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RESEARCH ARTICLE



Normative future visioning for city resilience and development

Mark Pelling^a, Thaisa Comelli^a, Marco Cordova^b, Sibel Kalaycioğlu^c, Jonathan Menoscal^b, Rachana Upadhyaya^d and Matthias Garschagen^e

^aInstitute for Risk and Disaster Reduction, University College London, London, UK; ^bFLACSO-Ecuador, Quito, Ecuador; ^cDepartment of Sociology, Middle East Technical University, Ankara, Turkey; ^dSouthasia Institute of Advanced Studies, Kathmandu, Nepal; ^eDepartment of Geography, Ludwig-Maximilians-University, Munich, Germany

ABSTRACT

This paper argues for normative visioning as an underdeveloped component of adaptation planning. Multi-stakeholder and normative approaches to future visioning offer generative moments when creativity can meet the power to act required for critical, including transformative, adaptation. Including normative methods with community and city actors in adaptation planning allows for alternative narratives of development to arise as a basis for deeper conversation and potential action on the root causes of vulnerability and risk. A specific visioning approach is tested for four megacities – Istanbul, Kathmandu, Nairobi and Quito. Relations between current and future states of development and resilience are found to be both aligned (congruent or contingent) and in opposition (countervailing or constrained) shaping strategy for policy setting. These data are combined with additional work from London, Kolkata, New York and Lagos to pilot a City Resilience Challenge Index (CRCI), indicating to policy-makers whether and how cities are currently moving away from, rather than towards, envisioned trajectories of vulnerability reduction and adaptation. In the future, the CRCI might provide a global tool to track the progress of cities towards climate resilient development and, by doing so, to increase ambition and galvanize action.

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1. Introduction



Normative Future Visioning (NFV) is a process through which desired adaptation futures can be articulated with the present. As yet relatively undertheorized and applied, this approach is too often absent at the commencement of development processes that seek to enhance inclusive and transparent adaptation outcomes (UN-Habitat, 2021). How the future is imagined and who gets to be part of it is foundational to framing adaptation choices and actions. NFV offers an approach to help move the engagement of urban planning and action with the future beyond predictive forecasting approaches (such as demographic or flood hazard projections) that consider maintenance of the status quo in an uncertain future -, to reflexive and pedagogical visioning that can open critical self-appraisals of development choices and help initiate processes of progressive and potentially transformative climate change adaptation (Scolobig et al., 2023).

This paper argues for inclusive, NFV as a necessary component of inclusive climate change adaptation. The invoking of inclusive approaches to NFV research complements research on structural and procedural constraints on inclusion that asks how administrative arrangements and management tools can open planning up, through multi-level or multi-stakeholder engagements (Chu et al., 2016, 2017; Rigon & Broto, 2021). This work agrees on the importance of inclusion not

only for better technical outcomes but also for the wider health of polity and society and for maintaining urban democratic spaces (Watson, 2003). Less focus has been placed on how such diverse stakeholder groupings and interactions might best behold the future, rendering this an object for resilience planning *today*. We ask how far inclusive NFV can be a tool to help advance this agenda.

While predictive methods are relatively common, explicitly normative approaches remain at the margins of climate change adaptation (Nalau & Cobb, 2022). This lacuna is particularly concerning where observed development trends are moving systems further away from, rather than towards desired enabling conditions for inclusive climate change adaptation. Responding to this specific concern within NFV, we offer and test the deployment of NFV methods to enable city actors to collectively consider mis-match or alignment between observed and desired development trends and resilience and so reveal not only the nature of the enabling environment but also its trajectory. This application is built on the principles of coproduction (Jasanoff, 2004) as knowledge democracy (Bandola-Gill et al., 2023), the empirical cases presented operate at the city scale, but could equally be applied at local to national scales.

These considerations are extended below to outline motivation for NFV research (Section 2) followed by a review of

CONTACT Mark Pelling  mark.pelling@ucl.ac.uk  Institute for Risk and Disaster Reduction, University College London, Room 33, 2nd Floor, South Wing, UCL Main Quadrangle, London, UK

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research on NFV and its methodological challenges (Section 3). Section 4 and 5 offer a specific adaptation-oriented NFV application, presenting methods and results for four capital cities (Istanbul, Kathmandu, Nairobi and Quito). This is extended by drawing also on earlier work in Kolkata, Lagos, London and New York City to form an exploratory City Resilience Challenge Index that allows comparison of city performance and the possibility of a global analysis of the city resilience challenge. Section 6 presents Conclusions.

2: Motivations for a normative future visioning research agenda

Raising NFV as a research agenda within climate change adaptation has conceptual, technical and methodological motivations. NFV brings values into the centre of discussions and when inclusive allows for currently marginal preferences and priorities or ways of working and living to be considered and for dominant assumptions to be reviewed. Such insights could be valuable across many aspects of climate change adaptation planning and action – here we focus on three: risk root causes, the adaptation enabling environment and political will. Technical interest from urban adaptation responds to the potential for inclusive NFV to act as a boundary object, for example between urban planners and risk managers, or between administrators and local communities. Methodological motivations consider the tension between participation and power inherent in any approach that claims to be inclusive.

First, by invoking desired futures, NFV approaches open a safe space for stakeholders to identify the political judgements behind risk root causes. The need to address systemic risk root causes is demonstrated by the IPCC 6th Assessment Report which for all world regions documents a failure to manage urban risk from existing environmental hazards associated with flooding, heat, water and food security, with the adaptation gap being consistently greatest for the urban poor (IPCC, 2022). This analysis builds on multiple studies and broad academic consensus highlighting the challenge of addressing decision-making power asymmetries that lead to risk, as well as more visible proximate drivers (housing quality for example) (e.g. Garschagen & Romero-Lankao, 2015; Pelling, 2011; Rumbach, 2017; Wisner et al., 2004). Responding to this challenge is at once a political and technological endeavour and one that is time limited. Already rapid urban growth is set to accelerate through the next 20 years offering a global opportunity for urbanization to build resilience – or, if unsuccessful, risk – into human development. The need for timely and concerted action on urban development today to shape the future emphasizes the urgency of deploying inclusive methods of knowledge coproduction.

