

Just Climate Adaptation in Cities: Reflections for an Interdisciplinary Research Agenda

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Abstract

The briefing focuses on three critical points for understanding what just adaptation means for cities:

1. The reconfiguration of the physical environment in urban areas to respond to new adaptation demands;
2. Demands for inclusive adaptation that challenge the systems that create inequality and discrimination;
3. The dynamics of power and action, reflecting upon who can deliver just urban adaptation in contemporary cities.

Just urban adaptation requires recognising the multiple ways in which climate change shapes cities, through its impacts but also through human responses to it. Just urban adaptation action must also consider existing housing and infrastructure legacies, often shaped by colonial histories and existing practices that enable habitation. Ideas of just adaptation are also closely tied to the production of urban adaptation knowledge, especially whose knowledge counts and whose doesn't count when it comes to decision-making. The humanities and social sciences drive a research agenda that puts just urban adaptation at the centre of collective responses to climate change.

Introduction

The contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, published on 9 August 2021, states that human influence on the climate system is now ‘an established fact’, and its impacts are already apparent.¹ Urban areas will be affected directly (for example, by frequent extreme climate events, sea-level rise, and increased probability of flooding) and indirectly (for example, by large-scale ecosystem and social processes such as migration or disruption to supply chains). New findings on the relationship between regional and urban climate suggest that urbanization also exacerbates impacts such as heatwaves and precipitation.

Adaptation to climate change² will likely be a critical challenge for cities in the 21st century. Local and regional governments, businesses, and people will seek to protect lives, life opportunities, and material assets. Adaptation is also redefining the urban economy, with a new set of demands on maintaining safety. It poses new burdens in urban areas, although some people also find that adaptation creates opportunities, from those who see urban adaptation as a source of financial opportunities to those who link urban adaptation to the need to deliver fairer, more inclusive urban futures. The Global Commission on Adaptation argues that an investment of \$1.8 trillion from 2020 to 2030 could generate \$7.1 trillion in total net benefits.³ Urban areas already require investments in climate-resilient infrastructure to improve services such as housing, transport, water, sanitation, drainage, and waste management. Whether or not urban areas can meet adaptation challenges, adaptation actions will have consequence. The differential impacts of adaptation on communities are already palpable across urban space.

Urban adaptation generates a new landscape of urban adaptation policies that intersects with the social infrastructure of cities. Increasing concerns about how inequality and discrimination shape adaptation possibilities, alongside questions about the aims and goals of adaptation, put justice at the center of debates on urban adaptation.⁴

Scholars within the humanities and social sciences are already contributing to understanding what just adaptation means for cities. The briefing focuses on three critical points of this discussion: the reconfiguration of the physical environment in urban areas to respond to new adaptation demands; the demands for inclusive adaptation that challenge the systems that create inequality and discrimination; and the dynamics of power and action, reflecting upon who can deliver just urban adaptation in contemporary cities. In conclusion, just urban adaptation requires recognising the multiple ways in which climate change shapes cities, through its impacts but also through human responses to it. Just urban adaptation action must

1 IPCC (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)], Cambridge University Press.

2 The IPCC defines adaptation as follows: “In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.” In: IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)]. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Available at: <https://www.ipcc.ch/sr15/chapter/glossary/>

3 Global Commission on Adaptation, G. C. o. A (2019). *Adapt now: a global call for leadership on climate resilience*. Groningen, Global Center on Adaptation and World Resources Institute.

4 Shi, L., E. Chu, I. Anguelovski, A. Aylett, J. Debats, K. Goh, T. Schenk, K. C. Seto, D. Dodman and D. Roberts (2016). “Roadmap towards justice in urban climate adaptation research.” *Nature Climate Change* 6(2): 131-137.

also consider existing housing and infrastructure legacies, often shaped by colonial histories and existing practices that enable habitation. Ideas of just adaptation are also closely tied to the production of urban adaptation knowledge, especially whose knowledge counts and whose doesn't count when it comes to decision-making. The humanities and social sciences drive a research agenda that puts just urban adaptation at the centre of collective responses to climate change.

