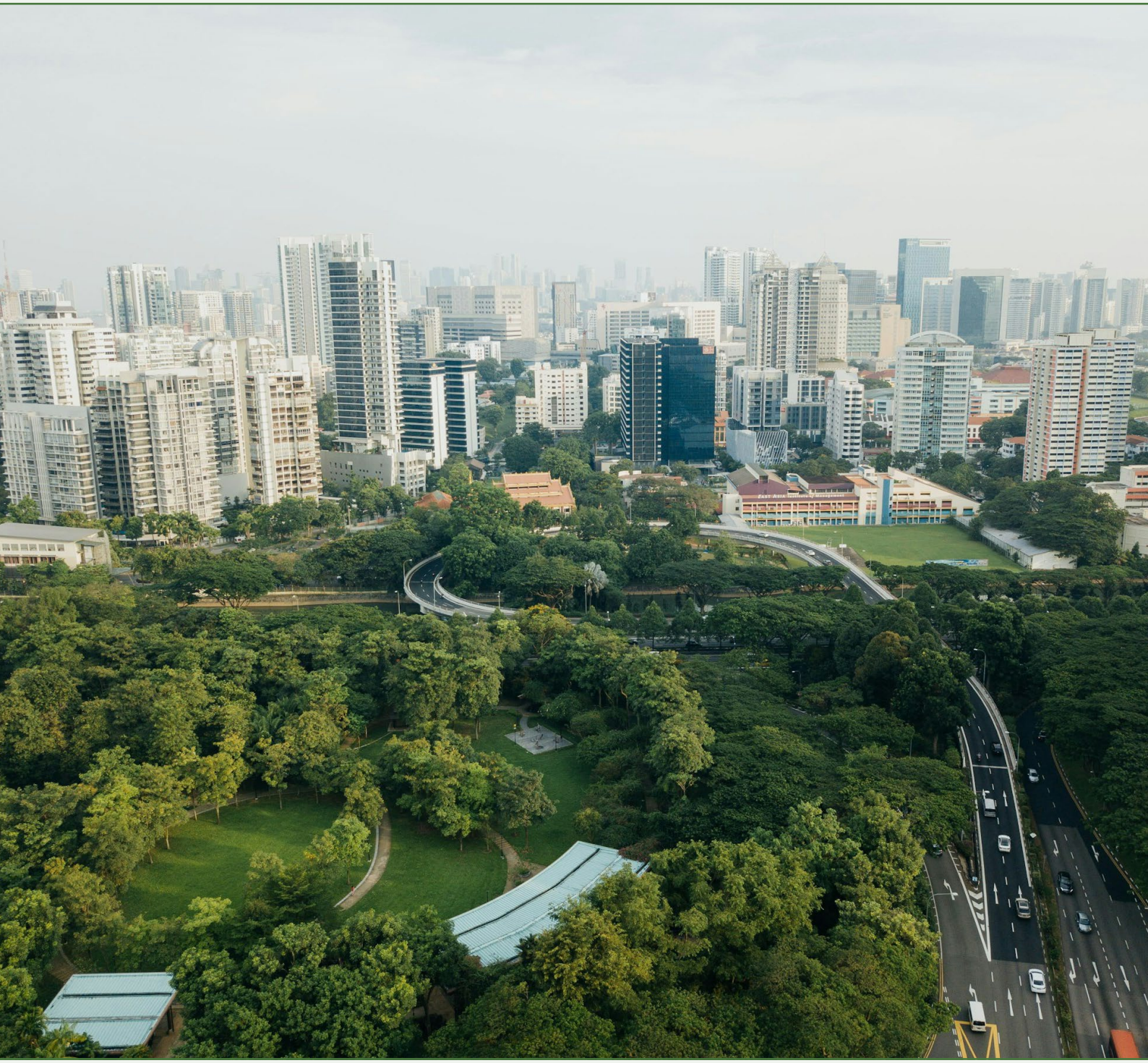
Urban Regeneration for Climate Resilience



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Urban Regeneration for Climate Resilience

This paper discusses the contribution of urban regeneration in advancing climate resilience in cities.