Second, the normative focus alongside the longer temporal lens offered by NFV can bring a critical lens or lenses onto the assumed trajectories of development and risk. The flexibility of NFV allows methods to generate self-reflection and innovation at different scales, sites and stages within decision-making systems. In particular, NFV that opens reflection onto enabling conditions of adaptation can complement existing work on discrete decision-making behaviour. As an assessment of the current literature, the IPCC's Sixth Assessment Report

(IPCC, 2022) invokes the future as a range of pathways shaped by critical decision-points that result in more or less resilient states. NFV could complement such understanding by surfacing diverse viewpoints on the status of the enabling environment and offering desired alternatives. Identifying such alternatives is a first step to making change and opening scope for transformative adaptation (Scolobig et al., 2023).

Third, inter/transdisciplinary applications of NFV methods can bring political alongside technological barriers and opportunities into transparent adaptation planning and action. Through surfacing and debating desired futures normative ideas can be brought into planning processes. Existing normative elements of visioning can be part of hybrid methods but these tend to emphasize exploratory and probabilistic approaches (e.g. Iwaniec et al., 2020; Lord et al., 2016; Ringland, 1998; van der Heijden, 1996), therefore not always leading to the surfacing of potentially conflictive views and underlying power imbalances that shape coproduction processes including the identification of lessons from visioning work. If inclusive and employed as a critical reflection and learning process, future visioning can invite different stakeholders to frame decision-making around desired futures and how these might be achieved. This can help shift the logic of planning from a regulatory defence of existing assets and infrastructure to a creative enabling of futures under construction, potentially transformative (Nalau & Cobb, 2022). It can further help decision-makers and other urban stakeholders to distil political and technical opportunities for action as part of accelerating equitable urban resilience through urban investment, policy and collective or citizen action (Robin & Broto, 2021).

Fourth, through providing a focus on the future and on normative perspectives NFV approaches could help bridge between the administrative functions of urban planning and risk management/climate change adaptation. Both urban planning and climate change adaptation have inherent normative emphasis and mandate – allowing NFV to help bridge the divide between these two policy areas (Wamsler, 2006), to translate spatial knowledge into public-oriented action (Friedmann, 1987). Whilst surrounded by conflictive agendas and often captured by elite discourses (Gualini, 2015), planning remains a vital mechanism through which risk management can deliver sustainable development as part of the connected agendas of climate change adaptation, mitigation and social justice (Werners et al., 2021).

Fifth, inclusive NFF methodologies can be used to directly consider participation and power including how best to incorporate socio-cultural difference into future visioning. Such inclusive approaches can be uncomfortable for participants and require time to deploy. Participants may identify perceived failures in past and ongoing decision-making and highlight different narratives and experiences of risk, leading to different preferences for city functions and spaces to be prioritized in risk reduction and adaptation (Borie et al., 2019; Iwaniec et al., 2020). Such observations can feed into or initiate agendas that contest established decision-making apparatus and the institutional norms guiding decision-making in cities as much as the technical choices of project management. It is this disruptive potential that offers NFV as an initial step

towards transformative risk management or adaptation (Pelling, 2011; Solecki et al., 2017). Sensitive preparation, facilitation and follow-up are part of well managed NFV, ethical concerns are particularly appropriate when marginalized voices call in public for alternative values or hidden experiences to be brought into adaptation planning. Expectations that NFV will lead to be material action must be realistic and communicated clearly. The most successful NFV will be articulated within a planning process connecting this to policy development, deployment and implementation. The call for NFV needs to recognize on-the-ground power imbalances. In integrating different types of knowledge and rationales and in balancing imaginations with constraints and trends (Baibarac & Petrescu, 2019; McPhearson et al., 2016; Nalau & Cobb, 2022; Sheppard et al., 2011). Participatory planning and critical urban theory perspectives provide some guidance in this direction: the field has gone through multiple ‘turns’ – moving from consensus-driven approaches towards the recognition of conflict, difference and critical or transgressive knowledges (mostly from southern, postcolonial and decolonial critiques) (Legacy, 2017; Watson, 2016).

Figure 1 summarizes the promise of NFV as a potential approach to engage diverse stakeholders in jointly recognizing the political and technological elements of urban resilience. It can help bring clarity on goals, destabilize entrenched assumptions and promote innovation in adaptation decision-making processes (Ringland, 1998; van der Heijden, 1996). However, where visioning the future is less inclusive and challenging, superficial NFV could allow dominant values and preferences to be reproduced, missing opportunities for critical reflection and scope for redirecting decision-making outcomes. Inclusive urban governance requires an articulation of collective – potentially conflicting – visions of the future, as part of the imagination of new or alternative development trajectories for just resilience (Glaas et al., 2019). Such perspectives inform our approach to NFV, making it focused not only on procedural equity, but also on a policy-oriented methodology that seeks the redistribution of risk and environmental goods through climate change adaptation.

3. Inclusive normative future visioning and scenario-building

Having established the motivations for NFV as a research agenda This section provides an overview of the literature on NFV for urban adaptation by drawing from future visioning, critical urban theory and participatory planning studies. The future has always been an object for urban planning. Whilst modernist approaches have imagined linear progress from past experience to planned urban futures, postmodern approaches recognize the future as an emergent (Pelling et al., 2022), contested environment, always in the making and experienced differently depending on viewpoint (Albrechts et al., 2003; Sandercock, 1998).

The scheme presented in Figure 2 summarizes key considerations relevant to three epistemic approaches associated inclusive future visioning; forecasting, backcasting and scenario building (Shiple, 2000; 2002). Across epistemologies, the meaning of vision as an *object* varies, although in most

contemporary cases, and here, it is presented as a synthesis or expression of an aspired future (Marx, 2011; Shipley & Michela, 2006). Visioning, in turn, can be understood as the *process* of thinking and articulating both relevant and desired end-states, and the trajectory (or scope of options) that go from present to future (van Vliet & Kok, 2015). Normative Future Visioning (NFV) refers to approaches that explicitly emphasize the search for desired feasible futures and are often critical of power imbalances in society. Visioning approaches (without acronym) and experiences are more generic and can include methods where the normative is absent. These approaches are discussed below and used by Section 3 in the design of a NFV methodology.

