





# Chapter 10:

## Building Climate Resilience in Urban Areas

### *Quick facts*

1. The intersecting challenges of climate change and urbanization have been on the global development agenda for decades, yet action on the ground is still failing to keep pace with the worsening impacts.
2. Cities are only as resilient as their most vulnerable inhabitants: urban resilience cannot be achieved without putting fairness and equity at the centre of urban climate action.
3. Most of the solutions cities need to respond decisively to climate change are already available.
4. Resilience interventions achieve the greatest impact when they harness local resources and deliver collective benefits.

### *Policy points*

1. Resilience should be negotiated with communities, rather than imposed on them: a negotiated approach can open up different perspectives and enable the most vulnerable to define what form it should take.
2. City authorities should move beyond top-down hierarchies to embrace their role as coordinators, striving to engage a broad range of stakeholders to share responsibility for climate resilience.
3. Urban resilience is not a fixed end-point that cities reach through a single prescribed pathway, but rather a horizon to travel towards through incremental steps.
4. Rather than focusing on the specific, immediate symptoms of climate change, cities should embrace a more holistic approach that addresses the root causes of vulnerability.

In the first decade of the 21st century, a period that culminated with the publication of UN-Habitat's *2011 Global Report on Human Settlements on Cities and Climate Change*,<sup>1</sup> interest in the role of cities in responding to climate change grew. The increasing frequency of disaster events globally was motivating cities to focus greater attention on how to alleviate their climate vulnerabilities through policy and planning. Globally, there appeared to be a strong consensus that, in the words of UN-Habitat, “the effects of urbanization and climate change are converging in dangerous ways”.<sup>2</sup> However, despite this apparent momentum, urban policy is still not keeping pace with the threat of climate change even in cities most exposed to its impacts,<sup>3</sup> let alone develop into transformative action.<sup>4</sup> Some explanation for this disconnect can be found in the vagaries of short-term planning and policy cycles.<sup>5</sup> The disconnect also results from a constrained view of urban resilience.

The evidence that emerges throughout this report is that current climate change action is insufficient, given the urgency of emission reductions and resilience building. As the IPCC argues, every fractional increase in global average temperatures will reduce the window for achieving a safe and sustainable future. At the same time, cities are at the forefront of climate risks and could play a vital role in bridging the “adaptation gap”. It is important to remember that options already exist: each of the chapters here provide a wealth of information about how existing knowledge, technologies and community-based approaches can be streamlined into planning, infrastructure development, governance, innovation and finance.

A recurrent theme throughout this Report is the importance of a people-centred approach to climate action: communities must be at the centre of any meaningful climate action in urban areas. While this offers an overarching principle that is relevant to almost any context, the sheer diversity of local conditions, needs and capacities in different settings makes it almost impossible to develop a single roadmap for cities to achieve resilience. Actions to advance urban adaptation and mitigation must be tailored to specific locations and timescales; at the same time, no action will deliver climate-resilient development once and for all. In practice, delivering climate-resilient development in cities and urban areas depends on open-ended processes in which outcomes to some extent always remain provisional—and dependent, too, on the interpretation of multiple actors with very different points of view.

These are the contradictions and uncertainties that a people-centred approach to climate action must necessarily embrace. Climate-resilient development is not a fixed destination, but rather a horizon that can guide urban development towards inclusive and solidarity-based decision-making. In this context, this chapter asks what urban managers can do to deliver effective, inclusive and just climate action. By urban managers, this chapter refers particularly to officials and policymakers in local governments but also acknowledges that many different actors can act as urban managers on different occasions: national government officials responsible for urban policies, consultants developing master plans, NGOs organizing community groups in neighbourhoods, companies investing in urban social enterprises and many others.



**The evidence that emerges throughout this report is that current climate change action is insufficient, given the urgency of emission reductions and resilience building**

The chapter provides an action-oriented framework to understand climate-resilient development in cities, beginning with recognition of the complex nature of urban resilience and the need to adopt multi-dimensional, multi-scalar and long-term approaches to deliver it. In addition, focusing on the inclusive aspects of urban resilience, the framework highlights the importance of committing to a negotiated approach to climate action. The framework explores different styles of resilience delivery, aiming to balance expert-led approaches with those pioneered by communities themselves. Finally, building on the findings of what has already been covered in this report, the chapter reflects on the transformative possibilities of different actions, including infrastructure development, multi-level governance, sustainability innovations and sustainable finance, to address the structural drivers of climate vulnerability in cities. The chapter finishes by reflecting on the value of envisioning future scenarios to develop focused and inclusive climate action.

## 10.1 Putting Urban Resilience into Action

This section explores how cities can put resilience into action, beginning with an exploration of the complex and contested nature of how resilience itself should be defined and delivered. With that in mind, it goes on to make the case for a negotiated approach to resilience – one that recognizes the need to tolerate and indeed welcome disagreement and conflicting perspectives into the process from the very outset, allowing a range of stakeholders (in particular, those most marginalized from traditional decision-making) to define the priorities. Finally, it offers a brief overview of some of the different models, from “shock-proofing” to “resilient community development”, that have guided urban climate action.

### 10.1.1 The complex nature of urban resilience

Urban resilience is shaped by the complex interactions between communities, markets, ecosystems, infrastructures and the wider societal system in which a city is situated.<sup>6</sup> As shown in Figure 10.1, resilience is determined by humans and their engagement with their surroundings: in addition to individual resilience, their resilience is also the product of their relationship with ecosystems, resources and technologies. Consequently, urban resilience transcends conventional silos of analysis because of its emphasis on the interconnectedness that characterizes city systems.<sup>7</sup>

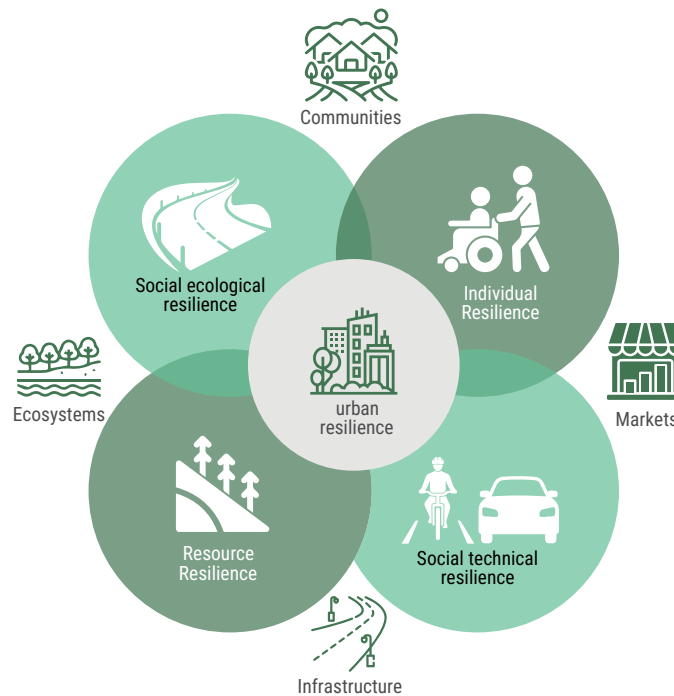
**Figure 10.1: Dimensions of urban resilience**

Illustration by Vanesa Castán Broto

Today, resilience is recognized as a multi-sectoral, multi-dimensional and multi-stakeholder effort that requires effective collaboration and cooperation across various scales. This is because the dimensions of climate resilience—and indeed, of climate vulnerability too—are interrelated and mutually reinforcing. Resilience should therefore be viewed from an integrated perspective that cuts across sectoral boundaries and brings together a variety of stakeholders across the city. This was why the 100 Resilient Cities Program, launched in 2013 and funded by the Rockefeller Foundation, appointed a dedicated Chief Resilience Officer to oversee the different activities and ensure their efforts were not obstructed by sectoral boundaries.<sup>8</sup> While the programme results were mixed, and there is still work to do to integrate social justice concerns into the concept of resilience, the position of the Chief Resilience Officer constituted a critical institutional innovation that advanced the practice of urban resilience.<sup>9</sup>



**Urban resilience is shaped by the complex interactions between communities, markets, ecosystems, infrastructures and the wider societal system in which a city is situated**

In addition, urban resilience is a relational property: it cannot be isolated into a single element of the city. Instead, resilience connects different components that together make the city more than the sum of its individual parts. This means urban resilience emerges from

different dependencies, connecting the city with wider global networks. A multitude of threats—from terrorism and pandemics to economic recession and climate-induced hazards—make risk and uncertainty a routine feature of urban decision-making and foster a culture of being in perpetual preparation.<sup>10</sup> This may be overwhelming for urban decision-makers and managers who already face restrictions in overseeing the day-to-day functioning of cities and urban settlements, with no discretionary funding available to invest in potential or future risks. Two considerations may help in engaging productively with the notion of resilience: reflecting on the *timescales* of different risks, and considering the best *spatial scale* to intervene to build urban resilience.

Chapter 3 provides an overview of the risks posed by climate change to urban areas. Urban areas in low-elevated coastal zones face both rapid- and slow-onset impacts, from typhoons and flooding to rising sea levels. Slow-onset events such as heatwaves, while often attracting less attention than large-scale but isolated natural disasters such as tsunamis, will result in increasingly challenging living conditions in urban areas. For urban managers, this means engaging in diverse strategies to manage the relationships between urban systems, ecosystems, infrastructure and resources. Rather than one-off actions to protect the city, resilience calls for building an ongoing culture of managing and addressing disasters, emphasizing social and ecological protection over the longterm. Resilience needs to be built into every aspect of urban management, harnessing the city's available resources and mobilizing every segment of its population. Adaptive social protection programmes, such as community health or livelihood support programs, are the most effective way of managing resilience in slow-onset events.

The second challenge is identifying the appropriate scale for action to build urban resilience. Given that resilience encompasses a wide range of sectors, assets and constituencies, from globalized markets and regional ecosystems to city-wide infrastructure networks and community-led initiatives, urban managers find themselves working to create alignment between government bodies, private sector entities and local residents.<sup>11</sup> At the same time, resilience requires a certain level of autonomy. Communities may find that government policies to deliver resilience at a city level result in repressive practices that reduce rather than increase the resilience of some households or settlements.<sup>12</sup> Resilience should develop organically in the communities themselves: it needs to be negotiated rather than imposed. Ultimately, resilience efforts are at their most successful when they harness local resources and initiatives to deliver collective infrastructure and service provision.<sup>13</sup> When this happens, local capacity and social networks are progressively strengthened, empowering communities to develop autonomous, context-specific solutions to climate change.

Of course, it is also the case that communities may themselves drive exposure to risks. For example, on the Gold Coast in Australia, communities gravitate towards areas closer to the sea, which are perceived as more desirable despite the risks.<sup>14</sup> In these circumstances, local governments

may find that demand for land and housing may conflict with attempts to increase resilience. Consequently, an effective resilience agenda needs to enrol all urban actors as responsible collaborators in the process. As Chapter 2 emphasizes, it is vital to move past the perception that lack of government ambition, whether at the national or local level, is the only obstacle to advancing policies to reduce emissions and protect the safety of communities. Instead, the journey towards urban resilience has multiple pilots at its helm, requiring governments, businesses and communities to work together towards a common goal.