Produced by UN-Habitat Flagship Programme 1 'Inclusive Communities, Thriving Cities' and Flagship Programme 3 'RISE-UP: Resilient Settlements for the Urban Poor'

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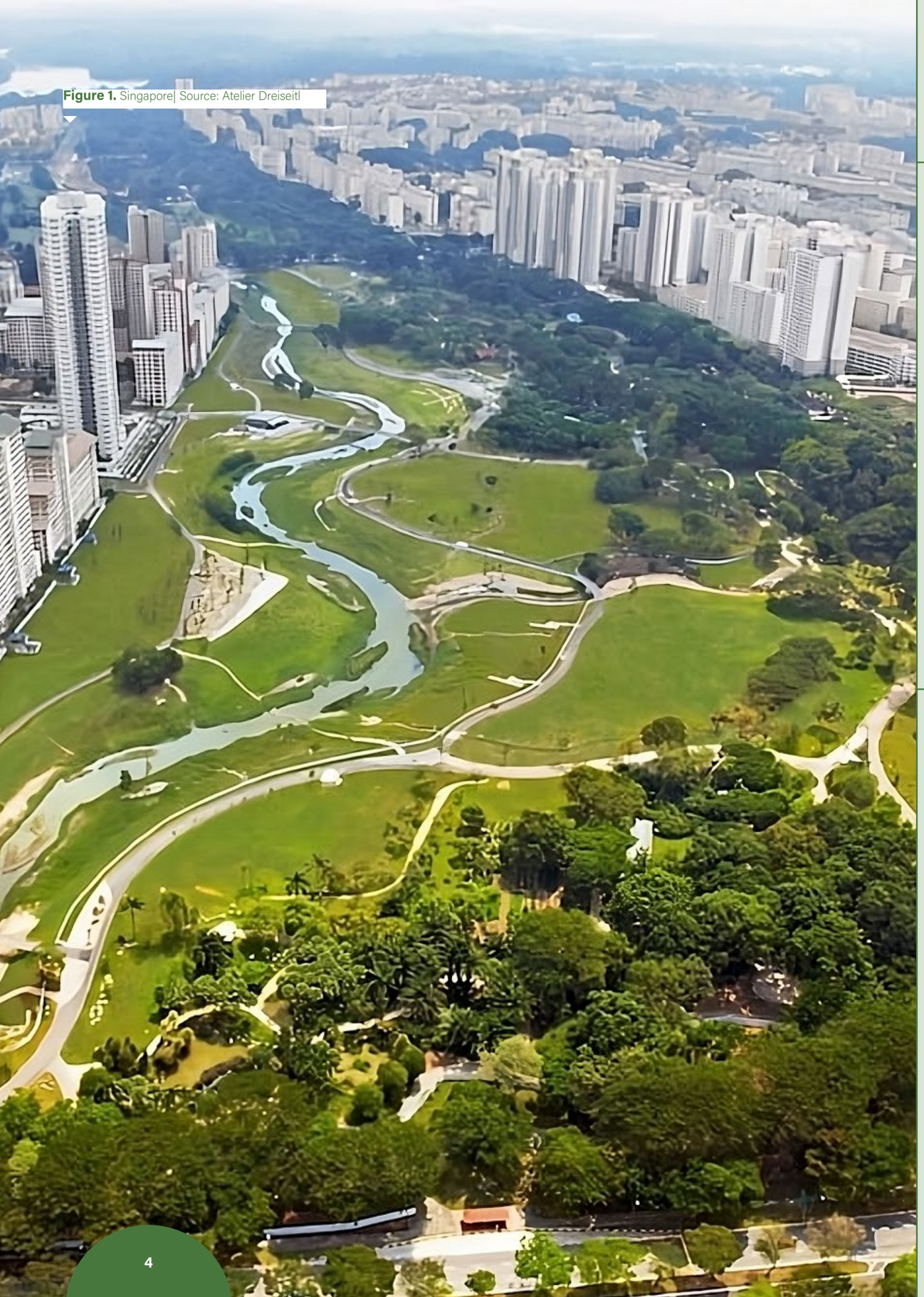

Figure 1. Singapore| Source: Atelier Dreiseitl

Summary

Cities stand at the forefront of the climate change battle, housing over half of the world's population, a number set to reach 68% by 2050. Over 90% of urban centres, particularly located along coastlines[1], are highly vulnerable to climate change impacts such as sea level rise, floods and heatwaves. The urban heat island effect exacerbates these challenges, with temperatures in cities being up to 10°C higher than in rural areas[2]. In addition to their vulnerability, cities significantly contribute to climate change. Despite covering just 2% of the global land footprint, cities account for 70% of global greenhouse gas emissions and 78% of the world's energy consumption.[3]

This combination of high vulnerability and substantial contribution to climate change highlights the multifaceted challenges cities face. Cities must simultaneously navigate an array of interconnected challenges, including population growth, migration and displacement, social and economic disparities, demographic shifts, political instability, and environmental and resource constraints, intensifying their vulnerability to climate change. These complexities exacerbate the need for integrated and innovative approaches to urban climate resilience.