Innovation in inclusive scenario building, visioning and story-telling was accelerated within urban strategic planning research in the 1990s and 200s developed to better integrate increasingly sophisticated land-use models into public planning processes (Couclelis, 2005). Although some associate visioning with utopian thinking (Shiple & Newkirk, 1999), articulations within urban development planning have tended to emphasize visions that are oriented to solving concrete spatial challenges (Albrechts et al., 2003). In fact, visioning has been championed for its capacity to assess a diversity of future options that are both utopian and concrete, desired and attainable (Uwasu et al., 2020). This requires any use of futures visioning to be clear on its aims to avoid misleading participants. It has also been well accepted by planners because of its potentially normative and progressive nature (Uyesugi & Shipley, 2005). That is, the content of visions is ideally not detached from collective principles and values (Davis & Hatuka, 2011). Clear visions have also been said to galvanize action more easily (Couclelis, 2005), even though there might be pitfalls in terms of efficacy of consequences and follow-through (Gaffikin & Sterrett, 2006; Shipley et al., 2004). Flexibility is also a key component of future visioning. Instead of a blueprint that creates a rigid set of options for planners, visioning creates an open framework in which shared goals are established and a wide range of options and combinations are possible (van Vliet & Kok, 2015).

Backcasting entails reflecting on a desired end-state and tracing a pathway back from future to present (Bizikova et al., 2011; Shipley, 2000). This can incorporate assumptions that constrain the desired end-state and pathway choices to more or less achievable goals according to specific criteria. The majority of futures work on climate adaptation and disaster risk reduction has built from a tradition of forecasting. Forecasting entails moving from the observable past to a deterministic or probabilistic future (Sene, 2008).

There is a tendency to think of backcasting and forecasting as opposite approaches; the former being more qualitative and imaginative, and the latter being more factual, quantitative and grounded. However, such approaches are hardly employed in a pure form. Researchers have increasingly recognized that there are complementarities in these ways of future thinking (Dixon et al., 2018; Lemp et al., 2008) and that a useful strategy to articulate them could be through scenario techniques (Ratcliffe & Krawczyk, 2011). Documents such as IPCC Reports (2012; 2022) have drawn on this approach, incorporating a probabilistic scenario (‘business as usual’) as a baseline and developing



Figure 1. Visioning articulates desired urban development-resilience pathways.

alternative pathways that might be more optimistic or pessimistic depending on a combination of external (uncertain) factors and internal (controllable, conscious societal) choices. Scenario approaches have been praised for their capacity to simplify a range of possible future options, avoiding participant fatigue and allowing focus on selected alternatives, for example those that are desired, plausible and legitimate (Iwaniec et al., 2020; Lord et al., 2016; van Vliet & Kok, 2015). Some of them come with visualization techniques that materialize even further futures that are often broad and conceptual (Sheppard et al., 2011).

Increasingly, future visioning is associated with critical approaches to participatory planning (UN-Habitat, 2012).

Participatory approaches – when taking inclusion seriously – take visions and visioning away from the search for a static desired future based on a coherent set of values established by authorities and decision-makers, towards the construction of collective images or statements that translate common goals whilst preserving social differences (Ballard et al., 2017; Davis & Hatuka, 2011). Envisioning with normativity and inclusion therefore involves discussing whose aspirations about the future ultimately count, and to whom are visions directed (Harrison, 2006; Marx, 2011).

Not having such discussions could lead to misguided investments and poor adaptation. For instance, when assessing large scale infrastructures in a few African cities, Watson




	Forecasting 	Backcasting 	Scenario Building 		
Epistemic approaches	Predictive futures based on past trends and present configurations	Unbounded desired futures with pathways to the present	Exploratory & plausible futures based on hypothetical alternatives		
Methodological component	Who Parity of stakeholder representation	Where Incorporation of marginalised voices & knowledges	What Relevance of context & scope of options	How Strategy to articulate epistemic approaches	Why Assessment of consequences & follow-through
Risk/ constraint	Viewpoint exclusion & discursive capture	Hindered creativity & curtailed radical options	Visions unclear or detached from local needs & realities	Visions too implausible or unambitious; fatigue for excess of scenarios	Lack of utility; little or negative impacts from visions

Figure 2. Approaches used in the context of future visioning.

(2014) contends that these are the products of visions which are blind to the realities of most local inhabitants. Cityscapes marked by glass skyscrapers and smart systems are inspired by elite imaginations of high-tech and aseptic futures. These visions contribute to a ‘speculative urbanism’ (Ibid, p. 216) which exacerbates – rather than questions – root causes of urban inequity and risk. Critical participatory approaches can lead to visions with more imagination (Albrechts, 2015; Balug, 2019) opening scope for inclusive planning and transformative action (John et al., 2015; Sheikh et al., 2022).

Yet explicitly highlighting the normativity in visions can be challenging, especially in global South contexts marked by deep socio-spatial fragmentation and conflictive rationalities (Watson, 2003, 2013). Critical and inclusive NFV approaches should consider divergence as well as convergence points in the formulation of collective visions (Legacy, 2017). And even when convergence points are found, different perceptions about the present or competing interests for the future might lead to unclear or contested trajectories (Robinson, 2008).

Despite the promise of comprehensive future visioning that strategically uses heuristics and interdisciplinary approaches to facilitate policy choices, recent reviews on the topic highlight how underdeveloped and undertested normative approaches have been. Future visioning therefore rarely surfaces normativity, and problems related to power imbalances are too common (Nalau & Cobb, 2022). Other challenges include issues of climate change literacy, inadequacy of tools and time allowance, dystopian visions and uncertainty about the future blocking creative solutions, lack of data and funding, and little focus on global south geographies (Nalau & Cobb, 2022). Conscious of such challenges, we argue for a strengthened focus on NFV and present a methodology as one step in addressing this concern, while also opening space for further methodological innovation – such as the exploratory resilience-development challenge index for global assessment of city scale capacity.

3. Methodological approach: resilience-oriented future visioning and index development

The different epistemologies described above can be built into many applications and concrete methodological approaches. Here, a combined approach is presented tested through case study work in high risk cities across the globe. The combined approach comprises, first, a participatory methodology for in-depth resilience oriented NFV and, second, an explorative index development on resilience challenges. This approach demonstrates the opportunity NFV provides for inclusive urban development planning that builds a collective questioning of established adaptation trajectories and associated enabling conditions. The approach is illustrative rather than definitive.

3.1 Resilience-oriented normative future visioning

The first part of this approach, i.e. the NFV method, has three aims. First, to create a space in which multiple stakeholders interact with enhanced parity (the ethos of coproduction). Second, to surface collective visions that come with a clear scope of options. Third, to associate visioning outcomes with

Table 1. The urban development-resilience visioning method.