In summary, a resilience perspective will promote integrated approaches to urban decision-making, redefining the role of the local government as a coordinator, and distributing responsibilities among different actors. For example, the city of Rotterdam in the Netherlands, one of the participants in the 100 Resilient Cities program, transformed its response to environmental vulnerability by moving from specific actions to address the direct effects of flooding to a broader social and ecological resilience agenda. By increasing sectoral integration across multiple scales of action, as well as recognizing the autonomy of diverse actors beyond the state, Rotterdam successfully expanded its field of intervention to include a wide range of potential threats, from food shortages to cyber-attacks.<sup>15</sup>

**Table 10.1: Rotterdam’s resilience approach before and after participating in the 100 Resilient Cities program**

	Before the 100 Resilient Cities program	After the 100 Resilient Cities program
Scope of resilience agenda	<ul style="list-style-type: none"> <li>Focus almost exclusively on water management and flooding.</li> </ul>	<ul style="list-style-type: none"> <li>Integrated approach encompassing water safety and flooding, cyber security, infrastructure robustness, socioeconomic protection and inclusion of vulnerable groups, clean air and ecological quality.</li> <li>Emergency strategies are broadened to consider food security, drinking water supply, energy access and electronic data.</li> </ul>
Institutional changes	<ul style="list-style-type: none"> <li>Led by individual sectors, with few joined-up initiatives concerning flooding and safety.</li> </ul>	<ul style="list-style-type: none"> <li>Resilience is redefined as an integrated, cross-cutting challenge: the local government becomes a coordinator or node between diverse actors, including businesses, NGOs, communities, and the public.</li> <li>Relations between departments within the city government also increase.</li> </ul>
Resilience responsibilities	<ul style="list-style-type: none"> <li>Resilience is regarded as a task for national or local government.</li> </ul>	<ul style="list-style-type: none"> <li>An inclusive approach to resilience that recasts resilience as a task for public government, NGOs, private companies, as well as individual citizens.</li> </ul>

Source: Spaans & Waterhout, 2017.

### A negotiated approach to urban resilience

For many cities, “resilience” regularly headlines environmental assessments, spatial strategies and economic plans, even if the exact meaning of the word itself is rarely interrogated. However, given the complexity of the concept, it begs the question: what form of resilience is being promoted? Indeed, historically resilience has entailed a broad and at times contradictory range of ideas, depending on how shocks are approached:<sup>16</sup>

- Approaches that emphasize *endurance and absorption of shocks through robustness and redundancy*, especially in infrastructure systems;
- Approaches that emphasize *prevention of shocks through preparedness strategies*;
- Approaches that emphasize *anticipation of shocks through embedded resilience practices* in everyday life;
- Approaches that emphasize *mediated transformations for a more resilient environment*.

Thus, practical strategies for urban resilience may aim to mobilize resources in response to shocks, attempt to prevent them through careful planning or seek to integrate shock management into daily life. This may generate contradictions. For instance, one of the central aims of building resilience should be that communities are able to maintain continuity in their own lives. At the same time, however, for people living in high-risk areas, displacement may be the only option to ensure their long-term security and a more sustainable future. In this regard,

even relatively successful resettlement projects can be challenging. For example, the village of Vunidogoloa on Vanua Levu, Fiji’s second largest island, suffered multiple challenges related to seawater inundation, salinization and cyclone exposure. In response, in 2009 authorities began the process of relocating 26 households living on the shoreline of Natewa Bay to a new village one mile inland, with construction starting in 2012. However, while some of the villagers described the relocation as a “blessing”, it also disrupted established cultural and social relations in the process. Furthermore, as the community were excluded from the technical aspects of the project, such as the housing design and village layout, the project also undermined their autonomy.<sup>17</sup> While relocating may have increased resilience, the failure to mobilize local perspectives and knowledge represented a missed opportunity.

Figure 10.2 outlines a non-exhaustive list of some common characteristics associated with urban resilience, none of which is easy to define or characterize. It shows that urban resilience is complex to define and even more challenging to measure and evaluate.<sup>18</sup> Quantitative indicators may be helpful in some situations (for example, the number of households safer due to the relocation) but may miss less understood aspects of urban resilience (for instance, the potential disruption of local livelihoods because the current urban layout is inappropriate). For this reason, urban resilience is better thought of as emerging through the interaction between *concrete measures that strengthen or stabilize ecosystems, markets, technological networks and communities*—in this instance, the decision to invest in housing and infrastructure in a safer area away from the shore—and the *governance and decision-making processes that determine how these are planned and implemented*: the latter should help create a social dialogue that reveals multiple perspectives on urban resilience and their inherent contradictions.



Storm surge barrier, Rotterdam, Netherlands © Shutterstock

**Figure 10.2: Normative attributes that confer resilience in preparing or responding to shocks**

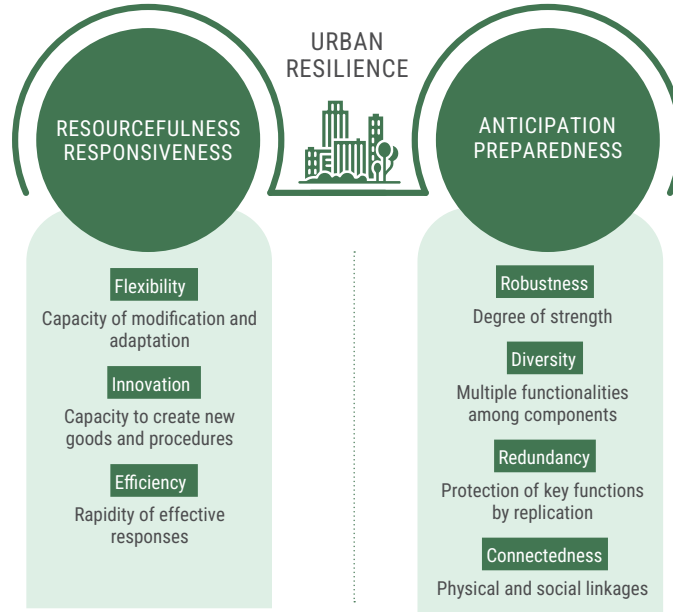


Illustration by Vanesa Castán Broto

A negotiated approach to urban resilience avoids pre-defining its components, instead focusing on actions emerging through the dialogue and negotiation of multiple interests in the city.<sup>19</sup> Negotiated urban resilience requires that such negotiations occur at the point of defining the normative aspirations of resilience. For example, in Seville (Spain), community-led movements have fostered a shift away from grey infrastructure to nature-based solutions (NbS) to climate change impacts.<sup>20</sup> Following the municipality’s publication of its climate change adaptation plan in 2017,<sup>21</sup> followed in 2019 by the local water utility company’s adoption of a climate emergency plan,<sup>22</sup> most of the budget for these plans was initially allocated to engineered measures such as advanced water treatment systems, retention tanks and rainwater sewer systems.<sup>23</sup> However, the active role of residents has led to the development of NbS such as parks, urban farms and renaturing. These responses have created a new model of resilience that addresses multiple risks (drought, flooding and heat) while also tackling social challenges and inequalities in the city.



**A negotiated approach to urban resilience avoids pre-defining its components, instead focusing on actions emerging through the dialogue and negotiation of multiple interests in the city**



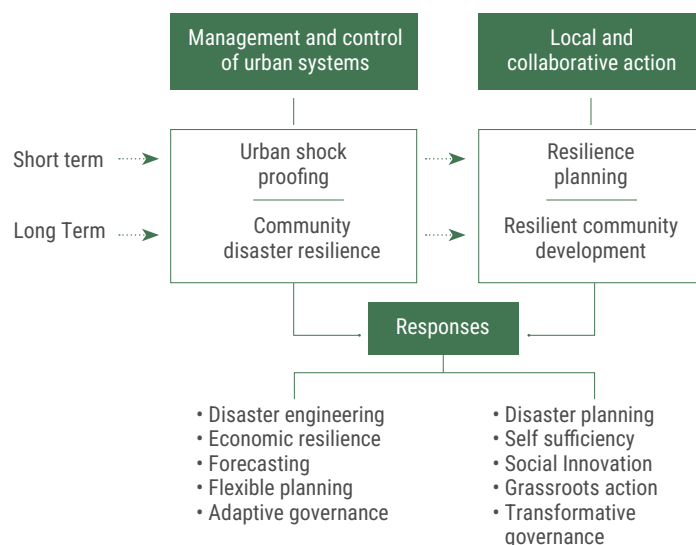
Seville, Spain cityscape with Plaza de Espana buildings. © Shutterstock

### 10.1.3 Styles of resilience delivery: from shock-proofing to resilient community development

Despite the need to reconcile top-down, technocratic planning with the collaborative, bottom-up thinking that is increasingly prevalent today, there is still a marked gap between these two approaches. Both are well represented in the urban resilience activities of different international organizations (including UN-Habitat and various other UN agencies) and the World Bank. In practice, there remain significant tensions in the deployment of different visions of resilience in urban policy and planning, from reactive “shock proofing” to long-term “resilience

planning”, from top-down “management” to bottom-up “collaboration” (Figure 10.3).<sup>24</sup> In this regard, a particular concern is how an over-emphasis on technocratic responses tends to obliterate the political aspects of resilience. In practice, policy makers “must decide which system is to become resilient, with respect to what threats, at what scale, for what purpose, and for whose benefit”: given that these decisions can have profound and wide-ranging implications for cities and their populations, “the question of who uses the concept of resilience and how is, therefore, also a question of power”.<sup>25</sup>

**Figure 10.3: Styles of resilience delivery**



Source: Based on Wardekker, 2021.

*Urban shock-proofing* refers to sectoral, system-specific actions to address specific shocks such as floods, heatwaves or droughts. Tools such as early warning systems, “city dashboards”, forecasting tools and stress tests are central to this approach. Shock-proofing may also be directed towards maintaining the functionality of a particular sector, such as transport, in urban development strategies (Box 10.1). Measures to facilitate urban shock-proofing are ubiquitous and often benefit from significant funding. For example, the Climate Investment Fund Smart Cities Programme focuses on successful urban shock-proofing projects.<sup>26</sup> This programme, together with the World Bank, funded the Mozambique Cities and Climate Project: among the areas targeted was the coastal city of Beira,

where the programme combined an emphasis on “hard” infrastructure to upgrade the city’s stormwater drainage system with a nature-based approach to flood prevention that included the planting of 7,000 trees and mangrove restoration.<sup>27</sup> In many cases, these projects build on ongoing initiatives by incorporating the risk-proofing element into sectoral interventions. While these investments are unlikely to support transformations, they may foster productive partnerships between the government, civil society and the private sector, potentially increasing resilience if they do not exacerbate existing inequalities.