Addressing these challenges requires a holistic approach that transcends siloed interventions and goes beyond addressing immediate needs in isolation. Urban regeneration (UR) emerges as a strategic process for enhancing urban climate resilience. Its integrated and inclusive approach transcends short-term threat mitigation by simultaneously addressing intertwined challenges: environmental sustainability, social inclusivity, and economic dynamism. This approach fosters the development of resilient, just, equitable, and prosperous urban settlements. By integrating nature-based solutions, promoting social cohesion through community engagement, and stimulating sustainable economic activities, urban regeneration paves the way for cities to proactively adapt, thrive, and prosper in the face of climate change.

What is Urban Climate Resilience?

Urban climate resilience is a complex and multifaceted concept encompassing the interconnected principles of climate change adaptation and resilience. Adaptation involves adjustments to minimize adverse effects of climate change, while resilience fortifies systems to withstand and recover from climate impacts. According to the Intergovernmental Panel on Climate Change (IPCC AR6)[4], resilience is defined as the "the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation." For UN-Habitat, a resilient city maintains continuity through shocks and stresses, positively adapting and transforming toward sustainability. It absorbs, adapts, and recovers from challenges,[5] continually moving in a sustainable direction.

Strengthening resilience, grounded in a systems-thinking approach recognising the interdependence of social and ecological systems, provides innovative solutions in urban settings. The Habitat III New Urban Agenda[6] strives to enhance global urban resilience to physical, social, and economic challenges, with a focus on climate change. This is highlighted by the UNHA2 resolution on Enhancing the interlinkage between urbanization and climate change stressing the importance of local action for achieving the goals of the Paris Agreement, and the resolution on Biodiverse and Resilient Cities, calling for mainstreaming biodiversity and ecosystem services into urban-territorial planning. This aligns with Target 12 of the Kunming-Montreal Global Biodiversity Framework, , notably by ensuring biodiversity-inclusive urban planning.[7]

Furthermore, resilience building, informed by the Sendai Framework, entails understanding disaster risk dimensions and strengthening governance for collaborative disaster management. This includes investing in risk reduction measures and enhancing preparedness to facilitate effective response and recovery, while integrating disaster risk reduction into development efforts.[8] IPCC reports emphasize the necessity of a 'transformative' resilience approach, implying profound, systemic, and sustainable changes in overall development trajectories. Urban regeneration arises as a key strategic tool in this effort.[9]

What is urban regeneration?

Urban Regeneration (UR) is a comprehensive, area-based and multi-agent collaborative planning process that improves the physical, environmental and socio-economic conditions of an urban area and links the generated benefits to the wider urban fabric of the city. In particular, UR focuses on revitalizing underutilized land or distressed urban areas, aiming to restore their functionality and vibrancy. Urban regeneration strategies often incorporate measures such as adaptive reuse of obsolete infrastructure, brownfield redevelopment, upgrading existing housing stock, enhancing energy efficiency in renovated buildings, and restoring the natural environment. UR builds on earlier approaches such as Urban Revitalization, Urban Renewal, and Urban Redevelopment, which primarily focused on physical transformation, introducing a more integrated and inclusive perspective[10]. Endorsed by UN-Habitat, **UR focuses on enhancing existing assets, including cultural and natural heritage, while ensuring that investments benefit the local community**, in line with paragraphs 38 and 97 of the New Urban Agenda. This comprehensive effort supports equitable infrastructure provision, strengthens local economies, and preserves the environment, thereby creating benefits for the overall city.

In essence, UR is a multidimensional, transdisciplinary and multi-scale process, addressing a wide spectrum of challenges from social deprivation to economic stagnation of urban areas. Notably, UR facilitates "urban co-governance" by involving local governments, city leaders, planners, policymakers, civil society, and investors in the co-design and co-creation of cities. This participatory approach fosters synergies in sustainable urban transitions while mitigating conflicts arising from urban complexity.