Pre-workshop	Workshop	Post-workshop
Stakeholder mapping	Agreement of dominant development trajectory	Follow-up through research and capacity building and integrated policy /planning processes
Participant selection and recruitment	Defining and detailing scenario contexts	
Facilitator training and detailed methodological design	Placing the current city	
	Placing the desired future city	
	Agreeing the technical and political pathways to move from current to desired future	
	Research actions to support movement	

ongoing policy or research on multi-hazard resilience and practical processes on the ground.

The method was codesigned with stakeholders from Istanbul, Kathmandu, Nairobi and Quito in the Tomorrow’s Cities urban risk hub (Galasso et al., 2021), building on an original method (Garschagen et al., *forthcoming*; Garschagen & Birkmann, 2018) applied in London (Pelling et al., 2016), New York (Solecki et al., 2016), Lagos (Ajibade et al., 2016) and Kolkata (Garschagen et al., *forthcoming*; Pelling, 2017).

Table 1 presents the key components of the visioning method. Pre-workshop activities consisted of stakeholder mapping and participant selection with the leadership of local universities and research centre partners. To allow consistency across study sites and in recognition of the wider project aims of bridging gaps between urban planners and risk management and public and civil society organizations, participants were drawn primarily from Municipal Government with representation also from local or ward level government (whichever was the lowest level), plus inclusion of national line ministries where relevant. Organized civil society groups representing the urban poor (such as affiliates of Shack and Slum Dwellers International), and private sector interests (such as Chambers of Commerce) with broad membership and city-wide interests were included. Mixed participation was important as it provided an opportunity to build new relationships. To reduce risk of discursive capture and help participants move beyond entrenched viewpoints, a small number of independent, expert academics or journalists were also invited. International NGO representatives were kept to a minimum to avoid non-local capture. The governance contexts of each individual city determined final participant selection. Participants were briefed and local facilitators trained. Training allowed for some tweaking of the presentation and flow of the workshop though its core elements and structure were held constant.

Workshops commenced with plenary discussion to arrive at an agreed expression for the predominant development trajectory experienced in the city (Figure 3, X-axis). Up to half a day was reserved for this activity. Development here refers to the overarching historical narrative of the moment and recent

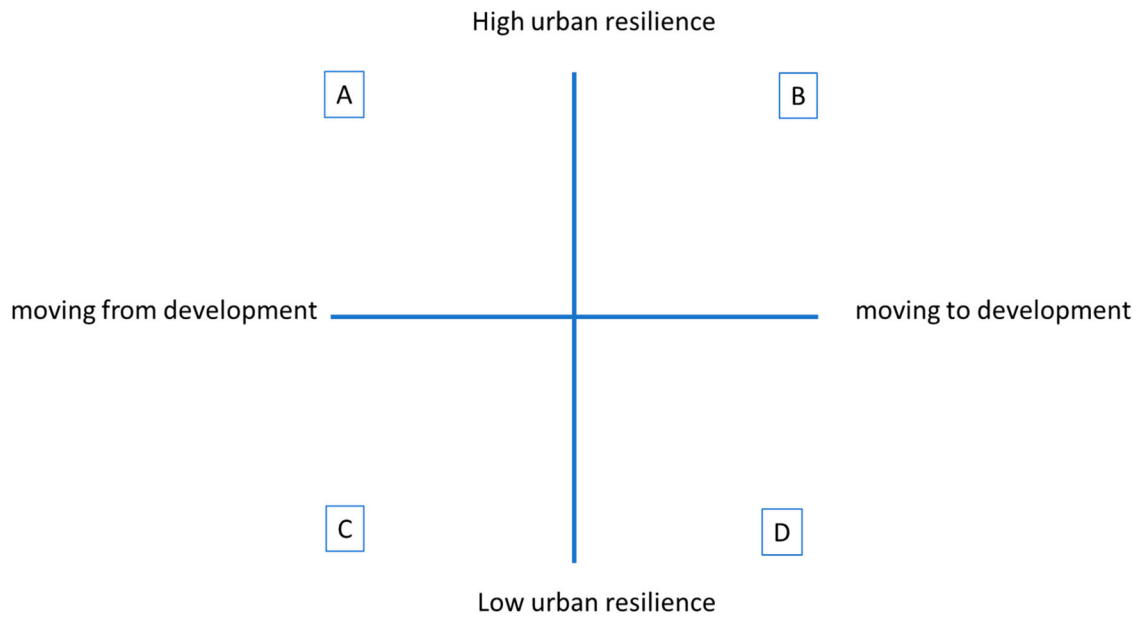


Figure 3. Visioning scenario frames.

past – of example: decentralized development, private sector led development or collectivization. The development trajectory describes large movements in recent history experienced by all stakeholders so that while the content is political, common ground is recognized. To achieve this facilitation can guide discussion away from specific experiences (e.g. past conflicts over land-use) and professional vocabularies of development (e.g. detailed regulatory mechanisms and their implementation) that would alienate or exclude some interest groups. Any tension amongst participants was reduced by moving conversation from recent events towards the longer durée of shifting power in society.

The agreed development trajectory was summarized in plenary by the facilitator as ‘moving from’ and ‘moving to’ statements. These are then cross-cut with high and low urban resilience options (Figure 3, Y-axis). Resilience was understood in terms of natural hazard including climate change and described the overarching capability of the city and its functions to avoid risk, cope with impacts and recover from past events. Plenary discussion was used to share and confirmation this common understanding of resilience. Imposing a definition of resilience allows for comparative analysis between cities (see Section 3.2). This generates four scenarios:

- A: historic development pathway coupled with high resilience
- B: unfolding development pathway coupled with high resilience
- C: historic development pathway coupled with low resilience
- D: unfolding development pathway coupled with low resilience

Each scenario was then detailed in break-out groups with mixed representation followed by plenary confirmation. This helped to base each scenario in experience using bullet points to describe the governance conditions that would allow such a

scenario to exist. Common conditions described the extent and quality of partnership between state and non-state actors and the extent and effectiveness of legislation. This included those for low resilience which were associated with failures in communication, collaboration, lack of data and accountability in decision-making. If time allows, an extension of this method is to ask what material conditions (e.g. housing quality, infrastructure access, etc.) would likely exist under each scenario. This adds scope for Geographic Information Systems mapping against urban regions/neighbourhoods that can feed into urban planning processes (see Pelling, 2017). Agreed scenario factors/GIS representation present a first output, a common agreement of the institutional causes (and/or material expressions) of higher or lower resilience differentiated by development trajectory.