### Box 10.1: The challenge of shock-proofing urban transport in Pune, India

The Pune agglomeration, comprising the cities of Pune, Pimpri and Chinchwad, is a large and expanding metropolitan area with a population of more than 7 million people. Its rapid urbanization has brought a number of challenges, particularly as a result of the growing number of commuters from adjacent areas and a transportation system still heavily dependent on fossil fuels. According to the 2023 Tomtom Traffic Index, Pune was ranked the seventh most congested city in the world.<sup>28</sup> Unsurprisingly, this had had a significant impact on air pollution: data collected by the Indian Institute of Tropical Meteorology in 2018, for instance, showed that Pune Metro's levels of PM2.5 air pollution had increased by 60 per cent in the space of just five years. Research by another organization, Urban Emissions Air Pollution Knowledge Assessment, also estimated that in 2014 Pune's PM2.5 levels were already more than four times over the World Health Organization's recommended limit.<sup>29</sup>

The city's daily flow of commuters is made up of a heterogenous mix of vehicles, with private vehicles accounting for almost half (47 per cent) of the modal share, with the remainder distributed between public transport (12 per cent), intermediate public transport (7 per cent) and non-motorized transport (33 per cent).<sup>30</sup> While Pune's public transport is operated with clean fuel (CNG and electric), with 1,570 vehicles on the road the current fleet is not sufficient to meet existing demand.<sup>31</sup> Auto-rickshaws, meanwhile, which offer last-mile connectivity, have increased to almost 136,000 in 2023 (amounting to 1,850 auto rickshaws per 100,000 population) and operate alongside 100,000 app-supported taxi services. This has created many challenges within Pune's transportation system. The reluctance of many residents to use public transport has contributed to the proliferation of private vehicles, while many informal rickshaw operators—though playing a vital role in connecting areas that lack formal transit infrastructure—are unregulated.

An integrated and accessible public transportation system is key to strengthening the resilience of the metropolitan area as it continues to grow. Promoting accessible, low-carbon public transportation will not only reduce pollution levels and enhance quality of life for residents, but also help the city in reaching its emission reduction targets. Pune was in fact an early pioneer of public transport, with the introduction of its Bus Rapid Transit System (BRTS) in 2006 (Pimpri and Chinchwad both followed suit in 2008).<sup>32</sup> However, the BRTS faced challenges due to poor project planning, poor receptivity from commuters and the public, who preferred private vehicles over the BRTS, and a lack of commitment from transport authorities. Subsequently, Pune has shifted its efforts towards the development of a Mass Rapid Transit System (MRTS) that will ultimately cover more than 165 kilometres (km),<sup>33</sup> with around 30 km operational as of September 2024. The proposed metro lines were prioritized over the BRTS and designed to follow the same routes, despite the significant financial drawbacks (MRTS's estimated costs are almost six times higher than the BRTS). The MRTS is also less flexible than the BRTS and poorly integrated with last-mile connectivity vehicles. Large infrastructure projects such as the MRTS also reduce the city's green cover, reducing protection against air pollution.

Shock-proofing transport requires measures to maintain mobility through a multitude of transport routes, infrastructures and nodal links, at the same time fostering diversity in transport modes, planning for population growth and addressing the risk of large-scale travel disruptions.<sup>34</sup> In this regard, the flexible fleet of autorickshaws plays a crucial role in maintaining mobility. However, transport resilience in the longterm requires also addressing air pollution and the increasing inequalities in addressing transport. The process of implementing the BRTS failed to include Pune's public and hindered the project's success. There are doubts about whether the MRTS offers a sustainable alternative and will be successfully integrated into the current heterogeneous fleet. These outcomes demonstrate how shock-proofing an isolated sector is unlikely to make a tangible difference in the city's resilience unless a more holistic approach is deployed. Resilience thinking calls for a comprehensive assessment of needs and inequalities in the transport system, beyond the certainties offered in mathematical models that do not reflect urban development's realities.

*Resilience planning* takes the lessons of urban shock-proofing, developing an integrated notion that articulates the more complex aspects of urban systems with a long-term perspective. This enables the rich toolbox of adaptive planning and governance to be deployed at the urban scale, from city labs and design competitions to scenario visioning tools and tailored insurance instruments. Many of these approaches build on the legacy of the 100 Resilient Cities mentioned above (Box 10.2). For example, resilience planning may be an essential tool for maintaining ecosystem resilience and developing NbS to rising sea levels, rather than relying on engineered coastal defences that may create additional risks for the inhabitants of coastal cities like Singapore.<sup>35</sup> Long-term thinking

tends to show interdependencies between different sectors that short-term approaches overlook. For example, an extended scoping exercise to future-proof water infrastructure in the city of Avignon, France, identified an area of vulnerability that had not been addressed in the existing short-term plans: the city depended on a valve-based flood protection system powered by the grid, meaning it would lack protection in the event of a power failure.<sup>36</sup> Building long-term resilience tends to facilitate the integration of concerns across different urban sectors. However, despite its integrated approach, resilience planning may overlook complex social dynamics and power relations (see Box 10.2).<sup>37</sup>

## Box 10.2: Resilient planning in Asian cities

The Temasek Foundation Urban Resilience Program (TFURP), launched in 2021, is a capacity-building program targeting city leaders. It is funded and managed as a collaboration between the Singapore-based Temasek Foundation, the Centre for Liveable Cities in Singapore and the Resilient Cities Network, the legacy of the 100 Resilient Cities programme.

Surat, in India, is one of the first cities to receive support through TFURP. In 2017, Surat published a City Resilience Strategy.<sup>38</sup> The strategy was organized around seven pillars, following the 100 Resilient Cities framework: connectivity and mobility; affordable housing; water availability and quality; economic dependence from dominant sectors; ecosystem and environmental regulation; social cohesion; and public health. One goal was to control pollution and conserve water from the Tapi, the main river supplying water to the city.

In 2022, the city presented its proposal for enhancing the River Tapi at the World Cities Summit. The proposal included three main actions: the design and construction of an additional barrage to provide water security, a feasibility study for the construction of a tertiary sewage treatment plant, and an integrated plan for riverfront development and social inclusion.<sup>39</sup> A stakeholder workshop, including experts, informed the strategy. Still, explicit efforts have not been made to incorporate other voices, such as those living in informal settlements that are likely to be affected by the proposals: the proposal remains an expert-led outlook on the city's needs.<sup>40</sup>

*Community disaster resilience* emerges from bottom-up experiences managing shocks and disasters at the neighbourhood scale. Various tools can be used to integrate risk knowledge with community perspectives and proposals for action, including indicator studies and maps, communication and education programs, and different modalities of participatory workshops to map risks or facilitate decision-making. Community disaster resilience is particularly relevant in areas where communities already live with frequent disasters, such as Indonesia and the Philippines.<sup>41</sup> In the United States, the National Institute of Standards and Technology has published a guide for communities to advance resilience in buildings and infrastructure systems.<sup>42</sup> The guide recognizes that communities have limited resources for resilience-building actions and aims to identify affordable steps towards resilience and align resources with priorities.

Community disaster resilience may start by bringing together multiple stakeholders for a collaborative planning process, and a key aspect is the identification of existing points of vulnerability in housing and infrastructures and their performance during a hazard. For example,

the designated committee could examine existing conditions of critical facilities (emergency operation centres, emergency services, police and fire stations, hospitals, non-ambulatory facilities such as prisons or nursing homes, critical industries), emergency housing and shelters, and housing and neighbourhood facilities for community recovery. A detailed discussion of community living conditions may help identify hazard protection measures effectively. Nevertheless, community disaster resilience may overlook broader interconnections and city-wide shocks. It has also been criticized for shifting the responsibility to communities, thereby minimizing the responsibility of city governments to protect their citizens.<sup>43</sup>

*Resilient community development* expands this approach by emphasizing the social embeddedness of risks and envisaging a transformative approach to delivering urban resilience. The combination of tools from the other approaches, such as participatory and collaborative planning, long-term visioning, citizen science, co-design laboratories and intersectional analyses, may all lead to the development of systematic methodologies for resilient community development. For example, the collective production of multiple resilience narratives (political, institutional, experiential) may help map alternatives for transformative change that put the concerns of communities at their core. There are few examples of resilient community development, but there is great potential to build on previous experiences of delivering resilience and move towards more transformative approaches. The following sections emphasize what a transformative approach to resilient community development could look like, building on a people-centred approach to resilient urban futures.

## 10.2 Navigating Climate-Resilient Development Pathways

What are the possible pathways to deliver climate-resilient urban development? Climate-resilient development pathways (CDRPs) are shared courses of action across society that put at their core the improvement of the well-being and prosperity of all people, especially those who are most vulnerable, while reducing carbon emissions and risks from climate change.<sup>44</sup> CDRPs emphasize development and challenge vulnerabilities, enriching a people-centred approach to urban resilience. As Chapter 1 explains, the integration of adaptation and mitigation objectives results in new opportunities for sustainable development.<sup>45</sup> The IPCC uses pathways to represent specific sequences of actions and consequences, emphasizing the complex decision-making processes at different societal levels. The cumulative impact of various choices leads to different levels of resilience, but every choice that reduces climate resilience also reduces the options for further action (Figure 10.4). This is an iterative, cumulative process, but every choice that reduces resilience creates path-dependence mechanisms that make it harder to shift the direction of travel. While there is no single, linear path to a climate-safe future, every urban management decision advances or hinders resilience in some way.

**Figure 10.4: Decision points to choose climate-resilient development**

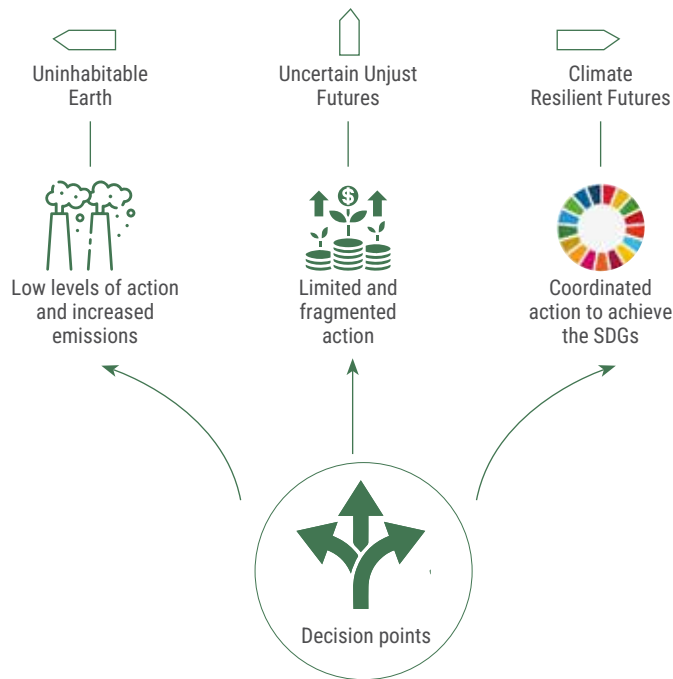


Illustration by Vanesa Castán Broto

The normative perspectives on resilience discussed in Section 10.2 provide a framework for evaluating decisions. Assessing the resource and knowledge base also supports resilience. Chapter 2 explains that despite their importance in climate-resilient development, cities still have inadequate resources for mitigation and resilience building, especially climate funds. These gaps are particularly prominent in rapidly growing cities facing significant infrastructure gaps and sprawling informal settlements. The exacting demands of some resilience-building approaches may be overwhelming for cities already facing profound challenges in maintaining city living. However, as previous chapters show, there is a menu of feasible options that every city can adopt.