By addressing climate change and spatial inequality through comprehensive interventions, UR not only fosters inclusive and sustainable growth but also significantly enhances urban climate resilience. Its holistic approach enables cities to better adapt to and mitigate the impacts of climate change, ultimately improving the quality of life for urban residents.

Common objectives of urban regeneration and urban climate resilience

Urban regeneration and urban climate resilience share a foundational commitment to the creation of sustainable, liveable, and resilient urban environments. The New Urban Agenda[6] underscores this shared vision, calling for "environmentally sound urban and territorial planning, infrastructure and basic services", "the development of disaster risk reduction strategies" and the "transition to a circular economy facilitating ecosystem conservation, regeneration, restoration, and resilience in the face of new and emerging challenges."

This vision translates to applicable solutions through the following actions:

1. Enhancing climate-resilient planning to protect natural and highly hazard-prone areas

i. **Building Resilience through Integrated Urban Planning:** Cities enhance their capacity to withstand environmental challenges by integrating climate-smart strategies into urban design and infrastructure development. Strategies include implementing flood protection measures such as avoiding flood-prone areas, enhancing drainage systems, incorporating green spaces, and retrofitting buildings to withstand extreme weather events. Non-physical solutions, such as raising public awareness and implementing social protection measures, also address vulnerabilities during climate-related events.

ii. **Implementing Rainwater Harvesting:** Cities can adopt rainwater harvesting systems to mitigate the impacts of droughts and ensure water security during dry periods. This includes installing rain barrels, cisterns, or underground tanks to capture and store rainwater for non-potable uses like irrigation, toilet flushing, and laundry which can reduce demand on municipal water supplies during droughts.

iii. **Fostering Green and Blue Infrastructure:** This involves the development of urban parks, urban forests, green corridors, and the preservation of urban rivers and water bodies to promote biodiversity and ecological sustainability. Green-gray solutions play a crucial role, combining traditional infrastructure with natural elements like parks and green roofs to manage stormwater and improve air quality.

2. Integrating climate resilience into urban design and development

i. **Supporting Circular Economic Revitalization:** Regenerative projects attract green investments and businesses, fostering innovation and green jobs, allowing for local economic diversification. Mixed-use development optimizes land use, minimizing the carbon footprint and promoting walkability. Integrating circular economic development, aiming to minimize waste and maximize resource efficiency, offers opportunities for sustainable economic growth while reducing environmental impact.

ii. **Promoting Social Cohesion and Equity:** Ensuring equitable access to essential services and resources for all residents is crucial for building resilient communities. Accounting for procedural and distributive justice concerns, this includes integrating community engagement strategies that prioritize the inclusion of diverse perspectives, particularly those of vulnerable and marginalized populations who are often disproportionately affected by climate change. By actively involving residents in urban resilience planning and decision-making processes, cities can better address their specific needs and concerns, ultimately fostering a more inclusive and equitable city. Enhancing social resilience through urban regeneration can create communities that are not only more cohesive but also possess the capacity and agency to collectively decide on and implement adaptive measures to address changing climate impacts.

iii. **Enhancing Urban Liveability and improving urban health:** Strategies for achieving this goal include the optimization of public spaces to enhance aesthetics and functionality, the promotion of active transportation modes for both environmental and public health benefits, and the fostering of a sense of community belonging through inclusive planning and design. Bioclimatic architecture enhances liveability by creating energy-efficient, climate-responsive spaces that improve comfort and sustainability, incorporating features like natural ventilation, shading, and green infrastructure to support, healthier, more engaging public spaces.

iv. **"Building back better":** This concept emphasizes the importance of not only recovering from challenges but also improving and fortifying urban systems in the process, enhancing resilience to future threats. It prioritizes resilient housing and infrastructure development to enhance the community's ability to absorb, adapt to, and recover from disasters. This approach involves integrating innovative design, construction, and planning techniques that not only mitigate risks but also foster sustainable and resilient urban environments for the long term.