Adaptation in urban environments

Urban adaptation does not happen in a vacuum. One insight of recent research literature is that the built environment constrains and shapes the extent to which urban adaptation is possible. History is a central factor shaping adaptation possibilities—histories of unequal social interaction sediment into infrastructure through land values and tenure and shape vulnerabilities to climate change impacts in every city. The normative objective of adaptation policy is to gain resilience, that is, to build urban communities able to withstand disasters and disruptions and use reconstruction efforts to improve conditions and reduce inequality. However, historical processes reveal the different ways in which social and political conditions undermine resilience over time.

The availability of different adaptation responses shapes the material fabric of the city. Adaptation responses depend on uneven geographies of urbanization, manifest in the constitution of large infrastructure systems and their interactions in the context of climate change impacts. The location of cities shapes the interactions between climate-related hazards. For example, future heatwaves will add to the urban heat island effect already shaping lives in cities such as Hong Kong and Singapore.⁵

The development of climate-resilient infrastructure is central to urban adaptation responses, as explained in the Global Commission on Adaptation.⁶ Climate-resilient infrastructure is planned, designed, built, and operated in ways that take into account climate-related variability to withstand future climate-changed conditions.⁷ Climate-resilient infrastructure may include, for example, measures related to the design of new infrastructures and the retrofitting of old ones, from ICT networks to housing. Digitalization is increasingly seen as mediating more responsive infrastructure systems, but societies increasing dependence on ICT exposes infrastructures to new risks that climate change will exacerbate, for example, if flooding and heatwaves impact on ICT assets.

Common urban adaptation measures include water storage, flood defences, and water supply and sanitation, alongside housing and spatial planning. However, urban adaptation also requires a wider range of measures including the development of prevention measures to tackle vulnerability and develop early warning systems, alongside measures to contain and mitigate disasters, and measures to facilitate rebuilding and adjustment, for example, through the development of nimble infrastructure networks. Urban adaptation needs to be considered at the planning stage, in new infrastructures, in retrofitting existing infrastructures and in examining the additional infrastructure needs that climate change generates. However, just urban adaptation raises deeper questions beyond design and implementation in relation to how infrastructure is embedded in socio-cultural structures — tied with existing practices, regulated by existing institutions, responding to culturally situated needs and desires.

5 IPCC (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)], Cambridge University Press.

6 The summary for example states “The report’s authors suggest that upgrading living conditions in vulnerable communities — which might mean improving housing, water, sanitation, drainage, and waste management — will build resilience and strengthen their adaptive capacity.”

7 OECD (2018). ‘Climate-resilient Infrastructure’, *OECD ENVIRONMENT POLICY PAPER NO. 14*. Paris, OECD.

Mitigation measures support adaptation because they are a means to prevent the root causes of climate change, thereby reducing the need for future adaptation and avoiding extreme scenarios where adaptation becomes impossible. Moreover, addressing mitigation and adaptation in tandem may facilitate the generation of co-benefits. For example, renewable microgrids enable energy access, support the development of jobs and technical capacity, promote low carbon infrastructure, and build resilience, for example, by facilitating access to communication infrastructure. Off-grid electricity systems may be easier to protect from disasters. At the same time, the development of local capacity for micro-grid construction and maintenance may be an asset to manage off-grid infrastructure during a disaster.

A new paradigm of urban adaptation — one that acknowledges the need for reconsidering human-nature interactions — is informing a new generation of climate adaptation plans in cities worldwide. A key observation is that urban adaptation demands responses that move away from a problem-solution frame. Instead, urban adaptation requires recognizing climate change as an ongoing phenomenon in contemporary societies that requires multiple actions, feedbacks, and adjustments. The city emerges as an emergent quality of multiple dynamic processes (economic transaction, social interaction, resource use) that cannot be entirely future-proofed. Actions that are adaptive and enable rethinking and adjustment will likely be more suited to a climate-resilient future. This is a new paradigm that demands new research about how trade-offs are managed under conditions of uncertainty so that vulnerable urban populations benefit. Nature-based solutions and social protection policies are new areas of interest associated with this paradigm.