**Building resilience requires an understanding of exposure and sensitivity to different climate change-related hazards**

**10.2.1 Assess interconnected urban risks**

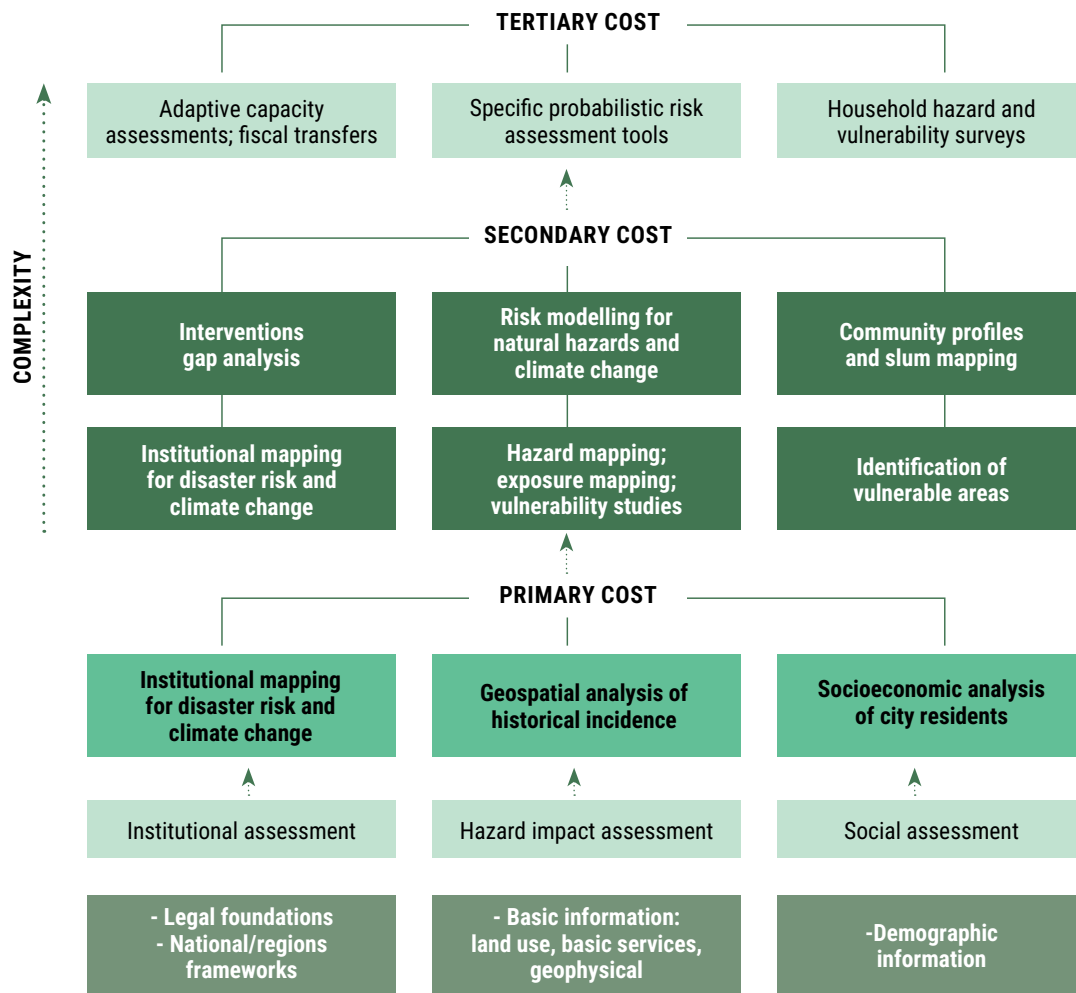
Building resilience requires an understanding of exposure and sensitivity to different climate change-related hazards. For urban managers, the question is how to balance the assessment with the potential resources and capacity to act. Risk assessment is an essential tool that, beyond informing sectoral plans or masterplans, should be regularly consulted in municipal strategy and operations. Guidance from the World Bank on Urban Risk Assessment (URA) proposes assessing hazards alongside socioeconomic and institutional assessments (Figure. 10.5). This approach requires a geospatial analysis of the historical incidence of risks and forecasting tools.



**Resilience is a way of thinking that puts risk, vulnerability, sustainability and inclusion at the heart of climate action**

Resilience is a way of thinking that puts risk, vulnerability, sustainability and inclusion at the heart of climate action. By adopting such a way of thinking, those seeking to activate change may be able to deliver more sustainable urban futures starting with feasible, workable action that can lead to future transformative change.

Figure 10.5: Risk assessment levers and pillars



Source: World Bank, 2022.

Chapter 3 provides an overview of the risks threatening cities. The chapter also shows the availability of information and data to understand those risks in the form of the Global Human Settlement Layer produced by the Joint Research Centre of the European Commission and the Copernicus Emergency Management Service. This resource supports all phases of disaster risk management. However, a full risk assessment may not always be possible. The World Bank's URA proposes three assessment tiers (primary, secondary and tertiary) as shown in Figure 10.5:

- The *primary level* involves an assessment using limited resources to assist cities in identifying hazard-prone areas and basic climate change impacts, as well as plan for disaster preparedness. This may involve simple risk maps through the overlay of a base map, a socioeconomic profile, a hazard profile based on historical hazards, and any projected growth and development maps.
- The *secondary level* mobilizes additional resources to support early-warning systems, estimation of losses, policy coordination, risk reduction measures and community-based programmes for risk reduction. For example, built-up area maps (which integrate a map of the building's footprint and estimated height) define built environment typologies and inform loss scenarios. The assessment relies on more advanced techniques, requiring more financial and technical resources to develop disaster-response capacities and to plan and implement non-structural measures to reduce risk
- The *tertiary level* focuses on developing probabilistic tools for risk assessment, and advanced risk management policies from early-warning systems to large-scale adaptation programmes. Box 10.3 describes the application of different approaches to urban risk assessment in different cities. As fuller understandings of urban risks are gained, their interconnections can also be assessed. Institutional analysis and vulnerability analysis are also important parts of risk assessment. However, as understanding of vulnerability increases, the need for more detailed assessments grows.

### Box 10.3: Different approaches to urban risk assessment: Case studies from Senegal, Philippines and Yemen

With the development of new digital technologies and the expansion of available data sources, urban risk assessment is a rapidly evolving field that is of particular relevance to climate resilience planning. There are a range of methodologies that can be deployed in this context, with varying degrees of detail and sophistication. Some examples (classified in line with the primary, secondary and tertiary levels in the URA) are presented below:

- *Multi-hazard mapping (primary level)*: given the improved availability of geographical and hazard data, cities have greater opportunities to deliver hazard assessments even in contexts where capacity and resources are relatively constrained. These can, for instance, develop a picture of risk from observation and analysis of existing climate impacts. The capital of Senegal, Dakar, for instance, faces natural hazards such as flooding, coastal erosion, drought and the threat of rising sea levels due to climate change. In June 2009, an urban risk assessment was conducted for a pilot study, with the intention of creating feasible methodologies for risk assessment in cities with strained resources. The assessment mapped hazards using available information such as population maps, land-price data and land cover information derived from Landsat satellite images. Spatial analysis showed that the city had undergone massive spatial transformations over the previous 20 years, and it helped to identify risk hotspots in peri-urban areas and derive an approximate loss scenario.
- *Detailed scenario mapping (secondary level)*: This approach involves more detailed inputs and analysis, such as future projections or the synthesis of different data typologies. The case of Legazpi, in the Philippines, illustrates a more advanced approach, integrating GIS and remote sensing data to develop a detailed picture of built-up area, land use and land cover, buildings and height assessments and population data to assess densities. The assessment considered different building typologies and their vulnerability (reinforced concrete, traditional brick construction with or without concrete reinforcements, assembled materials, timber). After consulting the Emergency Events Database to assess the main risks in the city, two damage scenarios were developed for tsunamis and earthquakes.
- *Probabilistic hazard modelling (tertiary level)*: This involves the use of sophisticated modelling. An example of this approach is the assessment of storm-water drainage in Sana'a, the capital of Yemen. The city is in an inter-mountainous plain which contains many wadis and faces frequent flooding during the annual rainy season, resulting in property damage and traffic congestion. A probabilistic risk assessment was developed to build a storm-water system, the Saylah Project. The risk assessment in Sana'a started with a historical hazard review and analysis, as well as probabilistic hazard modelling, which included hydraulic analysis of the Sana'a basin. This information made it possible to calculate precisely the probability of the hazard's occurrence and calculate building losses for different return periods.

Experiences of urban risk assessment demonstrate that even a relatively straightforward hazard assessment, drawing on existing and readily available data, can be very useful in planning for urban resilience. At the same time, the advancement of assessment methods and the availability of geographical information increasingly support more sophisticated methods of assessment.

Source: World Bank, 2012b.

### Tackling the drivers of differential vulnerabilities

Focusing on vulnerability, or susceptibility to harm, enables the social components of urban resilience to be articulated.<sup>46</sup> The objective is to find practical ways for policymakers to address the social and economic inequalities associated with gender, poverty, race/ethnicity, disability, religion, age or location that compound vulnerability to climate change. Chapter 4 explains that vulnerability results from a web of interconnected drivers, including socioeconomic disparities, inadequate infrastructure, urbanization patterns, governance structures and local environmental conditions. Climate vulnerability has complex political dimensions<sup>47</sup> and is often strongly linked to colonial legacies, such as land tenure and legal structures. In this vein, decolonization agendas have the potential to address the underlying vulnerabilities of marginalized groups, including to climate change. However, all too

often the protracted and contested process of tackling the historical, cultural and political drivers of vulnerability in this way is beyond the scope of urban managers and other resilience-building agents.

Chapter 4 makes a strong case for recognizing how vulnerabilities are differentiated.<sup>48</sup> Differential vulnerabilities result from the combination of uneven socioeconomic development (poverty, climate-sensitive livelihoods), unsustainable patterns of land use, and historical and ongoing patterns of inequity embedded in processes such as colonialism and exclusionary governance.<sup>49</sup> Vulnerability is thus differentiated across different axes of vulnerability (Figure 10. 6), which enable the identification of specific vulnerability drivers. Those can be tackled directly through specific strategies contributing to urban resilience. Differential vulnerabilities require a multi-pronged approach to challenge

vulnerability, including investments in resilient infrastructure, social protection and health provision, alongside cultural measures to foster solidarity and social cohesion, forms of governance that transform entrenched power relations, and an assessment of existing experiences, knowledge and capacities.