By integrating these shared objectives, cities can develop synergistic strategies to tackle complex urban climate challenges. Green and blue infrastructure, bioclimatic architecture, and active community engagement become key levers of urban regeneration, underscoring the interdependence of social, economic, and environmental pillars in achieving resilient and adaptable urban spaces. This translates to the creation of compact, green, and resource-efficient cities where regenerative natural systems act as buffers and safeguards against climate change and amplify overall urban liveability.

Urban regeneration as a driver for achieving climate resilience

Urban regeneration serves as a catalyst for climate resilience by providing participatory and integrated approach for urban planning and design that allows communities to adapt to the impacts of climate change, while enhancing social and spatial inclusion and supporting local economic development. From promoting green spaces and enhancing energy efficiency to upgrading transportation systems, regeneration strategies contribute to increased climate resilience. The transformative impact lies in the ability of urban regeneration to build resilience inclusively, through participatory processes, and organically, fostering a symbiotic relationship between cities and their environment.

The intrinsic link between climate resilience and social justice demands integrated strategies that address both environmental concerns and inequities in resource access and decision-making. Beyond survival, resilience-building strategies should encompass the transformation of societal structures and policies to promote prosperity and well-being, cultural preservation, and inclusion. UR, when applied holistically, offers a practical tool for achieving this by integrating sustainability, community engagement, long-term planning, and cultural preservation to address social justice and promote resilience effectively.

Engaging communities in regeneration projects empowers residents as active contributors, fostering long-term sustainability and social cohesion—vital for community resilience. This participatory model strives to create accessible and equitable urban spaces, featuring affordable housing, vibrant green and blue areas, and inclusive transportation networks, particularly benefiting marginalized groups. Additionally, fostering diverse economies and attracting green businesses bolsters local financial resilience, enabling communities to invest in adaptation measures and navigate unforeseen challenges.

Urban regeneration, therefore, goes beyond physical transformations and strives to empower communities and promote inclusive prosperity by strategically integrating sustainable practices, equitable participation, and economic diversification.

Examples of urban regeneration strategies with potential to contribute significantly to achieving climate resilience are:

- **Invest in Resilient Infrastructure where it is most needed:** Prioritize flood-resistant infrastructure, including green stormwater management systems, elevated critical infrastructure, and seawalls. Implement smart grids with distributed renewable energy sources for enhanced reliability and disaster resilience. This attracts businesses and fuels economic growth, while also protecting essential services and boosting community well-being.

- **Promote Compact and Mixed-Use Development:** In

non-hazard prone areas, promote high-density, mixed-use development near existing infrastructure and transit hubs to minimize urban sprawl and car dependence. Ensure diverse housing options and green spaces within mixed-use developments to foster social equity and liveability. Incorporate urban design principles promoting walkability, cycling, and public space connectivity, reducing dependence on private vehicles.

- **Integrate Urban Nature:** Implement extensive green infrastructure and biodiversity conservation strategies like parks, green roofs, and urban forests to mitigate the urban heat island effect and improve air quality. Utilize bioretention systems and rain gardens to reduce stormwater runoff and promote water reuse. Encourage community gardens and urban agriculture initiatives for local food production and social cohesion.

- **Upgrade and Retrofitting Buildings:** Implement deep energy retrofits in existing buildings to improve energy efficiency, reduce fossil fuel reliance, and enhance thermal comfort. Integrate renewable energy sources like solar panels and micro-CHP systems into building design and energy infrastructure. Prioritize sustainable construction materials and practices with low embodied carbon footprints.

- **Improve Public Spaces and Active Transportation:** Redesign and activate public spaces to enhance usability, attractiveness, safety, and community belonging. Incorporate seating, greenery, and recreational amenities. Invest in walking, cycling, and public transit infrastructure to encourage active transportation modes and reduce car dependence. Foster community engagement through inclusive planning, events, and cultural activities.

- **Promote Innovation, Knowledge Sharing, and Social Cohesion:** Drive forward-thinking solutions and exchange best practices to create resilient urban communities. Promote equity and social cohesion through initiatives enhancing livelihoods, job skills, climate awareness, and community responsiveness. Facilitate access to sustainable livelihood options, training, and educational opportunities, empowering communities for climate resilience.

- **Mitigate Social Vulnerabilities:** Implement targeted interventions to alleviate social inequalities and vulnerabilities. Develop affordable housing programs to address housing insecurity. Establish job training initiatives to enhance employment opportunities. Provide social support services to assist vulnerable populations.