Nature-based solutions refer to actions that use nature to address societal challenges, in this case, to mitigate the impacts of climate change, and protect nature and biodiversity. From mangroves that protect coastal cities to forest restoration programs that protect water reserves and urban farming initiatives, nature-based solutions recast nature as helpful infrastructure to support urban societies. The multifunctional character of nature-based solutions makes them attractive to different policy constituencies. However, social research has uncovered evidence of challenges related to practical aspects of implementation and their potential negative impacts on vulnerable social groups. For example, green infrastructures may increase the desirability of certain neighbourhoods, increasing land prices and pricing out lower-income groups that find new housing prices unaffordable, a process generally referred to as green gentrification.⁸

Social protection policies refer to any policies that address the consequences of lifelong exclusion, poverty, and vulnerability. Standard social protection policies include access to healthcare and education, child protection, measures to support life at old age, efforts to support low incomes, access to services, social security, and insurance. They may also include urban design policies, such as design measures to make the urban space accessible and facilitate evacuations of people with reduced mobility. The COVID-19 pandemic demonstrated the importance of social protection policies to prevent deaths and further damage in communities. Government interventions that failed to take account of the local circumstances and needs of vulnerable groups, such as lockdowns in informal markets, had a devastating impact on the whole society. In the absence of government services, communities themselves had to provide those social protection services, sometimes in partnership with local governments. In the context of climate change, just urban adaptation will

8 Xie, L. (2021) *Valuing Inclusion and Diversity, Embracing Uncertainty: Ways Forward for Nature-based Solutions*. The British Academy; Mabon, L. (2021) *Nature-Based Solutions and the Green Economy*. The British Academy.

require supporting structures of social protection. How to deliver social protection in urban areas is a central question for research on adaptation and resilience.

Thinking of climate-resilient infrastructures also depend on the city's social infrastructure, which supports essential living needs, such as health services and education. How do climate change adaptation policies intersect with physical and social infrastructures in cities? Empirical evidence and shared experiences show that local governments play a crucial role in implementing global agendas such as the Sustainable Development Goals because they can align delivery with local conditions and needs.⁹ Multi-institutional partnerships also play a crucial role in integrating multiple concerns in the delivery of adaptation action that aligns with people's aspirations to achieve prosperity and wellbeing. Architectural humanities dedicated to imagining the future of cities may help further the inquiry into just urban adaptation by examining the provisional and makeshift responses to changing environments that enable inhabitation of urban space. As new styles of planning develop to address the unique demands of urban adaptation, financial questions need to be asked for new development together with questions about how to protect intangible forms of heritage, local knowledge, and existing local capacities that may determine the long-term effectiveness of local responses.

Just urban adaptation depends on urban histories and how urban inequality congeals into specific urban landscapes. Historical and archaeological records have helped understand how climate changes and how cities change with the climate. Urban histories of colonialism, exclusion, and exploitation are visible in spatial and resource inequalities. Urban histories are drawn in the landscape and manifest in neighbourhoods that face simultaneously environmental risk and economic exclusion. Lack of essential services, a driver of climate vulnerability, is often common in areas with greater exposure to flooding, heating, and drought risks. The 2021 IPCC report demonstrates that documenting urban material histories reveals the interconnected drivers of vulnerability and emissions. The configuration of enclaves and areas of privilege, the enclosure of protected enclaves and subsequent gentrification of urban areas, the imposition of large infrastructure projects that only serve a subset of the urban population: urban history research can make a difference in understanding adaptation possibilities.

Urban history and political science can also help us to understand the impact of social movements on current action narratives. For example, the urban revolutions of the early 2010s in the wake of the global economic crisis linked human rights and democratization claims with concerns about the operation of the capitalist economy, degrading both society and nature. These social movements were closely related to public spaces in urban areas from Tahir Square to Occupy Wall Street. Through art, social media, collective workshops, they demonstrated how placemaking might be an effective strategy to address local vulnerabilities. Similarly, social movements concerned with climate change increasingly appear concerned about the complex linkages between human rights and environmental threats. Social movements have generated a sense of emergency, although mitigation is often emphasised over adaptation. Even though the discourse of emergency has motivated over 2000 emergency declarations among different institutions worldwide, these efforts have not been followed by a commensurable response from the public and private sectors.