At this point the method switched from a mapping of urban contexts (the four scenarios) to identifying a city’s resilience pathway. Individual participants were asked to place an anonymous vote to identify where, across the field of four scenario options, the ‘present city’ lies. Quantitative X- and Y-axis scales helped to reduce personal interpretation bias. In plenary, with all individual (anonymized) votes on display, participants negotiated a single agreed point describing the present city. Negotiation can be supported by providing a calculated plot using a measure of mean distance from all individual plots. The exercise was repeated for the ‘desired future city’. The time frame for the future plot can be set to correspond with a specific policy opportunity. Here, to allow comparative analysis 10 years was applied representing a period towards the limits of, but within, concrete urban planning time horizons. The agreed present and future city placements were then compared in plenary. Movement on the Y-axis indicates a desire for more or less resilience – a technical ambition; movement on the X-axis indicates a desire for change in the enabling environment for delivering the desired level of resilience – a political/administrative ambition. This was a second output, a shared vision for

the interconnected technical and political/administrative elements of the city's urban resilience pathway.

Break-out groups were reconvened to brainstorm what could be done in the near term by actors in the room and their organizations, or by others, to help build the enabling conditions for the desired future. This was a third output, providing a provisional list of action points, in some cities an action plan detailing research, data generation or capacity building needs to support desired enabling conditions.

All city workshop participants included technical officials with city level responsibility for urban planning, infrastructure and economic development including local government, community-based organizations and national line ministries. The greatest methodological challenge was to respect diversity in views while moving towards collective assessment. Two methodological learnings helped manage this tension. First, encouraging participants to focus on a broad development trajectory (the core theme for the moving from – moving to axis) and avoid revisiting the detail of specific projects or policies. Second, anonymized individual voting on past and present city plots. Anonymity prevented copy-cat voting and allowed participants to record views without censure.

Follow-on activities are determined by the wider context of the workshop. For example, wider participatory planning and capacity strengthening with city government and organized citizen groups (e.g. Tomorrow's Cities see <https://www.tomorrowcities.org/>), or an entry point for more detailed analysis of decision-making for resilience (e.g. TRUC, see Ajibade et al., 2016; Pelling, 2017; Pelling et al., 2016; Solecki et al., 2016).

3.2 Index on resilience challenges

In a second step, the visioning results from Istanbul, Kathmandu, Nairobi and Quito were then combined with earlier findings from Garschagen et al. (forthcoming) – who deployed future visioning with stakeholder groups from Kolkata, Lagos, London and New York – in order to develop and test an explorative yet comparable index for tracking the degree of challenge faced by cities in meeting their own resilience-development goals. Combining both sets of case studies generates a cohort of eight capital cities with which to test the utility of the method as a global assessment tool. This responds to the IPCC 6th Assessment Report framing of resilience as an emergent property of cities, with city actors navigating pathways towards resilience. Global assessment of the distance and direction of travel needed is helpful for judging the extent to which the global population of individual cities is acting on the time limited urban opportunity for delivering resilience. While core methods were common, Garschagen et al. (forthcoming) emphasize development context as well as moving-from and moving-to along the X-axis with city placements decisions not using numbered X- and Y- axes, so that final scores in the City Resilience Challenge Index for Kolkata, Lagos, London and New York are indicative.

The City Resilience Challenge Index calculation uses the X- and Y-axis with 0 as the central value and five as the maximum value for each bi-directional axis. Distance of travel between the present and desired city can have values between zero (no distance) and 10 across each axis. The City Resilience

Challenge Index is calculated by:

$$\frac{\text{distanceofmovementonXaxis} + \text{distanceofmovementonYaxis}}{20}$$

Index values range from 0 to 1. Larger values indicate more challenging pathway choices for city actors. To nuance the index, the direction of travel can be indicated by assigning a negative value when the desired future and movement of development are in opposition (countervailing or constrained) indicating work needed to address inhibiting governance. A positive value indicates future pathways aligned with development trend (congruent or contingent). Negative values close to 1 indicate cities with very challenging pathway options.

The index-development and the quantification of the workshop results are explorative at this stage – and learning about this method was as important as were the first-round results. The scales of the axes of the four quadrants, for example, were not fully operationalized in the respective workshops. Hence, different sets of actors might interpret the scales of the axes differently in the future. Yet, this being an expert-driven assessment, the discussions in the workshop indicated that the actors shared a common understanding of the general interpretation and quantification of the axes, which provides hopeful signals for further application and refinement of the method.

The index is quite different from other conventional indices used to assess risk, vulnerability or resilience at national or city level (see e.g. Garschagen et al. 2021 for an overview): while existing indices such as the social vulnerability index (Cutter et al., 2003) aim to measure the level of vulnerability or resilience in a given city, municipality or country in an absolute manner and through secondary quantitative data, the index developed here is based on expert elicitation and the first one to gauge resilience challenges in relation to self-defined normative visions of development and resilience. It hence allows to examine, track and monitor in a dynamic manner the gap between current trajectories and envisioned enabling conditions for resilience.

4. Results: normative visions and resilience gaps

This section presents two assessments. First the detailed results of four city level assessments (Istanbul, Kathmandu, Nairobi and Quito) used to support specific city resilience planning actions. Second, by combining results with four additional city assessments (Kolkata, Lagos, London, and New York) scope is considered for a global City Resilience Challenge Index.

4.1 City resilience trajectories

Stakeholders in all four cities expressed a desire for enhanced resilience. For Quito and Kathmandu, recent post-disaster technical and legislative reforms were cited as reasons for some confidence in disaster management and response elements of resilience. Istanbul and Nairobi were more self-critical of policy, institutions and infrastructure. The shared desire for enhanced resilience reflects acknowledgement by

city level actors of the urban adaptation gap. Across all cities, no participant argued that additional attention to resilience would constrain development. This reinforces evidence of the urban adaptation gap already observed at regional (IPCC AR6) and neighbourhood scales (IPCC, 2022).

4.1.1 City development trajectories

Development trajectories were multifaceted, dynamic and encountered through personal experience and political viewpoint. City discussions ranged from development trajectories marked by changes over time to the apparatus of the state including the movement of powers between local, regional and state government, through to policies of decentralization, budgetary redeployment, regulatory functioning and implementation and the balance between personal and collective responsibility for risk and resilience.