As Figure 10.6 shows, strategies that tackle those axes of differentiation tend to reduce vulnerability among marginalized groups and contribute to the city's overall resilience. For example, analysis of the drivers of spatial differentiation may lead to identifying challenges related to access to infrastructure, which can be directly addressed through planning for resilience (Chapter 5), investment in resilient infrastructure (Chapter 6), and inclusive governance (Chapter 7), all in line with the six pathways already proposed in Chapter 4. However, questions remain about how to challenge the cultural and historical drivers of vulnerability and the role of approaches that explicitly try to do so (Chapter 2). Local governments and urban managers are likely to face contestation over measures to tackle climate change if these measures do not tackle existing vulnerabilities.

Identifying the spatial drivers of differential vulnerability can help determine the exposure ranges of informal or deprived settlements.<sup>50</sup> For example, Chapter 4 explains how informal settlements face higher levels of vulnerability and proposes advancing a multi-pronged approach. Furthermore, Chapter 6 identifies informal infrastructure (such as informal water vendors or waste pickers) as a mode of service provision, which is often not acknowledged in risk and vulnerability assessments. Strategies to address the spatial drivers of differential vulnerability may include providing protective infrastructure, enforcing land use regulations, including vulnerable groups in the planning process, and facilitating engagement and partnerships with the private sector. However, vulnerable groups often find that many interventions increase rather than reduce their vulnerability, whether by acts of omission or commission. For example, local budgets that prioritize economic development and the protection of financial assets ignore vulnerable groups' needs and may divert investment from poor communities.

**Figure 10.6: Axes of differentiation of vulnerability and response strategies**

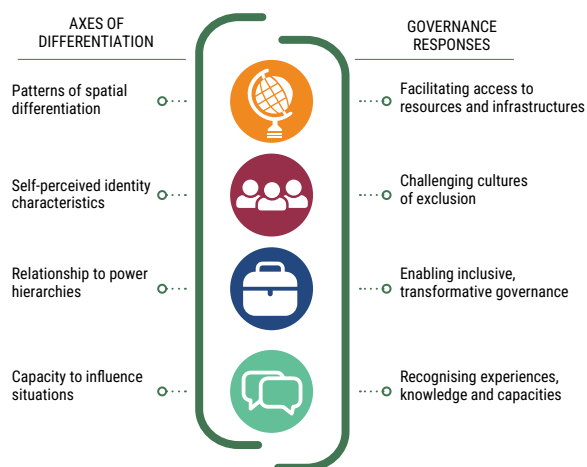


Illustration by Vanesa Castán Broto



Beira's drainage system contributes to the reduction of cyclical floods in the area, Beira, Mozambique © UN-Habitat/Veridiana Mathieu

The development of green infrastructure and regeneration projects can potentially reinforce existing socio-spatial inequalities, creating a process of “green gentrification” that displaces or dispossesses the urban poor (Chapter 4). Similarly, post-disaster relief programmes can have discriminatory or exclusionary impacts on certain groups, depending on ethnicity, gender or other characteristics. For instance, government support programmes during and after disasters are often shaped by assumptions tied to biologically deterministic stereotypes, such as those embedded in programmes for motherhood support.<sup>51</sup> Often, bottom-up networks are more effective than governmental institutions in delivering emergency support.<sup>52</sup> Responses to disasters often reproduce gendered hierarchies of work and responsibility, including the perception that women have “extra time” to participate in active networks to support the community.<sup>53</sup>

A first step towards tackling the spatial drivers of vulnerability is identifying how they work so that planning and urban management processes do not compound them. Community-led evaluations of vulnerabilities, often done hand in hand with risk assessments, may constitute efficient ways to identify the drivers of spatial differentiation (see Box 10.4). For instance, land prices and tenure security are both central factors in driving vulnerability because they determine housing structures, community relations and the maintenance of urban environments. From individual property ownership to customary rights, there are an array of tenure types with different social and economic vulnerabilities. Unfortunately, the dynamic relationship between tenure and resilience has received little attention in the literature.



**Post-disaster relief programmes can have discriminatory or exclusionary impacts on certain groups, depending on ethnicity, gender or other characteristics**

### Box 10.4: Differential vulnerability in the Philippines

Spatial indexes of urban vulnerability are increasingly popular to identify spatial drivers of vulnerability. For example, in the Philippines, a tailored metric known as the Social Vulnerability Index (SVI) uses 18 indicators from the 2020 Census of Population and Housing as proxies for vulnerability in the Philippines. It provides a composite of individual, household and housing characteristics and natural hazards, showing relative differences between barangays. However, there are limitations to exclusively spatial assessments because these do not reflect the multi-dimensional nature of vulnerability differences. Spatial assessments tend to privilege experts' views on risk, deemphasizing participatory or community-led approaches to understanding vulnerability. To address this, the application of the SVI in the Philippines has been coupled with robust social vulnerability assessments and participatory assessments of adaptive capacity to ensure these dimensions are not overlooked.

In 2014, the organization Environmental Science for Social Change (ESSC) in the Philippines piloted a participatory assessment of vulnerability and flood risk in Barangay Carmen, Cagayan de Oro City, and developed guidelines for the implementation of the Philippine National Disaster Risk Reduction and Management Plan (2011-2028). The assessment characterized risks in detail by co-producing knowledge that revealed key vulnerability factors such as work patterns, employment sources, access to evacuation centres and detailed building characterization. However, uptake by local governments of these methodologies has been slow.

Building on these experiences, the Homeless People's Federation of the Philippines (HPFPI) has partnered with a network of organizations led by the Technical Assistance Movement for People and Environment Inc. (TAMPEI) to create partnerships with local governments and other institutions and enable a community-led approach to urban resilience and adaptation in informal settlements across the country. Working in nine different communities across all regions, the project aims to tackle the drivers of differentiated vulnerabilities. These efforts are invaluable in challenging the widespread tendency in the Philippines to channel climate resilience efforts through established power hierarchies, often resulting in neoliberal urban transformations and the violent expulsion of people living in informal settlements. Communities may feel excluded and powerless in the face of such processes. To counter this, HPFPI promotes the formation of local savings groups to secure and access land. Iloilo City's Participatory Housing and Development project, for instance, a proximity relocation project, was made possible when the city government provided a 16.2-hectare plot in a lower-risk area.

*Source: ESSC, 2014, 2016 & 2023; CLARE Programme, 2023; Ramalho, 2019a; WRI, 2022.*

### The road towards sustainability

The new generation of NDCs has paid close attention to the importance of urban climate action. More than ever, there is an urgent need to advance the potential of place-based action to reduce emissions. UN-Habitat's *World Cities Report 2022* emphasized several actions in policy and planning that could support the transformation of cities towards greater resilience. First, there is the importance of small-scale measures towards sustainability. While often associated with major projects such as eco-cities or smart cities, low-carbon urban development usually occurs unspectacularly: either incorporated into the routine operations of urban management and service provision or reflected in local livelihoods and the urban economy. For example, in China, a solid waste generation project in Yichun (Heilongjiang) or a low-carbon industrial park in Anqiu (Shandong) may not be especially attention-grabbing, but they nevertheless contribute to a long-term sustainability trajectory. Rather than considering emission reductions as an add-on, many cities mainstream emission reduction concerns by aligning their activities with the NDCs in their country and thus, more broadly, with the international commitments of the Paris Agreement.

One way to ensure this synchronization is through the development of targeted policy and planning evaluations that can be applied to different investments made by local governments or other institutions. This approach has become much more widespread in recent years. For example, in 2018, the multilateral development banks launched a joint declaration to harmonize financial flows with the objectives of the Paris Agreement, including mitigation targets and commitments to deliver adaptation and climate-resilient operations.<sup>54</sup> There are now various methodological principles in place to assess those goals in direct investment lending operations.<sup>55</sup>

Climate-resilient development calls for a fundamental reimagining of urban economies and lifestyles. The challenge for local governments is that achieving such a shift depends on broader societal and behavioural changes that need to be underpinned by a collective process of dialogue, exchange and interaction. This is beyond the scope of any institution to undertake alone: again, climate-resilient development reconfigures the question of responsibility and how it is distributed across the city. What is needed is a simultaneous transformation in cultural and social values among the urban population (for instance, through the adoption of sustainable practices by individuals and households) alongside institutional, social and technological innovations to support these changes (Chapter 8).

One of the dilemmas of ensuring a just climate transition is how to navigate a socioeconomic transformation compatible with the climate, something articulated succinctly by the concept of “doughnut economics”: this theory hypothesizes that there is a safe operating space for humanity between a “social foundation” of minimum living requirements and well-being that should leave no one behind and an “ecological ceiling” of planetary limits that no one should surpass.<sup>56</sup> The question is how to translate this thinking into practical proposals

for urban living. Many cities have been inspired by the idea to attempt different models of urban development that are less carbon-intensive and more resilient. Figure 10.7 provides an overview of 40 subnational authorities worldwide that have embraced this paradigm in their policy and governance. The model provides a model of action for initiating the journey, implementing action and committing to the longterm that resonates with the priorities of many local governments and other subnational authorities.<sup>57</sup>

**Figure 10.7: Cities that have declared a commitment to the “doughnut economics” model**



Source: Doughnut Economics Action Lab, n.d.

Amsterdam (the Netherlands) was the first city to adopt the doughnut model into its urban strategy in 2020 with the launch of its “city portrait”. This emphasized not only the health and well-being of its own residents, but also those of people and ecosystems worldwide.<sup>58</sup> Moreover, the implementation of this vision is overseen by the Amsterdam Doughnut Coalition, which brings together over 20 organizations, including design agencies, neighbourhood initiatives, universities, think-and-do tanks, social enterprises and the municipal government. The results so far have been encouraging, with Amsterdam emerging as a leader in this exciting new model of urban development (see Table 10.2). One notable feature of its policy framework is the emphasis on equity and accessibility in land and housing.

**Climate-resilient development calls for a fundamental reimagining of urban economies and lifestyles**



Bloemgracht canal in Amsterdam, the Netherlands. © Shutterstock



**Table 10.2: How “doughnut economics” supports sustainable outcomes in Amsterdam, the Netherlands**

Outcomes	Measures
Control of urban growth and city size	<ul style="list-style-type: none"> <li>Control urban growth by converting light industry districts into mixed-use areas and facilitating smart densification (as shown in the city district of Buiksloterham)</li> <li>Actively lead land development by acquiring land, which is then serviced and provided as ground lease to developers and housing associations, with an emphasis on building affordable housing and urban commons initiatives (see below)</li> </ul>
Sustainable urban land rent and land use patterns	<ul style="list-style-type: none"> <li>Cooperation with various commons initiatives and networks as part of its “democratization” agenda</li> <li>Pilot projects to facilitate access to affordable housing</li> </ul>
Resource reductions through industrial location, agglomeration and clustering	<ul style="list-style-type: none"> <li>Plan for the circular transition of the Port of Amsterdam</li> <li>Ethical companies and civic organizations that aim to improve workers’ conditions in global supply chains</li> <li>Sharing and second-hand platforms, along with repair and restoration services</li> </ul>
Sustainable housing	<ul style="list-style-type: none"> <li>Increasing the number of housing cooperatives</li> <li>Requirement to use more circular materials and that more buildings have a material passport</li> <li>Ban on letting new-build homes so those owning homes have to live in them</li> <li>Squatting policies to reduce vacancies</li> </ul>
Sustainable transport and mobility needs	<ul style="list-style-type: none"> <li>Creation of more infrastructure for walking and cycling</li> <li>Incentives and privileges for e-vehicles</li> </ul>

Source: Based on Khmara and Kronenburg, 2023.