Challenges of justice in urban adaptation

Climate change will affect everyone, but some people will suffer the brunt of its impacts more than others. Vulnerable urban communities often have higher exposure to climate change coupled with limited capacity to respond after climate-related events. People's vulnerabilities are shaped by multiple drivers of inequality and how they manifest in social networks — including gender, class, race, ethnic origin, age, level of ability, sexuality, and nonconforming gender orientation. These drivers shape individual and groups' unique experiences of risk and their adaptive capacities.

Gender-based discrimination is still rampant in many cities, and few cities attend to the needs of children and young people, older adults, or less-able people.¹⁰ Racism and discrimination based on sexual orientation and gender equality, religion, class and caste, or ability also impact the lives of people who cannot access social support structures or struggle to join collective movements or communities. Cultural, institutional, and social discrimination became apparent during the COVID-19 pandemic. In the UK, for example, being black increases the risk of hospitalization.¹¹ COVID-19 made the impact of inequality and discrimination visible. The pandemic has had a material effect on the economy that has reinforced these inequalities and created a setback in advances to reduce poverty levels across all countries. Moreover, inequalities have an inter-generational component, as discrimination factors may be passed from one generation to another. Questions of memory and restitution are central to climate justice debates because climate injustice is related to other forms of violence and marginalization which have a material expression in the urban environment.

What conditions exacerbate vulnerabilities to climate change, and to what extent are those conditions recognized? Growing levels of inequality and exclusion have gone hand in hand with rapid urbanization.¹² These inequalities are reflected in spatial patterns in urban environments that mark divides between privileged and disadvantaged communities. One symptom of such urban inequality is the growth of informal settlements where the gap in urban services and housing quality coupled with lack of formal recognition by the state impacts people's lives and livelihoods. Informality is difficult to define (let alone measure), but one such attempt, the Atlas of Informality, points out that informal settlements account for one-third of all the urbanized areas.¹³ A common statistic mentioned is that 1 in 7 people live in informal settlements. Outside informal settlements, many people also suffer from a lack of access to services — because of institutional barriers, affordability, or the material conditions of living. Lack of services compounds the impact of climate change and limits the possibilities for recovery.

Just urban adaptation must actively engage with the forms of spatial inequality already visible in the urban environment, and address them head-on, for example, via urban planning. Citizens can drive processes of knowledge co-production to identify the risks of climate change that people face, how they may affect them, and what responses may be effective and fair. Inhabitants in informal settlements may already experience climate-related adverse outcomes but have limited knowledge of

10 See also policy evidence from Barford, A., Proefke, R., Mugeere, A., Stocking, B. (2021) *Young people and climate change*. The British Academy.

11 CDC (2021) *Disparities in COVID-19-Associated Hospitalizations. Racial and Ethnic Health Disparities*. Centers for Disease Control and Prevention. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/racial-ethnic-disparities/disparities-hospitalization.html>

12 UN-Habitat (2020). *World Cities Report 2020: The Value of Sustainable Urbanization*. Nairobi, UN-Habitat.

13 *Atlas of informality* available at: <https://www.atlasofinformality.com>

how those outcomes may change in the future. Relatively cheap and straightforward responses (such as practical waste collection to reduce flooding, housing designs that facilitate cooling, green public space, transitions to streetlights with solar power, access to clean fuels) may have an enormous impact. Still, climate finance tends to concentrate on large, prestige-oriented infrastructure projects. There are also limited efforts to support the informal economy, even though it constitutes the lifeblood of many cities.¹⁴ The formal economy is emphasized at the expense of informal economy opportunities for social groups that suffer discrimination, exclusion, and poverty.

Climate change is likely to exacerbate these processes, as privileged social groups prioritise measures to protect themselves at the expense of delivering public services for all. Equity must be put at the heart of adaptation measures to ensure that they do not exacerbate existing forms of discrimination. Fighting economic inequality is increasingly recognised as an effective means to fight climate change. Challenging inequality means also challenging, for example, the social structures that enable certain individuals and corporations to drive and maintain high carbon lifestyles at the expense of everyone's security. In that sense, mitigation measures that entail redistribution, such as taxation of polluting behaviours, have an important adaptation value.