4.1.2 Combining resilience and development

Table 2 summarizes city discussions. For all cities the private sector was recognized as simultaneously necessary and problematic for enabling a resilient future. In Kathmandu and Quito, private sector speculation and problems in land access were understood as drivers of land encroachment in hazardous and/or peri-urban areas by those with less financial means. In Istanbul, policies that empowered the private sector (e.g. large developers) lead to more tenure insecurity and renters. In Nairobi, stakeholders also emphasized that informal and smaller private agents could be boosters of development in some cases.

Problems with the current planning system and desire for more efficacy and capacity in resilience planning were also commonly mentioned. Policies and plans are perceived to be either outdated or unable to match the size of climate and multi-hazard challenges coupled with urban expansion. In the context of Nairobi, this challenge was explicitly connected to tensions between the formal and the informal city, and to socio-spatial inequalities. Participants argued that, although new pro-poor plans and policy were often proposed, they end up not being fully employed or enforced. In Quito, lack of comprehensiveness and continuity in policy making and implementation produced resilience investment that was fragmented with one-off efforts rather than long-term strategies.

Science was consistently identified as a partner in supporting movement towards desired development and resilience outcomes. In Istanbul, science and scientists were pointed as useful to clarify, communicate and translate concepts and ideas. That is, they operate as a bridge between knowledges and viewpoints. In Quito, universities were specifically named as trusted intermediaries between governments and other entities or society levels. In Nairobi, science was identified as providing a knowledge basis for actions (for example, through data and maps) and as being able to help legitimize knowledges and struggles on the ground, especially those carried by grassroots groups, CBOs, etc. Kathmandu echoed many of these points, as stakeholders emphasized the role of science in producing evidence that informs decision making, in helping to reinforce

Table 2. Summarized normative visions and discussions.

Development trends	Istanbul	Kathmandu	Nairobi	Quito
Overarching Normative Visions	Multi-stakeholder inclusion in planning	Strengthened local government	private sector-led development with strong government presence	Strengthened local government
Views on government and public sector	Tensions between central and local governments Need of participatory governance Outdated policies and regulations Issues in policy implementation	Tensions between central and local governments International aid Limited application of land use regulations and zoning (encroachment of hazardous areas and suburbanization)	Tensions between levels of government National investments in bulk infrastructure Slum upgrading interventions [+] Tensions between formal and informal land-use priorities in policymaking. Issues with policy and regulations implementation and enforcement Issues with plans implementation	Tension between central and local government Need of more participatory processes Outdated and low-impact policies and regulations Lack of comprehensive, long-term and continuous policy Issues with policy and plans implementation More capable municipal government [+]
Views on private Sector	Tenure insecurity and gentrification (megaprojects and investments) Private sector shaping city with limited regulatory power at city level	Private sector shaping city	Real estate boom	Private sector shaping city (growth in peri urban areas)
Role of citizenry	-	-	Informal and community-led initiatives adding value to city [+]	-
Role of science	Trusted knowledge brokers	Evidence based policy Capacity Strengthening	Evidence based policy Enabling citizen voice	Intermediaries between state and citizen
Contextual factors (dis)enabling resilience	In-migration challenges service provision Socio-spatial Inequalities growing (income) Facilities and infrastructure can be enhanced through resilience [+]	Migration challenges and opportunities [+] Urbanization Process Disaster Shocks Social changes	Socio-spatial inequalities high Precarious and vulnerable housing	Migration challenges Socio-spatial inequalities Informality

Note: The symbol [+] indicates that the theme was brought up in a positive way or as a development and resilience opportunity. Source: authors.

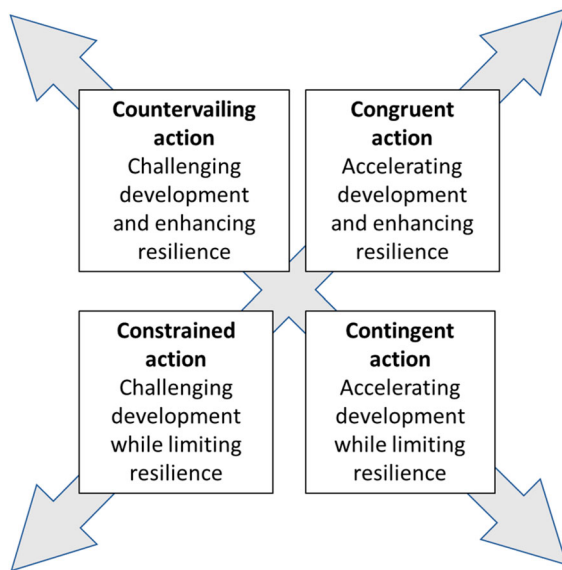


Figure 4. City development-resilience action pathways.

plans and codes, in capacity building for governments and communities, and as a space for advocacy building.

In all cities, participants aspired for a more inclusive urban resilience. In some cases, like Istanbul, this means decentralized planning and a more diverse stakeholder landscape. In Quito, this was framed as an ‘active citizenship’ issue to be improved on both the state and civil society sides.

4.1.3 City development-resilience pathways

Figure 4 offers a generic analytical framework to summarize the action pathways of city stakeholders when considering movement from the present to the desired future for both urban development and resilience. The summary presents four directions for action:

- Countervailing action: Dominant development generates unacceptable levels of risk and is undermining desired levels

of resilience. A reversal of development trends is needed to enhance resilience.

- Congruent action: Dominant development is already reducing vulnerability and exposure in the city, there is a virtuous relationship with resilience where enhancing resilience will enhance overall development opportunity.
- Constrained action: Reversing development trends and pulling back on resilience. Increased risk is accepted for gain from redirected development.
- Contingent action: Acceleration of dominant development is prioritized, constraining investment in resilience and risk reduction with resulting risk accepted.

Outcomes presented in Figures 5 and 6 are illustrative of the potential of the method used and its facilitation of collective visioning for specific groups, rather than representative of city trajectories. As noted above, all cities expressed a desire for enhanced resilience. Individual cities differed in the direction and nature of desired change in enabling conditions through which desired resilience could be delivered. Figure 5 presents desired pathways. The context of discussions in Istanbul oriented discussions to a focus on inter-agency relationships rather than general development trends, this reduces the confidence with which Istanbul’s pathway can be considered, indicated by a dashed line in Figures 5 and 6.