**By systematically embracing the recycling, reuse and recovery of resources, circular cities offer the promise of a “revolution in urban sustainability”**

Cities engaged in this model aim to move away from urban development models that emphasize growth at the expense of other well-being factors. The challenge is to develop the local economy without creating additional resource dependencies. Diverse economies are grounded in place-based experiences of people and knowledge worldwide; thus, it proposes engaging with diverse livelihoods and solidarity economies to develop alternative ways of inhabiting the world.<sup>59</sup> Such diverse livelihoods take advantage of the resource possibilities of a given context, reversing extractivist practices and questioning the supply chains that sustain a product or a service. However, this may not be feasible for a city working alone without the support of national-level institutions. China’s Sustainable Development Plan of National Resource-based Cities, 2013–2020 focuses on delivering industrial transformation for resource-intensive cities. For example, Jiaozuo City in Henan Province and Xiaoyi City in Shanxi have diversified their economies through tourism and ecological agriculture, shifting their economies away from coal.<sup>60</sup> The plan has had a more significant impact in the central and western regions than in coastal ones, but it constitutes an example of a national-level effort to reduce cities’ resource dependence.

In every case, the challenge is finding ways to rethink the current socioeconomic systems, linked as they are, to high levels of resource consumption and growing injustices. Urban living offers many opportunities to activate solidarity economies that help redefine broader investment patterns and work within larger political economy structures, away from fossil fuels and towards greater societal robustness, connectivity and flexibility. One approach, mentioned in Chapter 5, is the promotion of “circularity” in urban settings. By systematically embracing the recycling, reuse and recovery of resources, circular cities offer the promise of a “revolution in urban sustainability”.<sup>61</sup> In many cases, the application of these ideas is most evident in high-income cities such as London, Paris and Stockholm,<sup>62</sup> where there have been successful efforts to integrate adaptive and blue-and-green infrastructure into the urban fabric while engaging communities. However, the circular economy can also be developed in the context of informality, where communities themselves are already leading initiatives to deliver sustainability (see Box 10.5).



**Justice-based approaches to climate action can dismantle the oppressive systems that perpetuate inequalities based on gender, race or perceptions of ability and legitimacy**

### Box 10.5: Developing the circular economy initiatives in Kampala, Uganda

Kampala Capital City Authority (KCCA) is working with stakeholders to improve waste management in the Ugandan capital with the support of multilateral agencies and universities. Municipal waste collection remains inadequate and non-existent due to problems with accessibility and the limited availability of facilities. This perennial deficit in waste collection leads many people to develop their own waste management methods, including the harmful practice of burning or burying waste in inappropriate places, where it can pose significant hazards to both human and environmental health.

During the last two decades, an array of local workers and entrepreneurs have come together to address Kampala's waste challenges. The Lubaga Charcoal Briquettes Cooperative Society Limited (LUCHACOS) has worked with ACTogether (an NGO affiliated to the international network Shack/Slum Dwellers International (SDI)) to reimagine the flows of waste through the city in a circular way. They aim to establish micro-, small- and medium-sized enterprises that can process organic waste to produce briquettes, which then can be commercialized through local markets. In addition to reducing the waste reaching landfills and facilitating waste management, this initiative adds value to the organic fraction of waste, while also attending to the energy needs of the communities.

The initiative also has a number of challenges: for instance, producing briquettes requires controlled burning, which has additional impacts on the workers. Technological development is needed to facilitate their production with minimal pollution. To achieve this, the Urban Action Lab at Makerere University<sup>63</sup> has actively supported the establishment of circular economy initiatives, especially with waste, working directly with LUCHACOS, ACTogether and the communities they represent to understand the supply chain of briquettes and facilitate circularity in resource streams across the city. The Lab has developed a range of innovative capacity-building methods, including peer-to-peer learning exchanges. Some of the areas of learning include:

- *Waste and product management*: collection, sorting, mixing, proportions of ingredients, storage and post-production handling.
- *Management and organizational skills*: costing, pricing, record keeping, advertising and branding.
- *Fabrication technologies*: from simple briquette-making technology to environmentally sensitive carbonizing char drums.

Source: Kitembo et al, 2024.

### Making urban climate action plans inclusive

Risk and vulnerability assessments constitute the core of urban climate action plans: there is mounting evidence demonstrating the potential effectiveness of urban design responses to address many of those vulnerabilities. As outlined in Chapter 6, these can range from urban form and density interventions, the use of sustainable building designs and materials to reduce risks and emissions, the creation of public and green spaces to promote health and well-being, the provision of adequate sanitation and clean water, integrated waste management and the development of measures that enable circular economy approaches.

Chapter 4 proposes mainstreaming intersectional climate justice while also harnessing and strengthening local resources, institutions and locally-led climate action initiatives. Intersectional climate mitigation and adaptation plans prioritize the protection of the most vulnerable groups of residents, following participatory or community-based methods such as those outlined above. If unaddressed, structural dynamics such as racism, misogyny and other forms of exclusion may be replicated in urban resilience efforts. However, justice-based approaches to climate action can dismantle the oppressive systems that perpetuate inequalities based on gender, race or perceptions of ability and legitimacy.<sup>64</sup> To be realized, capacity building among planners and urban managers is needed to ensure intersectional thinking is integrated meaningfully into planning and urban design.

This transformation may begin with reflection at the individual level among urban practitioners on any existing unconscious biases, beliefs, judgements and practices—whether held by individuals or at the organizational level—that may be influencing planning practices.<sup>65</sup> For example, sanitation in many cities is designed for male users, and women often struggle to access toilets when they are most urgently needed. Moreover, the work that women perform may be overlooked entirely.<sup>66</sup> For instance, like many cities in Sub-Saharan Africa, Mwanza (Tanzania) lacks adequate sewerage: this infrastructural gap ends up being filled by women, who take on the (unpaid) responsibility of maintaining shared household toilets, cleaning them and emptying the pit latrines at significant risk to their own health.<sup>67</sup> These realities, which are not always reflected in planning initiatives, directly impact urban resilience.

Historically, urban planning and design have developed on the assumption that the able-bodied, working male is the “neutral” user of the city.<sup>68</sup> With this in mind, gender-inclusive planning and design offers valuable lessons for resilient planning. This approach does not aim to deliver actions for specific vulnerable groups, but instead aims to deliver action to everyone, even to those who are routinely excluded from the benefits of planning because of their position in society. The World Bank's *Handbook for Gender-inclusive Urban Planning and Design* lists six basic characteristics (replicated in full in Table 10.3) that actively address gender-based discrimination in the urban environment. Gender-

inclusive planning emerges from a history of struggles around gender, but recognizes that different drivers of discrimination intersect. Thus, the challenge for gender practitioners is how to transcend this history to address multiple and situated forms of vulnerability and deliver intersectional, transformative forms of planning. While new methods are emerging, the principles of gender-inclusive planning and design offer a solid base to deliver urban resilience for everyone.



One of the first actions for transformative infrastructure is the integration of informal settlements into city-wide strategies

**Table 10.3: Characteristics of gender-inclusive planning and design**

Gender-inclusive planning and design is....	Gender-inclusive planning and design is not....
<ul style="list-style-type: none"> <li>▪ <b>Participatory:</b> actively including the voices of women, girls, and sexual and gender minorities</li> <li>▪ <b>Integrated:</b> adopting a holistic, cross-cutting approach that centers gender throughout and promotes citizen-city relationship building</li> <li>▪ <b>Universal:</b> meeting the needs of women, girls, and sexual and gender minorities of all ages and abilities</li> <li>▪ <b>Knowledge-building:</b> seeking out and sharing robust, meaningful new data on gender equity</li> <li>▪ <b>Power-building:</b> growing the capacity and influence of under-represented groups in key decisions</li> <li>▪ <b>Invested-in:</b> committing the necessary finances and expertise to follow through on intentional gender equity goals</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Prescriptive:</b> designing and planning for women, girls, and sexual and gender minorities instead of with them</li> <li>▪ <b>An add-on:</b> considering women separately from other beneficiaries and project goals; failing to connect the dots or the actors involved</li> <li>▪ <b>Exclusive:</b> being concerned with the needs of able-bodied women or female persons alone</li> <li>▪ <b>Uninformative:</b> operating in a vacuum without engaging with and contributing to broader knowledge on gender</li> <li>▪ <b>Disempowering:</b> repeating or reinforcing historical imbalances in representation and agency</li> <li>▪ <b>Uninvested-in:</b> assuming gender goals are achieved if women are among beneficiaries without investing the required time and resources to follow through</li> </ul>

Source: World Bank, 2021.

For example, one common component of gender-inclusive planning and design is “universal design”, signifying a built environment which can be “accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability”. The exclusion of any member of society leads to less resilient systems. People with disabilities have long advocated for their inclusion as active stakeholders in the design and implementation of disaster risk reduction policy, a point that was explicitly recognized in the Sendai Framework for Disaster Risk Reduction 2015-2030. Urban managers thus can make a difference by creating positive spaces for the meaningful participation of people with disabilities, who have been routinely excluded from climate resilience planning.<sup>69</sup>

In summary, there is no excuse for local governments, businesses, civil society and communities not to integrate resilient thinking in their activities at any scale. Adopting resilience as a way of thinking enables multiple steps that can be taken today. Many chapters in this report have argued for climate action that is transformative. The following section examines ambitious strategies that may help towards a future-oriented perspective on urban resilient development.



Delivering climate-resilient development requires government action and decisive public policy

## 10.3 Creating the Conditions for Resilient Transformations

In many contexts, climate-resilient development can be linked to wider trajectories of change: for that reason, it is often linked with the possibility of fostering a fundamental societal transformation whereby human well-being and the health of ecosystems worldwide are both prioritized. Throughout the report, four pathways to achieve this have been emphasized: delivering transformative infrastructures, facilitating action through multi-level governance, mobilizing innovation and ensuring sustainable finance. Together, these approaches can help facilitate a broader transformative shift towards climate resilience.