Not surprisingly, just urban adaptation is most often linked to actions that challenge the structural drivers of inequalities. Planning strategies for a spatially just city in ways that reflect and represent the diversity of the urban population may work. Still, it cannot be the sole proposition to deliver climate justice. Actions that actively challenge entrenched forms of institutional and cultural discrimination may also be central to advance climate justice, from facilitating work place diversity to questioning the historical and cultural basis of clichés and prejudices that enable the reproduction of discriminatory practices in everyday life.

Climate-resilient development pathways are development trajectories that combine adaptation and mitigation goals, and that acknowledge the interconnectedness between those goals. At the heart of this idea is the possibility of challenging the profound inequalities that shape societies and cities. Recent debates have highlighted that how adaptation happens is as important as what adaptation takes place. A concern with maladaptation — the possibility that climate change responses may do more harm than good — has influenced adaptation debates.¹⁵ There are high risks that urban adaptation may cause maladaptation, particularly when justice concerns are ignored, for example, with the formation of enclaves of privilege securitized at the expense of surrounding neighbourhoods. In this context, we need to move from defining the principles for just transition and seek specific entry points to deliver future cities that work for all. Examples of just urban adaptation may be confined to particular contexts and have small impacts. Still, they always support the collective belief that climate justice is possible even in the context of increasing division and inequality.

¹⁴ UN-Habitat (2020). *World Cities Report 2020: The Value of Sustainable Urbanization*. Nairobi, UN-Habitat.

¹⁵ Eriksen, S., E., Schipper, L. F., Scoville-Simonds, M., Vincent, K., Adam, H. N., Brooks, N., Harding, B., Lenaerts, L., Liverman, D., and Mills-Novoa, M. (2021). "Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance?" *World Development* 141: 105383.

Power and agency in climate adaptation

For the last two decades, adaptation discussions have emphasized responsibility for climate change: who must deliver adaptation and mitigation action and who must finance it. Recent work on local adaptation action, however, highlights the practical aspects of climate action.¹⁶ In practice, a wide range of actors has a direct influence on the urban fabric, from international city networks such as C40 and ICLEI (shaping ideas of best practice in urban environments) to local communities (stepping in to facilitate the provision of services and social support when state services are absent). The role of the local government in facilitating just urban adaptation is well known, but local governments face multiple difficulties. Visible challenges for local governments are:

1. inadequacy of policy frameworks at the national and regional levels that limit the local government's agency;
2. institutional cultures that reproduce inadequate models of decision making, limit integrated planning, or prevent cooperation across departments; and
3. lack of adaptation finance to implement local action.

Demands for flexibility in infrastructures require equally flexible and adaptive structures of power in local governance.

Local governments, communities, and small enterprises face challenges in linking place-specific adaptation to broader challenges. As our understanding of compound risks develops, local approaches that treat specific risks in isolation become untenable. At the same time, many actors operating in the urban environment may not have the capacity or legitimacy to address the broader contexts in which they face risks, whether they are local governments, communities, or small businesses. For example, intense droughts and other climate disruptions may affect food supply chains. Disruptions may be particularly dramatic in the context of agricultural intensification, where urban dwellers may struggle to access food in cities surrounded by commodity crops. In Rosario, Argentina, soya production has displaced the production of food for the city. Since the early 2000s, the local government has partnered with communities and small businesses to develop urban agricultural practices in marginal urban land, helping develop new skills among urban dwellers and creating employment opportunities.¹⁷ In doing so, the city of Rosario has built resilience while also claiming control over food resources — what international activists call food sovereignty. Social movements claiming food, resource, and energy sovereignty re-examine local relations to resources and technologies while facilitating communicative approaches to planning. Some activists see this as a new paradigm to claim agency for people in the quest for urban resilience.