For Kathmandu, Quito and Istanbul preference was for congruent action. For Nairobi, countervailing action, a reversal of dominant development trends was called for. These views are determined by the agreed development trajectory in each city, other stakeholder group compositions might arrive at different conclusions. In Istanbul, where state centralization of authority limited the roles of city level stakeholders, development was presented as a movement to open these spaces rather than a desire for accelerated development as a whole. Both Kathmandu and Quito framed a better development-resilience nexus around stronger local government. In Quito, only modest acceleration in development was desired, thought necessary to delivered enhanced resilience. In Istanbul, development was discussed in terms of multistakeholder involvement in formal decision-

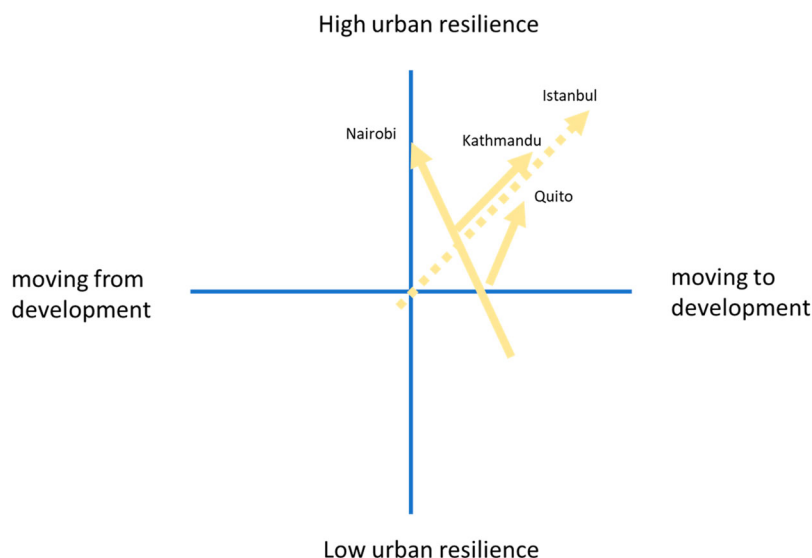


Figure 5. Desired city development-resilience trajectories.

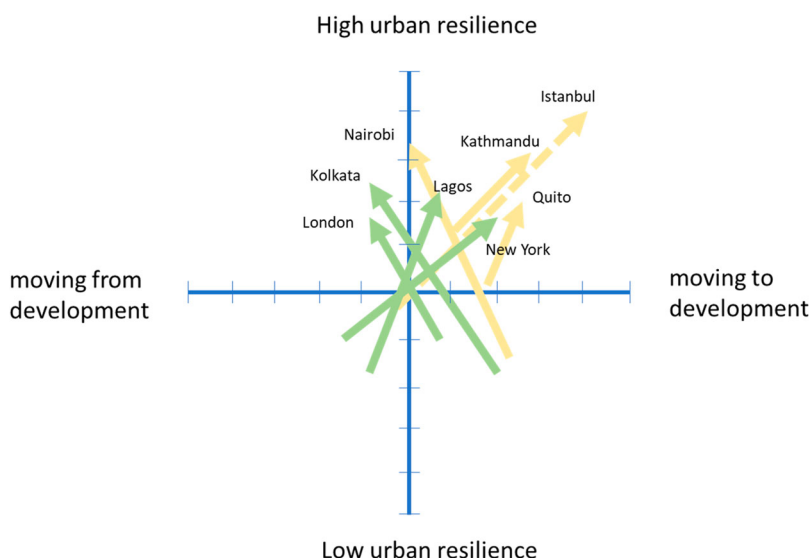


Figure 6. Development-resilience trajectories for eight cities.

making, in particular roles for sub-national administrations. Accelerated development in this context is a desire for further and more extensive engagement of sub-national government agencies in a centralized policy regime. Nairobi's call for a reversal in development trajectory drew out a concern for the weakening of city, neighbourhood and citizen-based institutions in the face of both national government agencies and corporate private sector interests that were seen to shape the city with limited downward accountability.

4.2. The city resilience challenge index

Figure 6 provides a graphical representation of the development-resilience trajectories amongst the combined eight-city cohort. Perhaps the most important finding is a confirmation that no city seeks constrained or contingent action on the development-resilience nexus. There is no case where resilience was seen as a drag on the preferred development path. Congruent action is the most frequent choice, preferred by Istanbul, Kathmandu, Lagos, New York and Quito. These are cities with a wide variety of urban governance, economic development and risk contexts. They show some optimism in ongoing policy processes reflecting enhanced local and municipal government capacity and prioritization of resilience/risk management in New York, Kathmandu and Quito; economic growth and perceived

political openings for more locally inclusive resilience building in Lagos and an aspiration for multi-level development and risk management in Istanbul. Countervailing action was preferred by Kolkata, London and Nairobi. These are a similarly diverse group of cities. London and Kolkata can be interpreted as responding to recent experiences of shrinking of city and local government capacity following central government policies reducing budget and regulatory powers over the private sector. These are both cases where withdrawal of the local state is perceived to undermine capacity for delivering resilience, especially for the urban poor. Nairobi's case reflects unease at ongoing weaknesses in political and governance regimes that limit inclusive and accountable development, diminishing resilience as a result.

Table 3 orders cities from highest to the lowest challenge score. Istanbul stands out as facing a high degree of challenge in moving towards the desired future resilience and development status. Nairobi and Kolkata are also relatively high scoring and as oppositional cities face working against the flow of ongoing development trajectories (reducing regulatory powers and ongoing governance constraints). Scores for Quito and Kathmandu indicate these cities are relatively well oriented to meet the future preferences of city stakeholders and supported by the exciting development trajectory. Contrasting the degree of challenge with national Human Development Index groupings highlights the influence of policy context beyond levels of economic development on the enabling environment for achieving linked adaptation and development goals. Relative scores suggest Istanbul's challenge is larger and Kathmandu and Quito's challenge smaller than might be expected guided by HDI group. This reflects administrative centralization in Turkey and post-disaster reforms and capacity building Kathmandu and Quito, as discussed in Section 5.

The CRC Index presents the ability of comparative analysis to reveal the degree of challenge faced by an individual city in moving towards desired states of coupled development and resilience and by comparison with the

Table 3. City resilience challenge index.