- **Localize the Renewable Energy Transition:** Invest in distributed renewable energy generation through rooftop solar, wind turbines, and small-scale hydropower on suitable sites. Develop smart grids to integrate renewable energy sources effectively and optimize energy distribution. Implement policies and incentives that encourage adoption of renewable energy technologies by both individual buildings and communities.

- **Promote Resource Optimization:** Embrace circular economy principles, minimizing waste generation through source reduction, reuse, and recycling initiatives. Implement advanced waste management systems like anaerobic digestion and organic waste composting to convert waste into valuable resources like biogas and fertiliser. Develop green procurement policies that prioritize sustainable materials and products with low embodied carbon footprints.

Urban Development Initiative for the Canaan Region (UrDI)

Region: Latin America and the Caribbean
City/Country: Port-au-Prince, Haiti

Focus: Disaster resilience

Following a series of natural disasters, including the 2010 earthquake, which led to widespread displacement, the Urban Development Initiative (UrDI) [11], led by UN-Habitat, aimed to transform Canaan into a resilient urban district. As the settlement expanded rapidly without a coordinated plan, it faced growing challenges related to accessibility, housing, infrastructure, economic development, and overall quality of life **(SDG 11)**.

UrDI sought to prevent Canaan from becoming an informal settlement lacking services. The initiative integrated planned city extensions, densification, and urban regeneration, addressing connectivity, infrastructure, environmental risks **(SDG 13)**, and water management **(SDG 6)**. A comprehensive urban analysis was conducted at regional, metropolitan, and city-wide scales, ensuring alignment with sustainable development principles **(SDG 9)**.

UrDI engaged stakeholders through continuous discussions, integrating community concerns into planning. The result was a strategic vision and a strengthened urban structure, improving access to services **(SDG 1)** and enhancing disaster preparedness through participatory planning **(SDG 17)**. The initiative demonstrates how collaborative urban regeneration can reduce vulnerabilities and foster long-term climate resilience.

Image 2. Focus groups during the first Charrette in Haiti | Source: UN-Habitat

Sustainable Tourism and Green Growth in Heritage Settlements of the Kathmandu Valley (Parya Sampada project)

Region: Asia and Pacific
City/Country: Kathmandu, Nepal

Focus: Heritage and Sustainable Tourism

Following the 2015 Gorkha earthquake, which caused an estimated US$ 3.5 billion in damage to human settlements and US$ 624 million in losses to the local tourism sector, the SWITCH-Asia Parya Sampada project [12,13,14], implemented by UN-Habitat and partners, sought to restore heritage settlements and revitalise the tourism economy **(SDG 11)**. Eighty per cent of damaged houses in over 50 urban centres were traditional, including in Bungamati, one of the Valley's oldest settlements with over 1,500 years of history. Here, 95 per cent of houses were damaged, yet few households could afford reconstruction.

The SWITCH project developed heritage recovery plans and supported safe and green housing reconstruction **(SDG 13)** through technical assistance, traditional construction training (SDG 9), and loan subsidies **(SDG 1)**. To regenerate sustainable tourism, the project promoted policy development, cultural museum enhancement, green public spaces, and entrepreneurship programmes benefiting over 600 locals **(SDG 8)**. Fifty-nine enterprises and peer networks were established, with a focus on women and youth.

Close collaboration with government agencies, NGOs, and community organisations **(SDG 17)** ensured participatory implementation. The initiative successfully integrated physical, environmental, and economic regeneration **(SDG11)**, fostering long-term resilience in Bungamati and Pilachhen.