As risks intensify, climate adaptation may become an attractive business opportunity, and thus, private finance may help bridge the adaptation finance gap. Paradoxically, financing large infrastructure projects may be easier than facilitating smaller, nimble projects that may directly benefit urban dwellers. For example, South African planner Vanessa Watson has tracked what she called 'African urban fantasies:' large projects of urban invention that do not relate to the material realities

¹⁶ Castán Broto, V. and Westman, L. (2021) *From Asking Why to Thinking How: Emerging Challenges for Urban Climate Action*. The British Academy.

¹⁷ Sustainable Food Production for a Resilient Rosario won the 2020-2021 Prize for Cities on June 29, 2021. Additional information can be found here: <https://www.wri.org/insights/rosario-urban-farming-tackles-climate-change>

of life in cities, let alone challenge existing drivers of inequality.¹⁸ The fixation with smart cities has also displaced organic models of urban development in favour of fantasies of urban control that invariably entail the deployment of information and communication technologies, with scant attention to the additional risks that such technologies generate. There is a risk that large investment programmes focused on infrastructure, such as the Green New Deal in the US and the European Green Deal in Europe, facilitate the deployment of large infrastructure projects at the expense of new alternatives of nimble and locally managed projects that could advance just urban adaptation. In the light of historical evidence about the long-term evolution of climate change during the industrialization period, there is growing scepticism about short-term responses that end up creating intractable long-term problems.

Large investments led by large companies with limited oversight from the public sector often result in additional hardships for vulnerable communities who see their livelihoods and social worlds disrupted. In addition, such approaches often overlook the opportunities to develop resilience already present in the urban environment. For example, in the context of informality, many people may resort to improvisation and makeshift infrastructures adapting to constantly changing urban settings and building models of urban development that may prove to be robust over the long term. Neighbourhood management groups in different parts of the world already provide collective services from running children's groups, providing security to the community, and allocating collective responsibilities. Such modes of innovation may be a more effective way to deliver just urban adaptation and reach scale through engaging citizens, communities, small enterprises, local institutions, and knowledge intermediaries such as universities, NGOs, and city networks.

As argued above, just urban adaptation also depends on facilitating the inclusion of those sectors of the urban population that are systematically excluded from decision making. Those who suffer discrimination often struggle to influence the policy decisions that affect them directly. While there is a consensus about the need for inclusive urban policy, there is less agreement about what it would mean to facilitate such inclusion. The local government may provide an intermediary level of action that can facilitate participation. Public requests for climate justice have also raised interest in broader involvement, for example, in Climate Assemblies or Citizen Juries — though the effectiveness of these participatory forums is still not apparent, as they primarily operate as advisory rather than executive institutions. Participatory budgeting could help build resilience but there are no empirical examples to demonstrate its effectiveness. Litigation may also be an essential route to contest adaptation actions and propose new ones.¹⁹

Climate justice has a vital component of recognition and due participation, something long recognized in the research literature on environmental justice.²⁰ Urban scholars have put justice-oriented research at the centre of environmental action. Philosophers have raised complex questions about the extent to which existing processes of knowledge production are subject to epistemic injustice²¹ that too often shapes processes of decision making and even the general understanding of the world and what is to be done — gaining agency to respond to the extreme situations under climate change requires producing and claiming relevant knowledge that bridges future climate change impacts with local experiences.

18 Watson, V. (2014). 'African urban fantasies: dreams or nightmares?' *Environment and Urbanization*, 26(1), pp.215-231.

19 Bouwer, K. and Setzer, J. (2021) *Climate litigation as climate activism: what works?* The British Academy.

20 Agyeman, J. (2014). 'Environmental justice and sustainability' *Handbook of sustainable development*, Edward Elgar Publishing.