### 10.3.1 Delivering transformative infrastructure

Transformative infrastructure tackles the drivers of both vulnerabilities and emissions. One of the first actions for transformative infrastructure is the integration of informal settlements into city-wide strategies: this is especially important given that the official “invisibility” of many marginalized communities is all too often a precursor to their displacement by modernist or “world class” infrastructure projects. One largely unacknowledged aspect of upgrading is the transformative impact it can have not only on the settlements in question, but also on the city as a whole: incremental strategies to facilitate access to basic services in informal settlements, for instance, may change the dynamics of land exchanges and pricing, enhance the capacity of communities to access new markets and improve the overall safety and well-being of

residents. In Chamanculo, a neighbourhood of Maputo (Mozambique), an ongoing pilot project for a neighbourhood energy transition led by the Universidade Eduardo Mondlane and developed in partnership with the municipality aims to facilitate access to collectively owned solar infrastructure such as solar lamps and charging kiosks, thus reimagining the possibilities for delivering energy services outside the formal network. Its transformative impacts relate to the demonstration of how off-grid energy can deliver alternative urban energy services in a country in which off-grid renewable energy has until now only been considered in remote areas far outside the reach of the conventional network.

NbS and measures to integrate green-and-blue infrastructures may also play a transformative role in cities. For example, the small city of Genk, with only 65,000 inhabitants, has transformed its post-industrial urban legacy into what is now considered one of the greenest cities of Flanders in Belgium. Among other initiatives, the city hosts the Heempark, a site to demonstrate local agricultural practices that houses some 350 educational groups and attracts about 10,000 visitors a year.<sup>70</sup> The Bee Plan, developed in 2014, aims to improve bee conditions on communal and private land and support local apiarists. A network of organic allotments also brings together volunteers and supports the participation of marginalized groups. These activities connect citizens and nature in inclusive ways. Citizens' involvement in renaturing the city changes

the relationship of residents with the local environment and generates investment opportunities. Infrastructure transformations, however, depend on connecting those infrastructures with basic services, housing and access to land, as Chapter 6 makes clear.

### 10.3.2 Facilitating action through multi-level governance

Transformation also requires an enabling governance framework. Delivering climate-resilient development requires government action and decisive public policy, with all levels of government having key roles to play. Governments, however, are not alone: a multi-level governance approach to urban resilience depends on diversifying the range of actors intervening in the urban environment, including the private sector, civil society organizations and individual residents who recognize the importance of their engagement across all aspects of life (Chapter 7). An alternative strategy for facilitating multi-level governance, instead of focusing on the distribution of responsibilities, is to bring every actor to the table according to their capacities. Table 10.4 provides an overview of low-stakes climate-resilient development strategies that can generate new operating methods for the diverse actors. Adequate capacities may not always be available, but the table provides initial suggestions that enable every actor to work towards resilient development.

**Table 10.4: Examples of strategies for the delivery of climate-resilient development at different levels of governance**

EXAMPLES OF STRATEGIES FOR CLimate-resilient DEVELOPMENT	National governments and subnational governments when relevant	Local governments and departments	Business and industry	Civil society and intermediaries	International Organizations and City Networks	Individuals and communities
Integrating mitigation, adaptation and development strategies	Analyze and understand the alignment between NDCs and efforts to deliver the SDGs	Develop advanced methods for integrated planning	Consider integration, mitigation and development within current business models	Provide examples of good practices on the integration of mitigation, adaptation and development	Facilitate learning across contexts	Considering how adaptation and mitigation relate to everyday challenges
Policy and regulation	Link resilience strategies with National Urban Policies and other urban policy instruments	Updating building codes, urban planning regulations, and land use policies to consider future climate scenarios	Abide by existing policies and regulations and help design appropriate ones, adapted to industrial conditions	Abide by existing policies and regulations and examine its shortcomings	Provide insights about the operation of policies and regulations across different levels	Abide by existing policies and regulations and help identifying embedded injustices in them
Institutional strengthening	Mainstreaming resilience across contexts	Consider resilience within sectoral policies	Integrate resilience thinking across the business model	Support the development of multi-stakeholder resilience networks	Adapt institutions to the demands of delivering resilience	Organize and protest against institutional abuse

EXAMPLES OF STRATEGIES FOR CLimate-resilient DEVELOPMENT	National governments and subnational governments when relevant	Local governments and departments	Business and industry	Civil society and intermediaries	International Organizations and City Networks	Individuals and communities
Investing in research and technology	Support resilient-specific R&D agendas	Facilitate the constitution of urban laboratories for experimentation	Invest in R&D for resilience	Actively facilitate the production of knowledge for resilience, and integrate different types of knowledge	Fund international R&D programmes on resilience	Mobilize and share local knowledges and experience for resilience
Community engagement and public awareness	Create the institutional conditions to broaden participation in decision-making	Actively create invited spaces for people to participate in policy making and planning	Create partnership and collaborations with a wide range of stakeholders	Deliver social innovation that facilitate spaces of participation and coproduction	Facilitate sharing practices across different contexts	Actively create political momentum collectively, to mobilise local voices
Put ecosystems at the centre of resilient efforts	Develop appropriate frameworks and policy for the integration of nature in all aspects of policy making	Consider the management of urban environments and resources	Adopt green production policies and implement best practices in business and industry	Develop alternatives and mobilize society to identify and respond to environmental challenges	Promote healthy environments for all in line with the SDGs	Develop positive relations with surrounding ecosystems
Financial Mechanisms	Facilitate the transfer of funds according to subsidiarity principles	Mobilize and allocate budgets, and access innovative finance mechanisms	Invest in green business opportunities and develop insurance and other mechanisms to manage future risks	Mobilize budgets in those resilience areas overlooked in mainstream efforts by public and private sectors	Direct international finance to resilient activities and prevent funding maladaptation	Provide the conditions for the implementation of sustainable measures when finance becomes available at the local level
Building Capacity and Sharing Knowledge	Integrate resilience in educational programmes	Deliver resilience training at appropriate levels	Implement resilience training programmes for employees and managers	Innovate in training and education for resilience	Share learning and training practices across international contexts	Actively learn about resilience in the community and beyond

**Mobilizing innovation as a transformation lever**

As discussed in Chapter 8, innovation can drive urban transformations: new technologies are being developed to facilitate decarbonization and adaptation; new practices and institutions will help transform societies to make them more sustainable and resilient; new forms of organization may help to deal with the growing risks of climate change. While this is generally understood, what is less well known is that inclusive innovation—that is, innovation focused on meeting the needs of marginalized people—may be central to facilitating transformation. Such a perspective must challenge existing drivers of exclusion regarding

access to services and resources, as well as recognition of multiple forms of understanding and knowledge in collective responses to climate change. In this regard, local governments are crucial in fostering inclusive and sustainable innovations. From developing inclusive innovation policies that facilitate the participation of a diverse range of actors, to the prioritization of innovation sectors that favour inclusion and capacity building, cities have a variety of actions which can foster transformations at the urban level.

### 10.3.3 Ensuring sustainable finance

Finance is a major aspect of supporting a transformative approach to climate-resilient development. Chapter 9 shows that finance remains one of the main barriers to delivering climate-resilient development, which is already acknowledged in the IPCC's *Sixth Assessment Report*. Local governments face insurmountable obstacles in accessing climate finance, and private investment is not flowing into climate-resilient development projects as it should. As Chapter 9 clearly shows, city governments cannot overcome those barriers alone. National governments and international financing organizations play a key role in facilitating intergovernmental transfers and the development of financial mechanisms to facilitate action at the local level. Chapter 9 further notes that cities have alternative means to leverage finance, and they can work with multiple actors within the city to deliver climate-resilient development. Exercises in visioning or institutional methodologies to evaluate whether current actions are compatible with climate-compatible development may not need additional finance, but the smart integration of existing resources while working across communities and institutions.

### 10.3.4 A global partnership for urban climate resilience

Within the context of the urgency to address the climate crisis, climate resilience across multiple dimensions is attainable, but requires collective efforts at multiple levels—global, regional, national, subnational and local—including a wide range of stakeholders in different contexts. Chapter 7 has emphasized the challenges of governance and the need to reinvigorate a global partnership in the context of climate-resilient development. The conditions for a new form of multilateralism that addresses local and place-based conditions have arrived, driven by communities themselves, which in turn could facilitate a greater sense of social responsibility across the world.

SDG 17 calls for the creation of a partnership for the goals, reimagining the role of ODA in promoting human well-being and strengthening human connections. The last SDG report, however, warns that debt distress continues to hinder development and that despite increases in ODA, this is largely related to the provision of support to refugees in a context of geopolitical instability.<sup>71</sup> Partnerships that take seriously the potential of collaboration within cities, towns and urban areas are still missing. This continued shortfall in city-level activities may have been a factor in the creation of the Sustainable Urban Resilience for the Next Generation (SURGe) initiative: it aims to accelerate local and urban climate action through multi-level governance, engagement and delivery through five integrated tracks, contributing to the achievement of the Paris climate goals and SDGs (Box 10.6).



**New technologies are being developed to facilitate decarbonization and adaptation**

### Box 10.6: Increasing connectivity: The SURGe initiative

Launched in 2022 by the Conference of Parties (COP) Presidency at COP 27, in collaboration with UN-Habitat and ICLEI, the SURGe initiative has been endorsed by more than 180 Parties to the conference. SURGe focuses on the integration of urban concerns into Multilateral Environmental Agreements to recognize the growing importance of subnational forms of governance in the delivery of climate-resilient development. It seeks to do this by connecting local, national and global action through strategies that demonstrate and enact those linkages. For example, some strategies include:

1. *Increasing the visibility of local actions in international political arenas*, for example, by demonstrating the effectiveness of local leadership at the annual COP meetings.
2. *Supporting national governments in developing strategies to engage with local-level action* through nationwide policies for urban management.
3. *Linking global goals to local implementation of climate action*, for example, by including climate-resilient development criteria in local pipelines of infrastructure development.
4. *Building upon existing experiences of city networks* in knowledge exchange and innovation across contexts.

However, SURGe faces fundamental challenges in including subnational governments in the multilateral space. Despite some positive examples, city efforts must be stepped up. Only 25 per cent of the 327 plans investigated in an empirical study in the EU demonstrated a commitment to fully attaining net zero. The challenge is not only for cities and their advocates, but also for national governments and international organizations to build multi-level partnerships capable of significantly improving their current capacities to deliver climate-resilient development. SURGe's success depends on redirecting new resources to cities as much as it depends on recognizing how specific actions catalyse wider transformations.

Source: UN Habitat, 2023a; Heijden, 2023; Salvia et al., 2021.

The IPCC specifically called for partnerships that, alongside political commitments, can enhance the effectiveness of climate-resilient development policy.<sup>72</sup> Partnerships are also important to facilitate the circulation of knowledge and transfer of technologies, as it has been the case through international city networks that have facilitated the spread of mitigation and adaptation practices and enabled learning from context to context.<sup>73</sup> However, those partnerships have to be practically minded, connecting with challenges on the ground. Climate-resilient development is greatly aided by partnerships between governments, civil society, and private sector organizations, across scales to address the vulnerability of communities or ecosystems.<sup>74</sup> Such partnerships are most effective when they include traditionally marginalized groups, including women, youth, Indigenous Peoples, local communities and ethnic minorities.