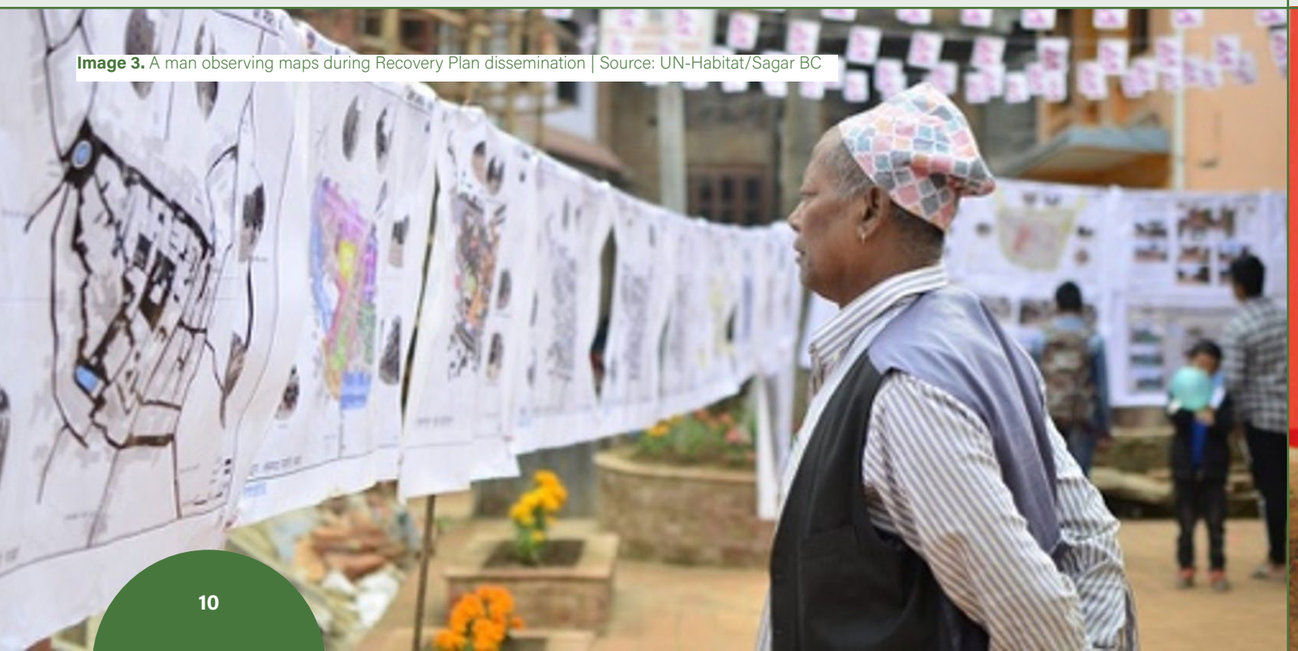

Image 3. A man observing maps during Recovery Plan dissemination | Source: UN-Habitat/Sagar BC

Safer Schools Programme

Region: Sub-Saharan Africa
City/Country: Mozambique

Focus: Education

Mozambique is highly vulnerable to extreme weather events, with frequent cyclones, floods, and natural disasters causing severe damage to infrastructure. The education sector is particularly affected, with approximately 1,000 classrooms destroyed or damaged each year, disrupting access to education (SDG 4) and increasing children's vulnerability.

In response, UN-Habitat and the Government of Mozambique launched the Safer Schools Initiative, aiming to shift the country's disaster risk reduction strategy from reactive response to long-term prevention. The initiative adopted a participatory planning approach, combining capacity-building, technical support, and the development of national standards for resilient school buildings (SDG 9, SDG 11). Over 3,500 classrooms were constructed or rehabilitated using climate-resilient designs, enabling them to withstand severe weather events **(SDG 13)**.

Schools were designed to serve dual purposes—as educational facilities and emergency shelters during disasters, thereby enhancing community safety **(SDG 3)**.

Community engagement and local knowledge were integral to the project, ensuring sustainable outcomes. By reducing recurrent reconstruction costs and safeguarding education access, the initiative supported poverty reduction **(SDG 1)** and fostered resilient communities.

Through partnerships with government agencies, NGOs, and local communities **(SDG 17)**, the Safer Schools Initiative strengthened school safety, ensured educational continuity **(SDG 4)**, and enhanced community resilience **(SDG 1).** This model has inspired similar projects in other sectors, demonstrating how integrated planning and resilient infrastructure can safeguard essential services and promote long-term climate adaptation.

Image 4. Elevated Primary School Maniquenique | Source: UN-Habitat

San Nicolas de los Garza 2030 Vision

Region: Latin America and the Caribbean
City/Country: San Nicolás de los Garza, Mexico

Focus: Long-term urban planning for sustainability

San Nicolas de los Garza[15,16] aimed to transition toward sustainability through an inclusive and participatory urban planning strategy. The SNG2030 City Vision, facilitated by UN-Habitat, engaged over 9,000 stakeholders, including government, private sector, academia, and civil society, in defining a long-term roadmap for sustainable development. The initiative introduced two additional tools—the Portfolio of Strategic Projects and Tactical Urbanism Master Plan—to integrate physical, environmental, and socio-economic regeneration **(SDG 11)**, while also addressing health and well-being concerns by ensuring access to green spaces and pollution reduction **(SDG 3)**.