21 Fricker, M. (2007). *Epistemic injustice: Power and the ethics of knowing*. Oxford University Press.

Knowledge coproduction recognizes the possibilities of bringing together multiple perspectives and types of knowledge to develop actions that improve equality and wellbeing in urban environments²² Co-production is a means to build a common understanding of a problem and deliver more creative means to thinking about the city. It relies on both informal and formal mechanisms of equitable engagement, collaboration and partnership. However, co-production alone is not a panacea. Co-production processes face the same power dynamics that influence social life, and vulnerable communities may see themselves playing a role in co-production process that do not fully recognize their capacities. At the same time, communities that already face discrimination may not be able to engage with collaborations that endanger them. For example, some communities have expressed concern that community mapping exercises may facilitate further discrimination if they provide data that enables evictions or shows the community's dependency on resources. These tensions in the production of knowledge need to be navigated accepting uncertainty, focusing on the creation of collective visions through working together, setting precedents, building political capabilities, create unlike alliances, mobilising cultural heritage, and an ethics of care.

Inclusive urban adaptation calls for moving away from victimizing communities, looking instead towards the structural causes of vulnerability on the one hand and the need for measures that harness the potential of those communities to respond to the challenges of climate change. Heroic narratives that dominate Western literature prevent our engagement with collective-led narratives that can mediate the construction of future communities and multi-scalar solidarities.²³ Rather than searching for a saviour (a daring politician, a new incredible technology) we need to work together to build collective solidarities capable to withstand the rising tides. Urban areas, as centres of action and innovation for social movements and urban communities, provide spaces where such alternative perspectives can emerge to reclaim collective human capacities. Climate justice also raises broader political questions about the enduring legacies of colonialism that shape urban inequality today and increasing demands for racial justice that are increasingly visible in climate movements. Creative engagements with black futurism, feminist practices of care, or queer research²⁴ are an invitation to re-examining social structures that we take for granted (white supremacy, heteropatriarchy, gender stereotypes) and constitute the societies and economies that caused climate change in the first place.

22 Hemström, K., Simon, D., Palmer, H., Perry, B., and Polk, M. (2021) *Transdisciplinary Knowledge Co-production: A Guide for Sustainable Cities*, UK: Practical Action Publishing <http://dx.doi.org/10.3362/9781788531481>

23 Gosh, A. (2016). *The Great Derangement: Climate Change and the Unthinkable*. Chicago, University of Chicago Press.

24 See for example: Patrizio, A., (2020). 'Ecologies of feminism and the queer'. In *The Ecological Eye* (pp. 60-76). Manchester University Press.

Conclusions and Key Points

- Urban adaptation generates a new landscape of urban adaptation policies that intersects with the social infrastructure of cities. Increasing concerns about how inequality and discrimination shape adaptation possibilities, alongside questions about the aims and goals of adaptation, put justice at the center of debates on urban adaptation.
- Just urban adaptation must actively engage with the forms of spatial inequality already visible in the urban environment. History is a central factor shaping adaptation possibilities — histories of unequal social interaction sediment into infrastructure through land values and tenure and shape vulnerabilities to climate change impacts in every city.
- Just urban adaptation raises deeper questions beyond design and implementation in relation to how infrastructure is embedded in socio-cultural structures — tied with existing practices, regulated by existing institutions, responding to culturally situated needs and desires.
- Mitigation measures support adaptation because they are a means to prevent the root causes of climate change, thereby reducing the need for future adaptation and avoiding extreme scenarios where adaptation becomes impossible.
- Vulnerable urban communities often have higher exposure to climate change coupled with limited capacity to respond after climate-related events. People's vulnerabilities are shaped by multiple drivers of inequality and how they manifest in social networks — including gender, class, race, ethnic origin, age, level of ability, sexuality, and nonconforming gender orientation. These drivers shape individual and groups' unique experiences of risk and their adaptive capacities.
- Climate justice has a vital component of recognition and due participation, something long recognized in the research literature on environmental justice.
- Knowledge coproduction recognizes the possibilities of bringing together multiple perspectives and types of knowledge to develop actions that improve equality and wellbeing in urban environments. Co-production is a means to build a common understanding of a problem and deliver more creative means to thinking about the city. It relies on both informal and formal mechanisms of equitable engagement, collaboration and partnership.
- Citizens can drive processes of knowledge co-production to identify the risks of climate change that people face, how they may affect them, and what responses may be effective and fair.
- In practice, a wide range of actors can influence on the urban fabric to facilitate urban adaptation, from international city networks such as C40 and ICLEI to local communities.

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