### 10.3.5 Envisioning climate-resilient futures

A significant challenge is the failure of current policy imaginations to visualize alternatives for climate-resilient futures.<sup>75</sup> The *2022 World Cities Report* explored how reflecting on possible urban futures was critical in generating demands for action and planning. Expert-based visioning methods—whether this is with a focus on predictive futures (forecasting), drawing back pathways from putative desired futures (backcasting) or facilitating the exploration of plausible futures through hypothetical alternatives (scenario building)—play an important role in linking aspirational targets with concrete actions.<sup>76</sup> Visioning requires a balanced representation of multiple voices (especially those frequently ignored or marginalized) and the articulation of plausible futures, with action plans that are both ambitious and feasible.

When there are divergent opinions, those marginalized voices are set aside, sometimes despite efforts to deliver inclusive visioning exercises. For example, a visioning exercise in the mid-hill region of Nuwakot, in central Nepal, found that climate-resilient development proposals from

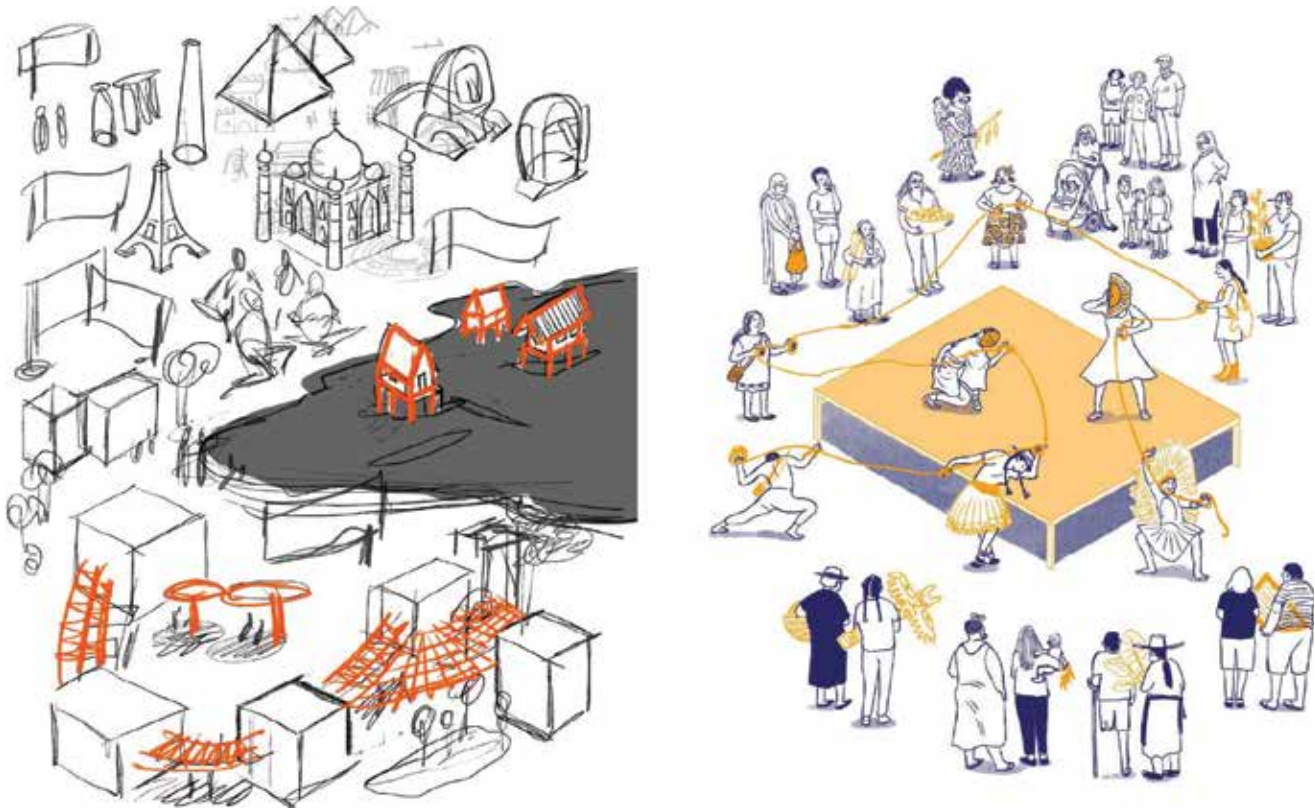
local development agencies (focusing predominantly on the promotion of entrepreneurship programmes and agricultural innovation) did not match closely with the demands of local communities who emphasized daily concerns such as irrigation, water supply, education and health. In particular, the views of individuals from the most excluded group in Nepal's caste hierarchy (Dalits) were routinely overlooked: Dalits were commonly excluded from development projects, while those from more privileged castes were recognized as legitimate stakeholders who could input more easily into those programmes.<sup>77</sup> Even inclusive planning processes may not challenge established power hierarchies without a clear perspective about the pathway to climate-resilient development.

Crucially, as shown above, climate-resilient development will require the integration of multiple perspectives, including those of experts and planners, but also communities and marginalized groups who should be provided with opportunities to participate and indeed lead decision-making processes. Figure 10.8 presents an example of one such attempt in which international experts on urban adaptation worked with a designer who integrated their perspectives into illustrations that could bring to the fore alternative future visions of the city—in this case, the contribution of heritage to adaptation. The first part represents an initial visual brainstorm, while the second part of the illustration represents a consolidated view in which participants move from a physical heritage perspective to an intangible one, showing how shared identities create invisible links that support collective mobilization efforts for adaptation. Prompting artistic creation to express individual and collective relationships with climate change is an effective way to generate climate-resilient visions of the city, and one that can help create partnerships across differences. Local governments and other local actors should harness the cultural potential of cities not just to develop solutions, but also to generate alternative imaginations about how a sustainable, resilient urban future might look like.



Transjakarta electric buses operating in the Sudirman and Thamrin areas of Jakarta, Indonesia. © Shutterstock

**Figure 10.8: Using artistic illustration to understand the role of heritage in adaptation**



Source: Olazabal et. al., 2024.

## 10.4 Concluding Remarks

In summary, resilience and inclusion must be delivered in tandem: a people-centred approach should put inclusion at the heart of the resilient city. Though it is sometimes difficult for local governments to connect the specific challenges they face with the broader objectives of the SDGs and other global agendas, their alignment has become more visible over time as international agencies and financial institutions work more closely with cities to achieve these goals. A concern for the well-being of people and the health of ecosystems within the city resonates with a broader concern for the well-being of people and the health of ecosystems elsewhere. Now, more than ever, cities are becoming global actors, navigating a path towards climate-resilient development in different locations and conditions.

Among other lessons, the chapter has highlighted the following:

- *A negotiated approach to urban resilience helps build a more inclusive understanding of resilience and sustained collective action in the long-term.* Urban managers can promote a negotiated approach to urban resilience that attempts to consider different perspectives, identify trade-offs and prioritize the interests of those who are most vulnerable.
- *Urban resilience depends on multiple, interconnected actions across sectors that is best achieved as a collective dialogue about priorities and preferences.* Vulnerable and excluded groups, such as people with disabilities, must be actively engaged in decisions concerning their well-being.
- *While more finance and resources are urgently needed, urban resilience does not only depend on the mobilization of big budgets and large-scale programmes.* Leveraging the resources and capacities within the city, including those of the most disadvantaged actors, is an important but often neglected pathway to achieving incremental improvements that together over time can prove transformative.
- *Climate resilience development requires putting fairness and equity at the core of urban management and planning.* Marginalization and discrimination create vulnerability, which ultimately affects all urban residents: by contrast, the more equitable and inclusive a city is, the greater its resilience to climate shocks.
- *Notwithstanding the different challenges and limitations many urban areas face, a range of viable alternatives already exist for governments to pursue.* In this context, the widespread inaction that continues to characterize national and local responses to climate change is difficult to excuse. This is especially true when many steps towards climate resilience can be built into existing work within cities.



## Endnotes

1. UN-Habitat, 2011.
2. UN-Habitat, 2011.
3. Nohrstedt et al., 2021.
4. Krishnan et al., 2024.
5. Dhar and Khirfan, 2017.
6. Olazabal et al., 2012.
7. Coaffee & Lee, 2016.
8. Rockefeller Foundation, 2024.
9. Fitzgibbons & Mitchell, 2019.
10. Westman et al., 2015.
11. Zebrowski, 2015.
12. Kaika, 2017.
13. Kareem et al., 2020.
14. Torabi et al., 2018.
15. Spaans & Waterhout, 2017.
16. Coaffee & Lee, 2016.
17. Bertana, 2020.
18. Ribeiro & Gonçalves, 2019.
19. Harris et al., 2018; Ziervogel et al., 2017.
20. Lara García et al., 2022.
21. Ayuntamiento de Sevilla, 2017.
22. EMASESA, 2019.
23. Lara & Moral, 2022.
24. Wardekker, 2021.
25. Dewulf et al., 2019.
26. Climate Investment Fund, 2024.
27. World Bank, 2018b.
28. TomTom, 2024.
29. Natural Resources Defence Council, 2019.
30. NIUA, 2021.
31. S Pune Mahanagar Parivahan Mahamandal, 2024.
32. Pune Municipal Corporation, 2024.
33. Metro Rail Guy, 2024.
34. Gonçalves & Ribeiro, 2020.
35. Nguyen et al., 2022.
36. Heinzlef et al., 2020.
37. Vanderlinden et al., 2015.
38. Resilient Cities Network, 2017.
39. Resilient Cities Network, 2023.
40. Ramalho, 2019b; Partelow, 2021.
41. NIST, 2015.
42. Wardekker, 2021.
43. IPCC, 2022c.
44. Möller et al., 2022.
45. McDowell et al., 2016.
46. Gajjaret et al., 2019, Frerk et al., 2011.
47. McDowell et al., 2016.
48. Pörtner et al., 2022.
49. Liu & Balk, 2020.
50. Ramalhob, 2019.
51. Ruszczyk et al., 2022.
52. Ramalho, 2019b.
53. World Bank, 2018a.
54. World Bank 2023.
55. Raworth, 2017.
56. Doughnut Economics Action Lab, 2020.
57. Doughnut Economics Action Lab, 2024.
58. Gibson-Graham, 2006.
59. Li, Liu, et al., 2021.
60. Williams, 2021.
61. Williams, 2021.
62. Makerere University, 2024.
63. Djoudi et al., 2016.
64. UN Women, 2022.
65. McFarlane, 2023.
66. Kyathsandra, 2023.
67. World Bank, 2020.
68. Brown et al., 2024; Görgens & Ziervogel, 2019.
69. Frantzeskaki et al., 2017.
70. United Nations, 2023.
71. IPCC, 2022c.
72. IPCC., 2022c.
73. IPCC, 2022c.
74. Pelling et al., 2023.
75. Pelling et al., 2023.
76. Pandey et al., 2021.