The urban planning consisted of three phases. The first phase focused on spatial analysis and participatory workshops to identify key urban challenges. The second phase, the city vision phase, defined long-term goals, which were consolidated into the SNG2030 City Vision document. The final phase, the operationalization phase, prioritized projects through participatory activities and involved local stakeholders in implementation **(SDG 17)**.

The SNG2030 City Vision project, inspired by Our City Plans[15], resulted in the development of a Municipal Climate Action Strategy (EMAC) [16,17] as a planning document to reduce the carbon footprint and improve urban resilience of the city, through a Climate Action Plan that includes 15 strategies and 181 actions, shaping the future of San Nicolas de los Garza and refining participatory planning methodologies. The initiative also influenced the creation of tools such as the Strategic Visioning Workshop Guide, exemplifying how participatory analysis and strategic planning can strengthen urban resilience and climate action **(SDG 13)**.

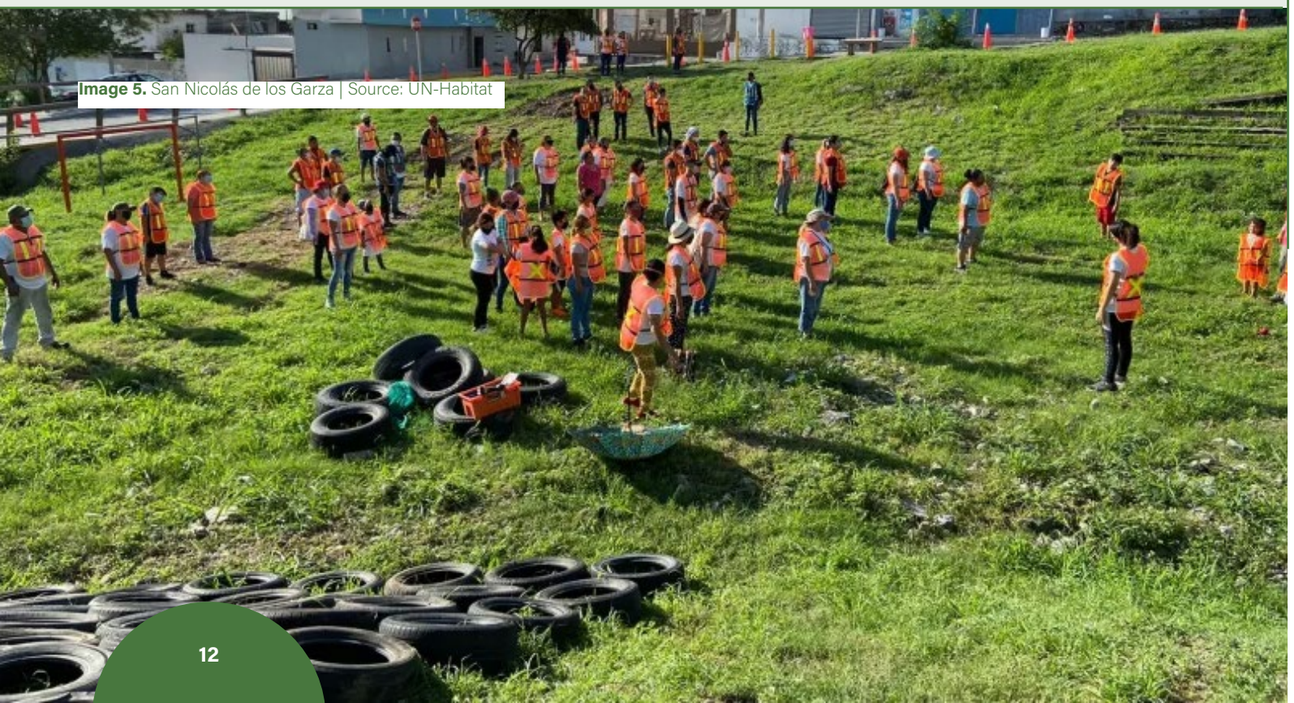

Image 5. San Nicolás de los Garza | Source: UN-Habitat

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