City	Development	Resilience	City Resilience Challenge Index	National HDI group*
Istanbul	5	5	0.5	Very High
Nairobi	-3	5	-0.4	Medium
Kolkata	-3	4	-0.35	Medium
Lagos	2	4	0.3	Low
New York	3	3	0.3	Very High
London	-2	3	-0.25	Very High
Kathmandu	2	2	0.2	Medium
Quito	1	2	0.15	High

*Source, UNDP (2022).

HDI to highlight the influence of core human development indicators. In presenting a simple and quantitative representation of the complex challenge space faced by cities the CRC Index also enables a baseline from which to track the consequences of city action and changing policy environments over time. Given the urgency of the contemporary ‘urban opportunity’ for global resilience building there is a need for transparency in progress in cities and at a global scale. The CRC Index is one option for responding to this need. Additional testing is required but the promise is clear.

5. Conclusion

Adapting to climate change and multi-hazard risk reduction in ways that can also address un-met development needs and aspirations benefits from methods that invite stakeholders to disrupt the social contexts for thinking and learning. This paper first introduced the scope for inclusive approaches to NFV to help meet this challenge and then presented results from a study aimed at the enabling conditions for risk reduction and adaptation.

Designing inclusive NFV can build on the so far small number of direct applications to climate change adaptation and risk management and draw on rich experience from critical urban planning and participatory development. Five motivations arising from this frame together help define the contribution that inclusive NFV could make: scope to surface risk root causes, the adaptation enabling environment and political will, NFV as a potential boundary object between interests to build cooperative and transparent action and an opportunity to confront the tension between participation and power inherent in any approach claiming inclusivity. In sum, the disruptive potential of NFV can help stakeholders transcend the influence of existing structures and practices shaping everyday decision-making and so open pathways for transformative action.

Empirical application of inclusive NFV in Nairobi, Quito, Istanbul and Kathmandu confirmed the capability of NFV to respond to these motivations. Diverse stakeholder groups collectively contrasted perceived existing and desired future qualities of development and resilience. Agreeing on not only the size of any gap between current and desired states but also the extent to which development trends and practices restricted or enabled resilience. This provides two axes for stakeholders to consider for action – how much work is needed and in what direction that work should push. The City Resilient Challenge Index combined results with earlier work in Lagos, London, New York and Kolkata. The CRC Index is a first opportunity to track at global scale the performance of individual cities in bridging gaps between identified and existing enabling environments for adaptation and risk reduction. Bridging this gap is critical for sustainable development.

Both the city level inclusive NFV and CRC Index bring policy actions attention to the degree of difficulty cities are experiencing in moving towards desired future states. This is a break with existing assessments which orient analysis around past status – describing progress with reference to a historical baseline. The NFV method allows assessment to be based on the distance and direction to be travelled. The gap between desired

and current status is collectively defined enabling decision-makers to target action. As an inclusive method, views on the status of current and desired states are not fixed, they are socially constructed and can change according to shifting awareness, values and experience. The ability of inclusive NFV methods to track the challenge gap through the lens of social construction also breaks with established methods for tracking progress which tend to use an agreed baseline of observed and often quantifiable indicators. A socially constructed approach is less good at measuring progress on specific indicators but is better able to incorporate the influence of changes in public awareness and political will that shift the distance between the current and desired states. It is possible for example that the challenge gap grows not through lack of practical attention but through increased public or political understanding of hazard risk with potential to invigorate action.

The scope for inclusive NFV to enhance transparent, cooperative adaptation and its contribution in particular to intentionally transformative processes opens future research. The motivations identified in Section 2 point to specific questions where systematic research could detail the distinct contribution of normative as opposed to predictive visioning. How might inclusive NFV be deployed as part of integrated futures work alongside more established forecasting and back casting approaches? Can a more critical lens conscious of the tensions between power and participation be enabled by such integrated approaches? Surfacing the normative brings ethical concern – raising expectations without scope for action can bring participant disillusionment and undermine future action. This could be alleviated by applied research that embeds inclusive NFV into policy processes with tangible outcomes. In this way the creativity of inclusive NFV can meet the power to act required for critical, including transformative, adaptation. It brings the future into the orbit of action today.

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Ethics permissions

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Notes on contributors

Mark Pelling is a professor in risk and disaster reduction at the Institute for Risk and Disaster Reduction. He has served as a coordinating lead author for the IPCC AR6 Working Group II. His research interests include social and political aspects of climate change adaptation and disaster risk reduction decision-making in cities.

Thaisa Comelli holds a PhD in urban planning and currently works as a researcher at the University College London Institute of Risk and Disaster Reduction. With a hands-on approach, her expertise lies in the realm of coproduction and community-led methodologies for urban development and planning. She has conducted research engagements across numerous cities in Latin America, Europe, Africa, Asia, and the Middle East over the past decade. Her interests revolve around participatory planning and knowledge co-production, future methods for urban resilience and governance for climate adaptation.

Marco Córdova is a professor in the Department of Public Policy at FLACSO Ecuador. His research is interested in explaining local public action issues from multilevel governance approaches and comparative methodologies in the Latin American context.

Sibel Kalaycioğlu is a professor at the department of sociology, Middle East Technical University, Ankara, Turkey. Her interests include: social inequality, class and mobility, sociology of migration and the migrants, social networks, intergenerational relations, sociology of work, political sociology, sociology of ageing and youth, health, dynamics of poverty, precarity and social exclusion-inclusion, the relationship between state and civil society, citizenship, informal work, social policy, social indicators of sustainable development, Southeastern Anatolia Region and regional Development.

Jonathan Menoscal is a researcher and PhD student in Public Policy at Flacso, Ecuador. He has worked in several public institutions at both national and local levels, as well as in research through international organizations to reduce disaster risk and generating planned and sustainable cities.

Rachana Upadhyaya is a PhD candidate at the University of Bristol and a researcher at the Southasia Institute for Advanced Studies. Her research interests include: urban risk and resilience, and expertise on gender and social inclusion.

Matthias Garschagen is a chair professor in Human Geography at Ludwig-Maximilians-University Munich (LMU). He served as a lead author in the IPCC for the SROCC, AR6 and Synthesis Report. His research focuses on future urban risk trends, the evaluation of different adaptation options and the governance of urban risk reduction, particularly at the interface of state and non-state actors.

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