. conceptualized and wrote this perspective.

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